



WATER SERVICES
ASSOCIATION OF AUSTRALIA

CLIMATE CHANGE ACCELERATING TO NET ZERO

MAY 2023





ACKNOWLEDGEMENT OF COUNTRY

We acknowledge and pay respect to the past, present and future Traditional Custodians and Elders of this nation. We recognise their continuing connection to land and waters and thank them for protecting our waterways and environment since time immemorial.





WATER SERVICES
ASSOCIATION OF AUSTRALIA

Overview of WSAA

The Water Services Association of Australia (WSAA) is the peak body that supports the Australian urban water industry. Our members provide water and sewerage services to over 24 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises. WSAA facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. The collegiate approach of its members has led to industry-wide advances to national water issues. WSAA can demonstrate success in standardising industry performance monitoring and benchmarking, as well as many research outcomes of national significance. The Executive of the Association retains strong links with policy makers and legislative bodies and their influencers, to monitor emerging issues of importance. WSAA is regularly consulted and its advice sought by decision makers when developing strategic directions for the water industry.

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FOREWORD

Antonio Guterres, the Secretary-General of the United Nations, highlighted that “Climate change is the defining issue of our time, and this is the defining time to act”. Alarming, the United Nations Environment Program (2021) forecast that the present trajectory will see the planet warming by 3oC above pre-industrial levels by 2100. The Intergovernmental Panel on Climate Change (IPCC) Report released in March 2023 states that emissions need to be cut by almost half by 2030, if warming is to be limited to 1.5°C.

Now is the time to accelerate towards Net Zero and the water industry has committed to align reductions with that timeframe and many utilities are striving for ambitious targets. The stakes could not be higher for the water industry. In Australia, recent weather events have seen records broken through bushfires and floods, with intense extreme weather events becoming more common and having increasingly dangerous impacts on communities and infrastructure. Working with the rest of the world to meet and exceed global emissions targets is vital.

In parts of Australia and New Zealand, our customers want us to make faster cuts to our emissions and reach Net Zero sooner. In WSAA’s 2021 National Customer Perceptions Survey of nearly 9000 responses across Australia and New Zealand revealed that three quarters of people believe climate change is a serious threat, with young people the most concerned. Strong emissions reduction targets are important because they help us accelerate to Net Zero.

To avoid catastrophic climate change, we need to do things very differently. We must reduce our emissions in ways that sustain value for customers and shareholders, grow our business, and assist the community to adapt to climate change. Now is the time to confront the global climate challenge. As a sector, we believe that this can be done in a way that reduces costs to the community while improving the liveability of our cities and towns, boosting public health and economic prosperity.

Water utilities stand to be impacted more than most sectors, being one of the largest government contributors to carbon emissions due to the nature of our products. However, many utilities are at the forefront of achieving Net Zero carbon emissions by being more efficient with resources, minimising emissions and developing innovative ways of harnessing the potential resource production of assets through products such as biochar.

This paper seeks to build on the WSAA Towards Resilience paper, released in November 2021. It is designed to assist Senior Managers, Executives, governing bodies and Boards identify the pathway and key steps that leaders can take to achieve Net Zero carbon emissions. It provides the elements required to develop a Net Zero roadmap, integrated with strategic objectives and supported by key actions to build quick wins and maturity and expand beyond the boundaries of the traditional water business. This high-level guidance is underpinned by detailed guidance and case studies to provide practical assistance to practitioners.



Adam Lovell
Executive Director



Tracey Slatter
*Managing Director Barwon Water
WSAA Board Member
Chair of the WSAA Utility
Excellence Committee*

CLIMATE CHANGE ACCELERATING TO NET ZERO

Purpose of this document

This guide is designed to help water businesses decrease their greenhouse gas emissions. It serves as a practical resource, featuring real-world examples, so that we can learn from each other. This provides the multiple benefits of highlighting what is possible, together with showcasing how others have achieved these results while also meeting their existing core functions. The guide was developed under the leadership of the WSAA Utility Excellence Committee with input from key subject matter experts within the WSAA membership to facilitate systemic change within the water sector.



CLIMATE CHANGE - ACCELERATING TO NET ZERO

Why this is important for the water industry

The many examples that now exist highlights that the water industry has a unique opportunity to enhance customer value by pursuing options that mitigate climate change whilst meeting customer, community, and business expectations.

We need to tackle climate change because it **“is the defining issue of our time, and this is the defining time to act”**, as quoted by Antonio Guterres (Guterres, 2018), the Secretary-General of the United Nations, The Paris Agreement of 2015 records the commitment of 195 countries to respond to this call for action and have collectively agreed to keep temperature increases below 2oC compared to pre-industrial levels, while pursuing to keep them under 1.5oC. Australia is a signatory to that agreement. Alarmingly, the United Nations Environment Program (2021) forecasts that our present trajectory will see the planet warming by 3oC above pre-industrial levels by 2100. There is correspondingly an increased call that we need to accelerate towards net zero.

