

LIVERPOOL CLIMATE ACTION PLAN

Prepared by Kinesis for Liverpool City Council
December 2021

**LIVERPOOL
CITY
COUNCIL**



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Executive Summary

Context

In 2020, Liverpool Council developed the *Sustainable Resilient Liverpool Strategy*. The report identified potential emission reduction pathways for Liverpool Council Operations and the Community.

The report identified 6 Key Moves for Climate Action:

1. Council as a Leader
2. Liverpool Collaboration Area
3. Zero Carbon & Affordable Growth
4. Climate Resilient Water Supply
5. New Mobility Future
6. Targeted Approach to Waste

This *Climate Action Plan Report* identifies the key actions and priorities that sit behind these key moves and how Council can achieve the emission reduction pathways.

Additionally, this report builds on or responds to the following:

- Changes to the global, NSW state and local policy context settings
- Council resolution towards developing a Climate Action Plan
- Liverpool's specific planning and economic context as well as role in Greater Sydney

These actions are intended to help Liverpool reach Net-Zero by 2050 and the council's corporate assets by 2036.

Prioritising Actions

This action plan

- Reinforces sustainability as a key consideration in the priorities and programs pursued by council teams.
- Seeds future programs for individual council teams. It provides clear direction and helps prioritise actions and next steps including additional studies that may be required for council teams for implementation.

The plan provides a framework for Council to prioritise actions based on:

- Timeframe for implementation
- Sustainability Impact
- High level feasibility

The actions are designed to build and expand on Council's existing pipeline of sustainability programs and initiatives across its own operations and the community.

A Live Climate Action Plan

A suitable monitoring framework will be critical for Council to measure progress and refine the Climate Action Plan as required.

Currently, data relating to resource use and emissions of Council's operational and the Community are siloed across different sources including individual spreadsheets and some data sets are monitored through platforms including Azility and Resilient Sydney.

A single streamlined monitoring framework to track both council and community operations could effectively digitize the framework prescribed in this Climate Action Plan. It can create a single source of truth to measure the impact of programs and policies relating to the climate action plan. Doing so can also drive engagement across different teams within council fostering improved business intelligence and knowledge sharing.

Strategic Context

Helping deliver on Our Home Liverpool 2027

This document, the **Liverpool Climate Action Plan** is an important component of a broader framework to deliver the outcomes of the Our Home Liverpool 2027 Community Strategic Plan.

The Climate Action Plan provides guidance on key implementation mechanisms including but not limited to planning controls to realise the community's expectations.

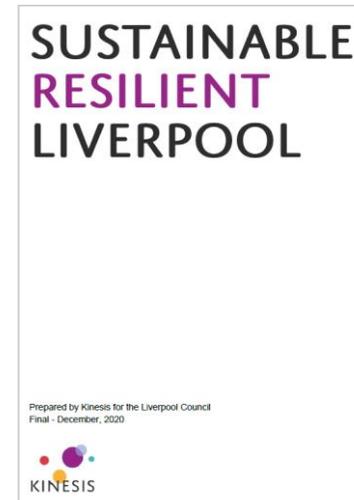
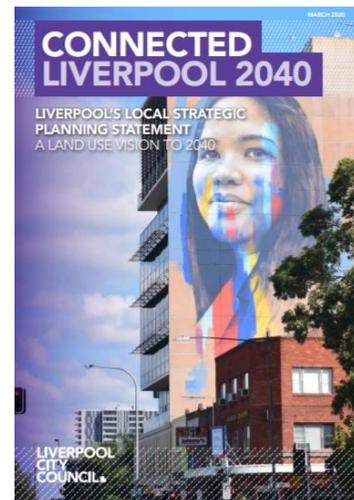
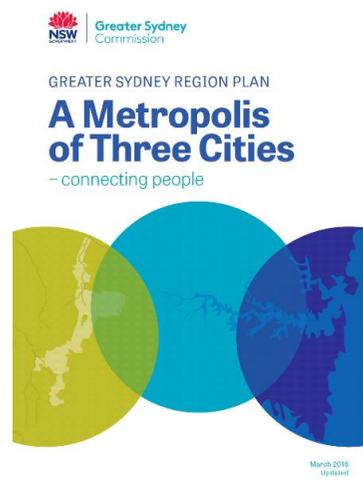
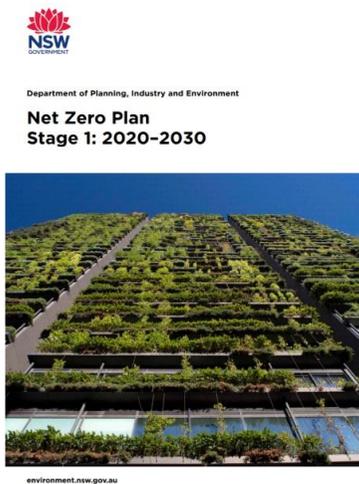


Helping deliver State Climate Action

The Liverpool Climate Action Plan builds on state and regional policy as well as Liverpool’s own net zero pathways work to progress climate action across Liverpool:

- **NSW State level targets and direction:** The NSW State Government has released a Net Zero Emissions Plan with state wide targets to achieve net zero emissions by 2050 and sustainability directions for the state to pursue.
- **Metropolitan planning guidance:** The Greater Sydney Commission (GSC) Region Plan and District Plan provides guidance and considerations for local governments to incorporate in their planning process to achieve net zero emissions across the Sydney Metropolitan Region.

- **Liverpool Local Strategic Planning Statement:** The Liverpool LSPS review in 2019 identified sustainability as key planning concern for council. Specifically managing the future growth and development in a manner consistent with addressing Climate change.
- **Liverpool community & council emission reduction strategy:** The Sustainable Resilient Liverpool Strategy has identified emission reduction pathways for Council and community.
- **The priority actions for implementation:** The Liverpool Climate Action Plan provides clear next steps and actions for realizing the emission reduction pathways in the Liverpool community and council.



Current Liverpool Community

Current resource consumption and emissions patterns in the Liverpool LGA helps identify key areas of opportunity, develop responsive strategies, the impact of which can be monitored and adapted as required. Where available, 2019/20 data has been used. Where unavailable, historic 2016/17 data has been used. This information provides current data context and highlights areas of opportunity across the local government area that have been considered in developing the strategies and actions. As the action plan is implemented, a data monitoring framework will be used to update this information and track progress.

 **2 Million**

Thousand tonnes of CO2-e emissions generated by the Liverpool Community in 2019/20

Electricity consumption makes up 52% of total emissions. Transport is next highest, producing 32% of community emissions. Waste contributes a further 13% of total emissions.

Per dwelling residential emissions of the Liverpool LGA approximatedly equal to the average across the Greater Sydney region.

 **17%**

Of households in Liverpool LGA had solar PV as of July 2020

As a comparison point, only 11% of dwellings across Greater Sydney have installed solar PV. Having said that, Liverpool LGA's solar PV take up was still lower than some comparable local government areas in Sydney's fringe in FY2019/20. Additionally, BASIX data suggests only 5% of new homes were built with solar PV in 2017/18, suggesting that lower penetration may persist in the LGA.

 **60%**

Of household red bin made up of food and garden organics waste in 2016/17

The average household in Liverpool generates 620kg of waste per year, roughly in line with the waste generation of an average household in Greater Sydney. Reducing waste to landfill especially by diverting and treating organics waste will make a significant contribution to reducing emissions.

 **<10%**

Canopy cover in Liverpool centres in 2016/17

Some Liverpool suburbs have even lower canopy cover, <5% in some areas. There is a causal relationship between higher urban tree canopy cover with lower land surface temperatures. Liverpool's centres currently have canopy cover rates falling well below the LGA average of 11% and the Government Architects' recommended 15-25% canopy coverage for high to medium density areas. Greening is a Premier's Priority and cooling Liverpool is a key objective of the Western City Deal.

 **15%**

Higher electricity use than the average household in Greater Sydney in 2019/20

The average household in the Liverpool LGA consumes over 6,000 kWh per annum. Larger single dwellings in outer suburbs generally consume more energy. Electricity consumption is evenly split across the residential and non-residential sectors.

 **15GL**

Of water is used by the Liverpool community in 2019/20

62% of mains water (from Sydney Water network) is consumed in the residential sector and nearly half of all the water used in a household is for non-potable uses such as irrigation, toilets and laundry. Industrial water uses account for a 17% of demand. Demand per dwelling is comparable to the Greater Sydney average

 **2x**

the car use of average household in Greater Sydney in 2019/20

55% of households own two or more cars. This exceeds the Greater Sydney Average of 45%. Residents travel over 20,000km per year on average by private vehicle, with 70% using private vehicles as the primary mode of transport to work.

 **38%**

Of employment within Liverpool is accounted for by local workers.

A further 33% commute to the neighbouring LGAs – Campbelltown, Fairfield, Camden and Canterbury Bankstown. Geography and access to public transport contribute to Liverpool's car reliance. Over 70% of the short to medium trips to work are made using a car. Switching to more sustainable transport options can make a significant difference in emissions and deliver household cost savings.

Current Liverpool Council

Current resource use and emissions of Council's operations helps identify key areas of opportunity, develop responsive strategies, the impact of which can be monitored and adapted as required. 2016/17 data has been used for this analysis.

It should be noted that since 2016/17, Council has advanced its streetlighting and solar PV program. As such, as this Climate Action Plan is implemented, a data monitoring framework will be essential to update this information and track progress.



 **29,000**

Tonnes of CO2-e emissions generated by Liverpool Council Operations in FY17

Streetlighting accounts for 53% of Liverpool's corporate emissions excluding council operated waste facilities. The council fleet accounts for a further 8% of corporate emissions. Other significant emitters are the Whitlam Leisure Centre and the Moore Street administration building.

 **35%**

Of council energy is supplied by power purchase agreements

Liverpool City Council currently purchases 35% of its power from renewable sources using power purchase agreements. Expanding this program can be considered in addition to the solar capital works program to deliver emissions reduction.

 **143 kW**

Of solar PV capacity installed on Council's assets

Council has been installing solar PV panels on its assets with 143kW installed with a further \$250,000 of capital works planned for an expansion of the solar program

 **53**

Passenger and light commercial vehicles by 2030

Liverpool City Council is aiming to expand its fleet of passenger and light commercial vehicles from 12 to 53 by 2030. After streetlighting, fleet is the largest source (8%) of Council's total emissions. Transitioning to electric vehicles presents a significant opportunity for Council's emissions reduction.

Six key moves

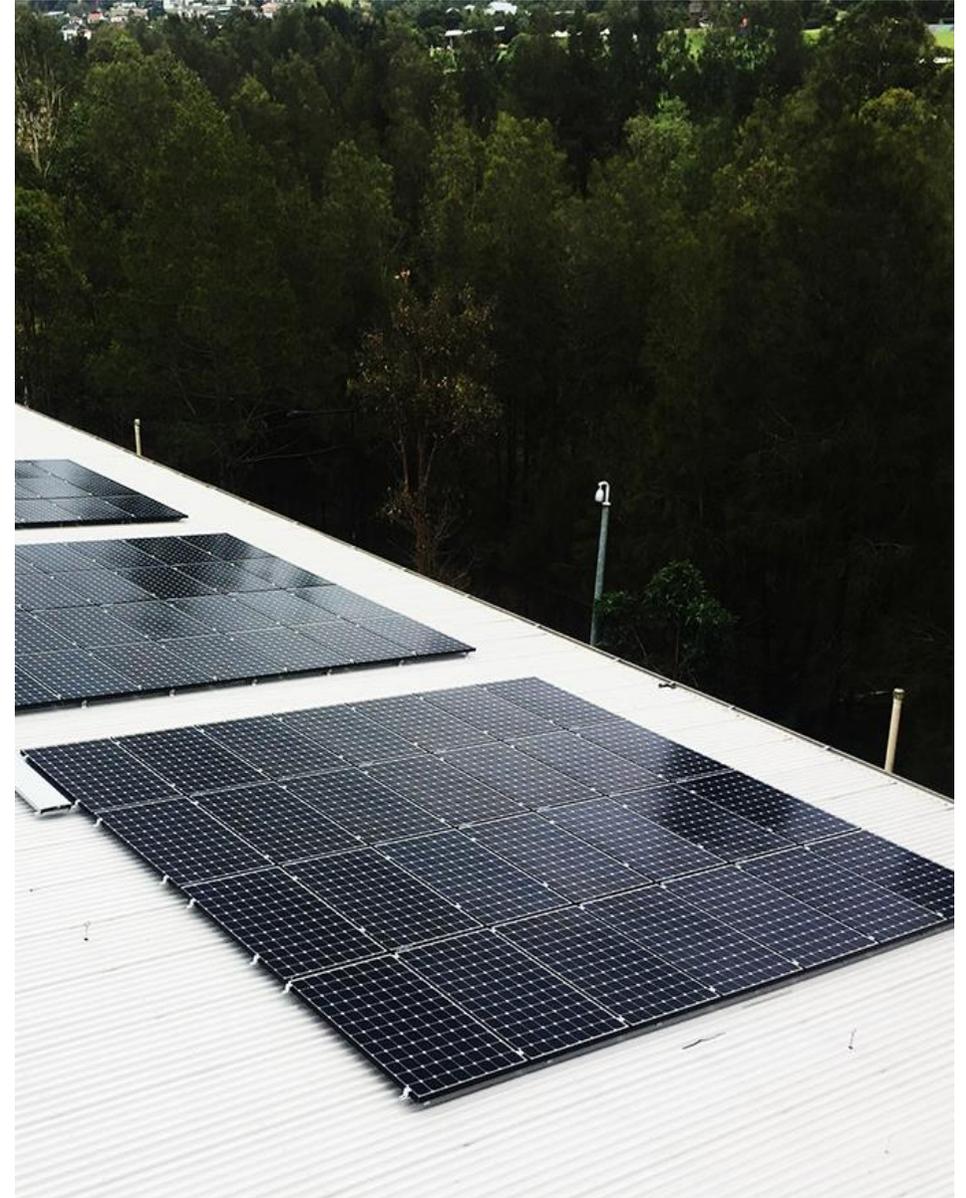
Liverpool Council is aiming for Community wide emissions to reach Net Zero by 2050, in line with the State Government Targets. Our Modelling shows with offsets, Council's corporate assets can reach Net-Zero by 2036. Sustainable Resilient Liverpool strategy identified 6 key moves for Liverpool Council to lead on in order to reach emissions targets and deliver local climate action:

1. **Council as a Leader** continuing to deliver efficiency, renewable energy and water reuse opportunities across all assets to demonstrate leadership and save money.
2. **Sydney's First High Performance, Low Carbon Precinct** delivered in the Liverpool Collaboration Area.
3. **Zero Carbon & Affordable Growth** - ensure all new buildings across the local government area deliver low carbon, low water, climate resilient, affordable outcomes.
4. **Climate Resilient Water Supply** to address urban heat and greening across all growth and renewal areas of the LGA
5. **New Mobility Future** that responds to changing transport patterns, the needs of residents, technological innovation in the transport sector and the investment in 15th avenue corridor and Western Sydney Aerotropolis.
6. **Targeted Approach to Waste** diverting organics waste through new services, infrastructure and embed circular economy principles for a new approach to waste.

The 6 key moves were developed based on emission reduction pathways for both Council operations and the broader community. These pathways are outlined on the following pages.

This **Climate Action Plan** outlines specific actions that can be led by Council within each of these key moves. While these actions can be led by Council, implementing many of these actions will require collaboration and coordination across Council, residents, business and state government.

The development of this action plan included collaboration and consultation with key Council staff in order to shape the actions to take forward.

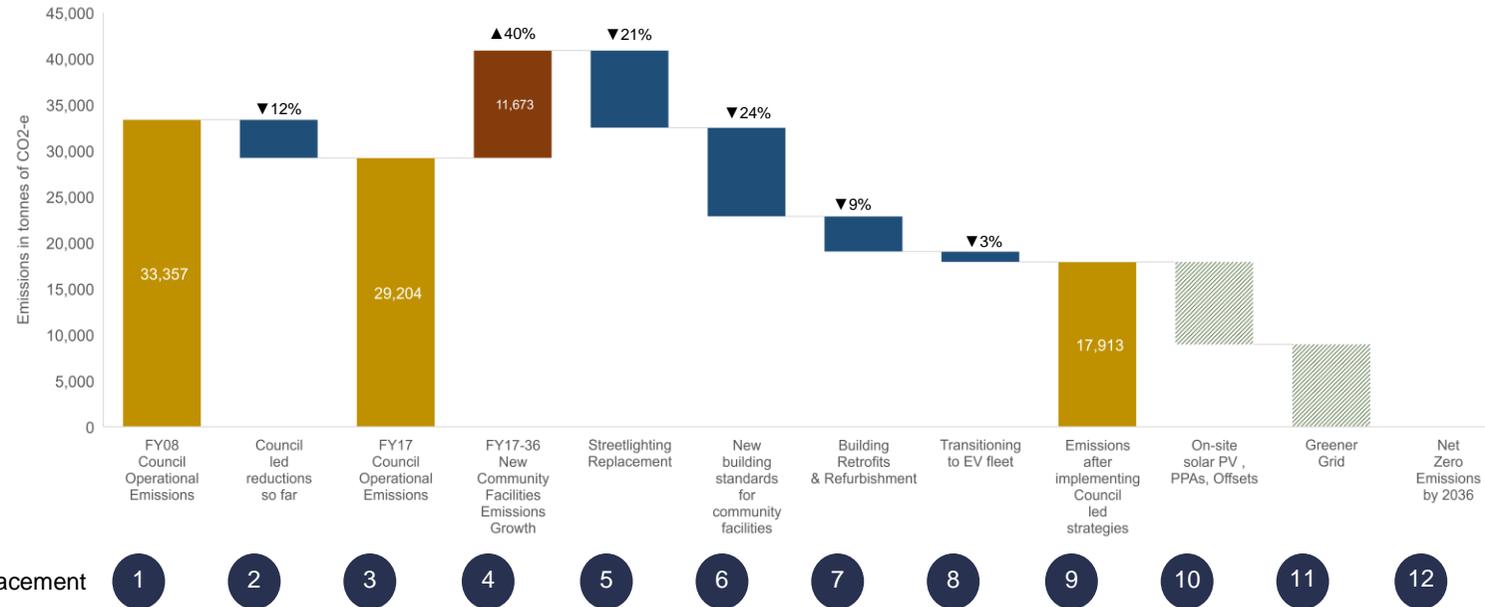


COUNCIL OPERATIONS EMISSION REDUCTION PATHWAY

Council's pathway to net zero emissions is outlined in the diagram to the right. This pathway captures Council's current sustainability leadership, future programs and external factors such as the decarbonisation of the electricity grid.

Each column of Council's net zero pathway is numbered and explained below.

1. Council's historical FY08 operational emissions is 33,357 tonnes of CO₂e.
2. Council has already displayed sustainability leadership and reduced emissions by 12% between FY08 and FY17. This emission reduction was achieved through a combination of energy efficiency programs including streetlighting and building refurbishments
3. Council's FY17 emissions baseline established as part of the Sustainable Resilient Liverpool Strategy is 29,204 tonnes of CO₂e
4. Additional community facilities to cater to projected population growth to 2036 in Liverpool have been estimated. If these facilities have current average emissions performance, it can increase FY17 emissions by 40%

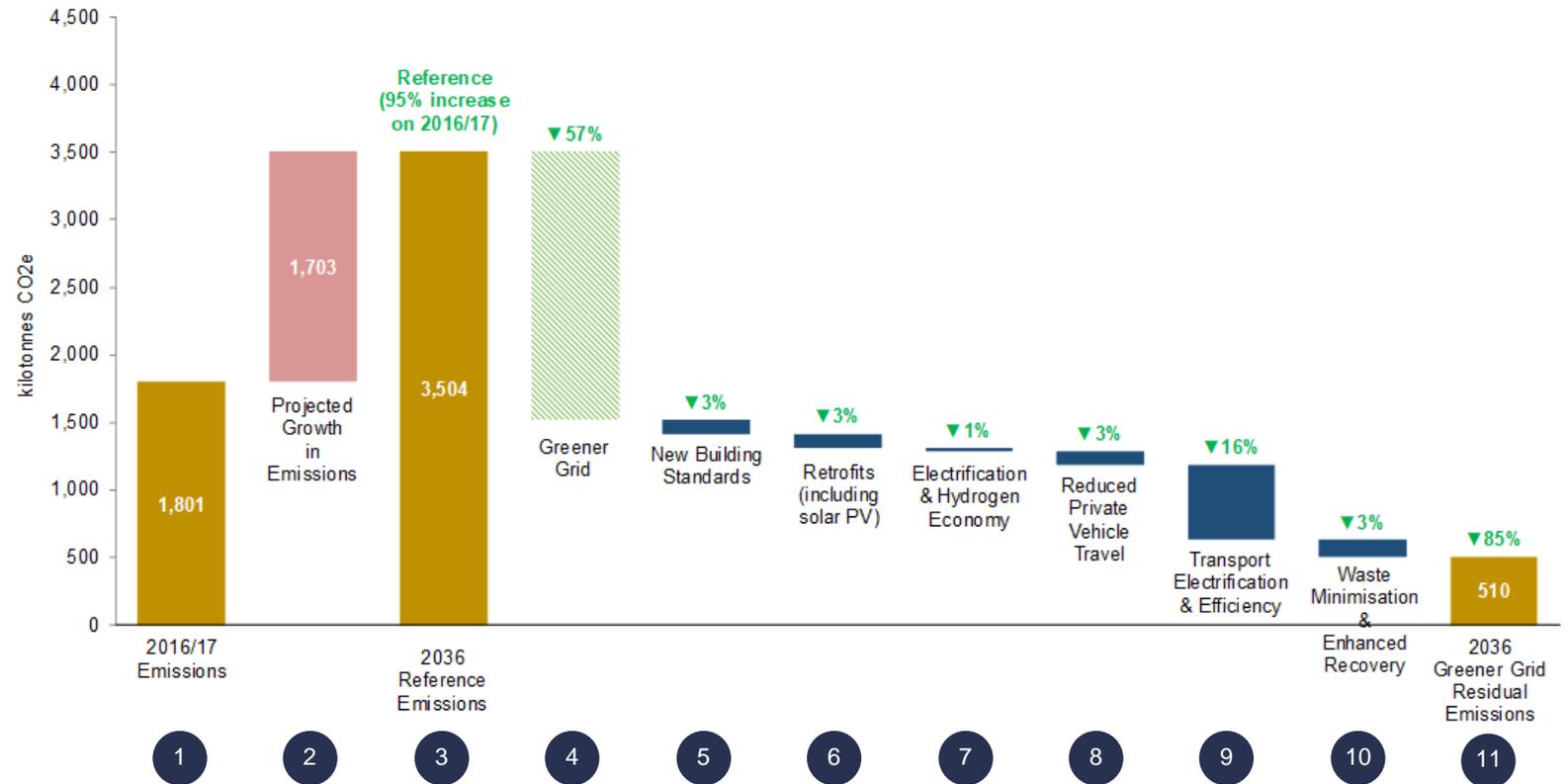


5. Council is nearing completion of its streetlighting replacement program and this is expected to deliver a 21% emission reduction on the forecast 2036 business as usual emissions.
6. If projected new community facilities are built to suggested best practice emissions performance standards, it can deliver a 24% reduction on emissions. These best practice performance standards are outlined in the
7. *Asset Performance* Standards section later in this report.
8. Building on the strategic refurbishment of the Moore St offices, Council can find additional building efficiencies including switching from gas to electricity in its assets and reduce its emissions by 9%.
9. Council is also looking to leverage the expected decarbonisation of the electricity grid by switching from petrol to electric vehicles (EV). Transitioning to EVs will deliver a 3% emission reduction.
10. Council led strategies are expected to deliver a 57% emissions reduction relative to the forecast 2036 emissions if no strategies were implemented.
11. Council is assessing additional sites for solar PV as well as exploring potential power purchase agreements that ensure its operations run-on clean energy.
12. The expected decarbonisation of the electricity grid from the closure of coal power stations and their substitution with renewables will also reduce Council's electricity emissions.
13. The combination of these strategies is expected to deliver net zero emissions across Council operations.

COMMUNITY EMISSION REDUCTION PATHWAY

The Liverpool community's pathway to net zero emissions is outlined below. This pathway outlines strategies that can be led by Council (such as planning controls), others that require collaboration with the community (such as retrofits and EV take-up) as well as external factors such as the decarbonisation of the electricity grid (or greener grid). Each column of the community's net zero pathway is numbered and explained below.

1. In FY17 community emissions were 1,801 KT of CO₂e.
2. Forecast growth in population and dwellings would result in a 1,703 KT CO₂e increase in emissions if no reduction strategies were implemented.
3. Council's FY36 emissions reference established as part of the modelling process is 3,504 tonnes of CO₂e. Reductions will be compared to this figure.
4. The expected decarbonisation of the electricity grid from the closure of coal power stations and their substitution with renewables will reduce the communities' emissions by 57% from the reference.
5. Implementing higher building standards to improve energy efficiency will reduce baseline emissions by 3%.
6. Retrofitting existing buildings with energy efficient measures will result in a further 3% reduction.
7. Reduced private vehicle use reduces emissions by 3%.
8. Electrification of gas fixtures and the addition of hydrogen to the gas mix will result in a 1% decrease from the reference.
9. The expected uptake of EV's alongside the decarbonised grid results in a 16% reduction compared to the reference scenario.
10. Waste minimisation and recovery strategies offer a 3% reduction in emissions from the reference scenario
11. The combination of these strategies is expected to deliver an 85% reduction in emissions based on the reference scenario by 2036.



An Action Plan to get there

This section informs the development of strategies that drive emission reduction and resource efficiency in order to move Council and the community towards net zero emissions.

While this is not an implementation plan, the following table outlines key actions and next steps to support the delivery of the 6 key strategies using practical approaches to reduce emissions and water use and appropriate tools and policies available for Council to take forward. The implementation scope and timeline of these actions are dependent on financial considerations including their business case, resourcing and budgets available.

A monitoring system can help Council track the impact of various actions and refine the strategy as necessary.

These actions will require collaboration and coordination across Council, partners in the Western Sydney Regional Organisation of Councils (WSROC), residents, business and state government agencies. The actions below are structured so Council can take on one of 4 roles in the implementation process:

1. **Owner/ Operator** – Council manages, leads, delivers and communicates commitment, progress and outcomes towards climate action.
2. **Regulator** – Council develops an informed position and influences others who have the responsibility to make the decision and act through regulation including planning controls.
3. **Collaborative Infrastructure delivery** – Council is an informed critical partner in the delivery of infrastructure projects in Liverpool with mutual benefits for partners such as utilities, developers and state agencies.
4. **Service Provider** - Council provides services and builds the capacity within the community to take climate action.

Strategies outlined in this Action Plan have been prioritised based on

The implementation timeframe:

Indicative timeframes have been determined for the actions based on industry reports and Kinesis experience. These are subject to resourcing considerations and council organisational intelligence.

- Short (0-2 years)
- Medium (2-5 years)
- Long (5-10 years)

The sustainability impact

Kinesis has modelled the sustainability impact of each action. These have been categorised as low to high. High impact actions will enhance sustainability objectives the most, including lowering emissions and increasing water efficiency.

- Low impact
- Medium impact
- High impact

Indicative economic and social cost vs benefits

Industry reports including marginal abatement cost curves and Kinesis experience with infrastructure providers have been used to determine the relative cost/ benefit of each action. A qualitative assessment of each action's feasibility within the timeframe for each action is outlined below:

- Low feasibility – generally more difficult to deliver and low benefits
- Medium feasibility – moderately difficult to deliver and moderate benefits
- High feasibility – deliverable and desirable (high benefits)

In general, low feasibility actions were not included in the action plan.

Council Operations Action Plan

Action	Action Status	Council Role	Detail	Feasibility Commentary	Time frame	Stakeholder Considerations	Next Steps	Council lead agency (To be confirmed)
Solar PV on council assets Key Move 1	Underway	Owner/ Operator	Council has already installed 143 kW of solar PV on various assets.	High feasibility Year on year solar PV capital costs have been decreasing and on-site solar reduces electricity bills.	Short	<ul style="list-style-type: none"> Council assets team 	<ul style="list-style-type: none"> Explore additional solar PV – \$250k of future capital works are planned for this. Conduct feasibility study to identify additional council owned sites for solar PV installation. 	<ul style="list-style-type: none"> City Presentation Economy & Commercial Development I&E
Streetlighting replacement Key Move 1	Underway	Collaborative Infrastructure Delivery	Council has partnered with Endeavour Energy and WSROC through the Light Years Ahead program.	High feasibility LED costs have decreased over time. Collaborative funding from WSROC & Endeavour. Results in electricity cost savings.	Short	<ul style="list-style-type: none"> Endeavour Energy WSROC 	<ul style="list-style-type: none"> Complete streetlighting replacement program. 	<ul style="list-style-type: none"> Planning & Compliance Corporate Services
Power Purchase Agreement Key Move 1	Procurement review ongoing	Collaborative Infrastructure Delivery	Council has partnered with SSROC in a power purchase agreement that powers 35% of Council's electricity use with renewable energy.	Medium feasibility Cost-benefit analysis to be compared against on-site solar. There is a sustainability benefit for energy usage in sites that cannot install rooftop solar PV.	Short	<ul style="list-style-type: none"> SSROC WSROC Private sector industries 	<ul style="list-style-type: none"> Complete current procurement review of PPA. Conduct cost benefit analysis against on-site solar PV. 	<ul style="list-style-type: none"> Corporate Services

Action	Action Status	Council Role	Detail	Feasibility Commentary	Time frame	Stakeholder Considerations	Next Steps	Council lead agency (To be confirmed)
Efficient council assets Key Move 1	Underway	Owner/ Operator	Continue existing programmes to upgrade council assets with efficient fixtures and fittings. Ensure new builds align with high level best practice performance standard provided in the Appendix.	High feasibility LED costs have decreased over time. This will result in electricity cost savings.	Medium	<ul style="list-style-type: none"> Council assets team 	<ul style="list-style-type: none"> Develop new building standards (NABERS targets) for council assets. Some high level performance standards are provided in the appendix.) Continue refurbishment program. 	<ul style="list-style-type: none"> City Presentation Economy & Commercial Development I&E
Transition to all electric fleet Key Move 1 Key Move 5	Requires feasibility assessment	Owner/ Operator Collaborative Infrastructure Delivery	Transition the council fleet to electric vehicles. Provide EV charging infrastructure shared with community.	High feasibility EV costs are expected to rapidly decline over the coming years. EV's already offer substantial running cost advantages compared to traditional vehicles and will soon be cheaper.	Long	<ul style="list-style-type: none"> TfNSW NSW DPIE WSROC 	<ul style="list-style-type: none"> Develop EV strategy Begin transition of council fleet from petrol vehicles to EVs Collaborate with TfNSW to locate public EV charging infrastructure in commuter car parks & council car parks. 	<ul style="list-style-type: none"> City Presentation Corporate Services City Presentation Planning & Compliance

Action	Action Status	Council Role	Detail	Feasibility Commentary	Time frame	Stakeholder Considerations	Next Steps	Council lead agency (To be confirmed)
Recycled water for greening Key Move 4	Requires feasibility assessment	Collaborative Infrastructure Delivery	Drought proof council parks and open space with recycled water	Medium feasibility Cost benefit analysis to compare using potable water.	Medium	<ul style="list-style-type: none"> Sydney Water 	<ul style="list-style-type: none"> Begin feasibility assessment for recycled water to be used in parks. Collaborate with Sydney Water to connect Council assets to Hoxton Park recycled water network 	<ul style="list-style-type: none"> Planning & Compliance Community & Culture City Presentation

Council Actions Cost benefit and Prioritisation

	Prioritisation	Payback period (years)	Timeframe (years)	Sustainability impact (% reduction in emissions or water use based on modelling)
Streetlighting replacement	1	5-6 years	< 2 years	21%
Solar PV on council assets	2	6-7 years	< 2 years	10%
Power Purchase Agreement	3	N/A	< 2 years	10%
Efficient council assets	4	5-6 years	2- 5 years	33%
Recycled water for greening	5	5-6 years	10 years	34%
Transition to all electric fleet	6	>40 years*	10 years	3%

* Note that EV capital costs are changing rapidly and expected to reach parity with petrol vehicles within the decade. This will improve the payback significantly. The transition to electric vehicles can be considered as a longer term strategy. The current emission reduction from electric vehicles only relates to transition of light vehicles within Council's fleet. Emission reduction from transition of heavy vehicles has not been considered.

Source for payback periods:

- Streetlighting replacement: Council data, Kinesis past projects with other councils including Parramatta, Lane Cove, Hawkesbury, [100 percent renewables – Should Councils upgrade to LED streetlighting now?](#)
- Solar PV on council assets: [Jacobs, 2020 Mid-scale PV projections](#)
- Efficient council assets: [City of Canterbury Energy Efficiency Upgrade](#)
- Recycled water for greening: Altogether (previously known as Flow systems)
- Transition to all electric fleet: [NSW Electric Vehicle Strategy](#), [Bloomberg New Energy Finance - Electric Vehicle Outlook 2021](#)

Community Action Plan

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
High Performance Buildings Standards for new development Key Move 1 Key Move 2	Regulator	Develop BASIX targets and minimum NABERS targets that simulate best practice sustainability for all new development at Liverpool	<p>Medium feasibility</p> <ul style="list-style-type: none"> • Marginal cost of delivering interventions for higher BASIX can is <1% of median house and unit price. • Typical utility cost savings from delivering efficient new buildings are between \$500-\$1000 per household per year. 	Short	<ul style="list-style-type: none"> • NSW DPIE • WSROC • Major developers 	<ul style="list-style-type: none"> • Collaborate with DPIE and WSROC to explore potential uplift to new building standards for the Liverpool LGA. • These targets should consider the variability of building typologies and design across the LGA. Kinesis recommends further testing of the BASIX tool should be undertaken to verify such targets in the context to specific building design. • Prepare development controls which establish requirements for non-residential buildings through NCC pathways • Develop planning controls which mandate dual plumbing for recycled water connectivity in all new buildings. • Collaborate with State Government for SEPP changes that supportts high performance buildings. • Collaborate with State Government and GSC to define the characteristics of high performance precincts. 	Planning Team, liaison with DPIE

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
EV provision in all new buildings Key Move 5	Regulator	<ul style="list-style-type: none"> Future proof all new development in Liverpool to plan for community uptake of electric vehicles. 	<p>High feasibility</p> <ul style="list-style-type: none"> Estimated at approximately \$750 per space. Average Liverpool's household can save approximately \$1,100 per annum in fuel costs. 	Short	<ul style="list-style-type: none"> TfNSW regarding NSW Electric Vehicle Strategy WSROC Endeavour Energy 	<ul style="list-style-type: none"> Amend LEP/DCP to mandate EV charging outlets and infrastructure in all new development. An example clause for provision of EV charging in new buildings is outlined in the Waverley Development Control Plan. Engage with WSROC and Endeavour to discuss the expected growth in Electric Vehicles and provision of necessary electricity infrastructure requirements. 	Planning Team Transport Team

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
Develop urban heat resilience/ greening standards for implementation across the LGA Key Move 3 Key Move 4	Regulator	Increase resilience to urban heat by incorporating greening and cooling design in planning controls	<p>High feasibility and critical</p> <ul style="list-style-type: none"> The Western City Deal and specifically the Resilience to Climate Change Grant provides the relevant funding opportunity. Residents of Liverpool face increasing utility costs from air conditioning to tackle summer heat conditions. 	Short	<ul style="list-style-type: none"> WSROC Urban Heat Toolkit Western City Deal 	<ul style="list-style-type: none"> Amend LEP/ DCP to incorporate development controls or incentives to encourage vegetation, green roofs, green walls and materials with a high solar reflectance away from public domain in particular on western and northern building facades. These would be developed as part of the WSROC urban heat toolkit. Planning requirements for access to public open space. Public domain plan to accommodate minimum appropriate canopy cover targets across different parts of the LGA. Funding for staff who possess the required expertise in sustainability and vegetation e.g. Arborists. Develop Council operated nursery to that specialises in the collection of seed (and transplantable juvenile trees) from areas where trees are permitted to be cleared and re-introduces these species as new street trees in the road reserve and as new trees in nearby open space. 	<p>Planning Team Western City Deal Team Urban Design Team</p>

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
Prepare energy infrastructure to achieve Net Zero Emissions Key Move 1 Key Move 3	Collaborative Infrastructure delivery	<ul style="list-style-type: none"> Ensure the electricity network can handle expected growth and future trends in solar PV uptake 	High feasibility <ul style="list-style-type: none"> The short term outlook for electricity prices continues to be high (Jacobs for AEMO, Retail electricity price history and projected trends) Solar PV and battery prices continue to decrease (Bloomberg New Energy Outlook 2020) The payback period for installing solar PV in a typical dwelling is 5-8 years. (Kinesis analysis) 	Medium	<ul style="list-style-type: none"> Endeavour Energy Large industrial asset owners 	<ul style="list-style-type: none"> Meet with Endeavour Energy to discuss expected growth in solar PV and network opportunities including energy storage. Meet with large industrial asset owners including data centres operators to encourage solar PV installation. Establish performance targets for new development to facilitate solar PV Identify key existing sites and stakeholders for grid scale solar PV. 	Sustainability Team Planning Team
Drought resilient water infrastructure Key Move 3 Key Move 4	Collaborative Infrastructure delivery	<p>Increase the drought resilience of the LGA by expanding recycled water infrastructure.</p> <p>Connect the majority of public open space areas and additional greening proposed to recycled water networks</p>	Moderate feasibility <ul style="list-style-type: none"> Approximately \$1000 per dwelling to connect to the recycled water network. Sydney Water has plans for the Hoxton Park Recycled Water Network and may be able to create a business case for additional recycled water networks in Liverpool given the growth projections. 	Medium	<ul style="list-style-type: none"> Sydney Water Private water utilities Council parks team 	<ul style="list-style-type: none"> Engage with Sydney Water and private sector providers to determine feasibility and intentions for recycled water in major project areas across the LGA starting with the Collaboration Area. Engage with DPIE regarding the growth area SEPP to facilitate recycled water across new greenfield areas. Council parks team to assess the current water usage, costs and aim to connect the majority of public open space areas to recycled water networks offered by Sydney Water. Consider a LGA wide catchment/flood study that looks at removing formal channelised drainage infrastructure and reintroducing unpaved watercourses. 	Liaison with Sydney Water Parks and Reserves Team Sustainability Team Planning team Flood plain team

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
<p>Create accessibility based parking controls</p> <p>Key Move 1 Key Move 5</p>	Regulator	<p>Current parking rates do not respond to varying levels of car ownership in the LGA.</p> <p>Create accessibility-based parking rates for different parts of the LGA based on current and future public transport access and car ownership patterns.</p>	<p>High feasibility</p> <ul style="list-style-type: none"> High density residential development is expected in Liverpool's centres. Parking is a significant construction cost. \$50,000 to \$100,000 per parking space in some cases. Parking rates that respond to car ownership patterns can reduce parking construction and associated costs. In the future, excess parking will become a wasted asset. 	Medium	<ul style="list-style-type: none"> Major developers TfNSW 	<ul style="list-style-type: none"> Develop accessibility based parking rates for different parts of the Liverpool LGA. There are existing tools including the Kinesis Parking Platform to enable this. Parking rates should respond to public transport availability and resident concerns. Develop a car share strategy. This can be informed through monitoring of existing car share infrastructure in the Liverpool CBD. Meet with major developers and TfNSW to develop the concept of maximum parking rates for different parts of the LGA. Develop parking infrastructure designs that enables parking structures to be repurposed into the future. Incorporate the refined rates and parking structure design into LEP/DCP. 	<p>Planning Team Transport Team</p>

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
Circular economy approach to waste Key Move 6	Service Provider	Expand Council's waste services to facilitate a circular economy approach with focus on removing organics from landfill. Council should also work with developers to reduce construction and demolition waste.	<p>Moderate feasibility</p> <ul style="list-style-type: none"> Current Council waste audits show that nearly 50% of an average landfill bin is composed of organics waste. Council is already operating FOGO, this program should continue to expand Circular Economy is a part of the Council's Ten year waste strategy and will continued to see ongoing development. 	Medium	<ul style="list-style-type: none"> Waste Service Providers Agribusiness Local Business 	<ul style="list-style-type: none"> Expand the implementation of FOGO waste service for residential properties across the local government area after the program starts in 2024. While assessing potential service providers for FOGO waste processing, Council may also consider modular organics waste processing technology that converts food and garden organics waste into feedstock for agriculture. Partner with agribusiness industries in Western Sydney to accept organics waste processing outputs. Seek dialogue with developers regarding the feasibility of improved construction practices to reduce waste e.g. reduced usage of steel frames and 	Council Waste Team Council Liaison with Agribusiness industry Business Development team

Monitoring Performance

A Live Climate Action Plan

Council can ensure this Climate Action Plan remains live and relevant through an appropriate data monitoring framework.

Community monitoring

Council currently uses the Resilient Sydney monitoring platform to track and monitoring its community wide resources, emissions and renewable energy. This provides Council with data intelligence to monitor trends in LGA wide resource use and emissions, and track and report towards its net zero emissions goals.

It is recommended that Council continue to leverage the existing Resilient Sydney Platform to monitor the impact of its actions on the community resource use and emissions. Additional programs and policies can be added to this platform to track specific local actions, programs and policies at the community level.

Council monitoring

In addition to community monitoring, it will be critical for Council to be accountable to the targets it has set for its council assets and operations. This will help Council realise cost savings and provide community leadership. Council-led strategies will have significant impact in the near term delivering significant emissions reductions between 2020 and 2036. The Azility platform is not widely used across council teams and many council teams rely on disparate spreadsheets. As such, critical data is siloed across different areas of the organisation and there is no single source of truth.

A combined monitoring framework to track the impact of actions across Council operations as well as the community would effectively digitise the framework prescribed in this Climate Action Plan, provide a single source of truth for data and drive engagement across council teams. It would reduce the required effort to accurately measure and report on changes in emissions and social trends. This will better enable council to both assess the effectiveness of action and identify changes in community needs.

LIVERPOOL'S COMMUNITY EMISSIONS DASHBOARD (RESILIENT SYDNEY PLATFORM)



Monitoring performance.

While the sustainability and infrastructure strategies outlined in this report are designed with resilience and adaptation in mind, the expected outcomes will vary with changes in yield, mix of use and market responses.

As a result, it will be important for Council to identify performance metrics, relevant targets and monitor both the private sector developer's response to these requirements, as well as the performance of these strategies on the ground.

In addition, while this report focuses on energy and water performance outcomes, broader social and economic benefits need to be tracked in order to understand the broader benefits of environmental performance outcomes, including car ownership, travel patterns and pedestrian activity.

Based on the outcomes outlined in this report, the following key metrics have been identified for tracking and monitoring by Council (see Table right). These metrics provide the key indicators for whether or not the recommendations in this report are being delivered and the expected outcomes are being achieved.

To enable Council to respond to this data and adapt through the planning and implementation phases of the strategy, we recommend the establishment of a monitoring platform to help Council capture this data and track the impact of its actions. This platform should provide:

- The ability to capture the draft metrics from public and Council datasets
- Benchmarked metrics allow to show how decisions will impact individual centres, precincts and the broader LGA.
- The ability to run scenarios to review and adjust solutions for changes in land use forecasts, infrastructure and market responses, i.e. the ability to review planning controls, update infrastructure management of the landfill site, update engagement strategy with the community, etc. against the recommendations and metrics outlined in this report.

Metric	Units	Potential Source	Sector	Link to Strategy
Core Environmental Metrics				
BASIX	• BASIX Score	DPIE BASIX Data	Council and Community	Increase BASIX Targets & Recycled Water
NABERS	• NABERS Score		Council and Community	
Solar PV	<ul style="list-style-type: none"> • Solar capacity (kW/dwelling and total kW installed) • Solar capacity (kW/council asset and total kW installed) • New build solar installation (% of new dwellings and new council assets) • Total solar installations (% of all dwellings and council assets) 	DPIE BASIX Data and APVI	Council and Community	Increase BASIX Targets and renewables penetration
Water use	<ul style="list-style-type: none"> • Total water use • Recycled water use • % of buildings (council assets/ community buildings) connected to recycled water 	Sydney Water and private water utilities	Council and Community	Increase BASIX Targets & Recycled Water.
Parking Rate	• Spaces/dwelling	DA / BASIX Data	Community	Parking
Charging access	• Charging sites/park	Council data	Council and Community	EV
Landscaped Area	• % of site area	DA / BASIX Data	Community	Public Domain
Green roof area	• % of site area	DA	Community	Public Domain
Canopy Cover	• % of site area (at mature tree)	DA	Community	Public Domain
Broader Social & Economic Metrics (To be determined)				
Car ownership	• Vehicles/household	ABS Census	Community	
Containment	• % people who travel to work locally or from home.	Journey to Work (ABS Census)	Community	
Active transport	• Number of trips by walking and cycling	Council trackers ABS Census	Community	
Urban Heat Index	• UHI	DPIE	Community	

Asset Performance Standards

Kinesis has analysed emissions and water consumption data from existing assets to establish performance standards for future builds. These have been taken from the best performing 15% of assets. Where limited assets of a class exist, the best performing asset was used as a benchmark.

Asset Class	Emissions intensity (Tonnes of CO ₂ e per m ²)	Best practice electricity intensity (kWh per m ²)
Animal Shelters	0.005	5.2
Car Parks, Parking Lots and Decks	0.01	12.2
Childcare Centres	0.04	41.7
Civic/Municipal Centres, Administration Buildings, Offices	0.07	72.9
Community Buildings/Halls	0.015	15.6
Depots (Rose Street Depot)	0.5	528
Fire Stations	0.02	23
Libraries	0.08	85.0
Museums, Galleries	0.06	67.0
Recreation/Leisure Centres	0.12	130.0
Aquatic Centres	0.22	181.0

Glossary of terms

Term	Meaning
GSC	Greater Sydney Commission
LGA	Local Government Area
LSPS	Local Strategic Plan
Solar PV	Solar Photovoltaics (solar panels)
EV	Electric Vehicle
PPA	Power Purchase Agreement