Our customers and the community in many regions note the urgency and are equally calling for action. This includes customers calling out their expectation of water utilities through citizen’s jury’s, highlighting their concerns. The water industry is the largest GHG emitter within the government sector.

Greenhouse gas (GHG) emissions have historically been viewed as an externality, as emitters have caused pollution without recognising the social costs. However, advances in knowledge now allow for the accounting of these past externalities, which can often provide a strong economic case for GHG reduction projects. Given changes occurring nationally, costing these externalities has become part of the requirement for some States.

Where there are no immediate State based imperatives the role of the water utility in setting and moving towards a net zero target is less clear. In these instances, the primary reason for pursuing a net zero target is often about long term cost reduction.

Particularly an environment where there is rising inflation and increased pressures on affordability brought about by rising costs. Costs are being driven by supply chain constraints in goods and services, capital availability and personnel. The path to net zero carbon emissions can provide efficiencies which help address these pressures and constraints in a positive manner. Providing long term cost savings and generating approaches that reduce the ongoing cost of doing business.

What is currently being achieved?

There are already many examples around the world, together with those in Australia where water utilities have found innovative opportunities at the intersection of climate challenge, call for action, and adding value to their customers.

Beginning with some notable international examples, East Bay Municipal Utility District (EBMUD) has been operating a cogeneration facility at one of their wastewater treatment plants recovering energy from wastewater since 1985. The sewerage treatment plant in Strass, Austria, has been producing more energy than it uses since 2005. Hamburg Wasser has been recovering heat energy from their sewers since 2009. They also have two 2.5 MW wind turbines at their Dradenau wastewater treatment plant which were installed in 2010. While Sonoma Water in California has already lowered their energy related carbon footprint by over 99% in 2011.

Australian utilities also already have many completed examples:

It is against the background of recognising that there are many examples around Australia, and the world, that this paper has been written. We want to share these innovations, together with how they were achieved, so that water utilities can learn from each other and collectively achieve transformation at the sector level. We want to assist all water utilities accelerate towards net zero and address climate change.

Solar panels are used extensively on buildings, car parks and floating on lagoons. SA Water has 360,000 solar panels embedded at tanks, pipelines, and pump stations across the state. Yarra Valley Water has a solar panel carpark, and Wannon Water has plans to install a 500 KW floating solar PV system into one of their lagoons.

Utilities are not only installing solar systems on their own land but also forming partnerships with others to use solar energy produced offsite. For example, thirteen Victorian water corporations purchase solar power from the Kiamal Solar Farm under a new umbrella organisation called Zero Emissions Water.

Over 60% of the Water Corporation's passenger fleet is already electric or hybrid.

Both Barwon Water and Yarra Valley Water have a waste to energy facility.

The Hobart Aquatic pool recovers heat from the local sewer outfall.

Melbourne Water have installed water turbines in some of their large water pipes.

Wannon Water harvests rainwater from the roofs of an 800-home subdivision using this for reticulated supply at a lower energy than their normal system supply.

Sydney Water are in the process of constructing Australia's first biomethane-to-gas project at their Malabar Water Resource Recovery Facility. Barwon Water, Goulburn Water, Logan City Council, North East Water, Sydney Water, the Water Corporation, and Yarra Valley Water are in various degrees of progression in trialling hydrogen generation.

The Water Corporation are also carbon farming through the establishment and harvesting of a 1,400 ha plantation.

INTRODUCTION

WSAA Utility Excellence Committee, with assistance from WSAA members, has produced this guide of tangible and cost-effective options for Accelerating to net zero carbon emissions. It guides organisations logically through five maturity stages:



At each maturity stage the document covers actions across the areas of



The structure is designed to show that getting started involves many steps. Collectively answering the functional questions of why, what, and how. Each area is supplemented by links to case studies that elaborate on key initiatives to help with implementation. The experience from the case studies and those who have helped pull this document together is that moving to net zero not only can start with simple steps but can also support organisations to reduce costs and manage risk.

Although we have presented a five-stage process for achieving net-zero emissions, it is important to recognize that this process is likely to be iterative rather than strictly linear. Each utility will have its unique path to achieving net-zero emissions because of the various levers that can be used to reduce emissions. Utilities will need to experiment with different combinations of efficiency, renewable energy, and offsetting to determine the most effective mix for their specific circumstances. They must also explore opportunities within and outside their business area and start with smaller options before moving on to more extensive alternatives. Therefore, the journey towards net-zero emissions will be an iterative process.

What does net zero mean?

The term 'net zero' emissions is defined by the Climate Council of Australia as 'achieving an overall balance between greenhouse gas emissions produced and greenhouse gas emissions taken out of the atmosphere'[i]. Think of it like a set of scales: producing greenhouse gas emissions tips the scales, and we want to get those scales back into balance, which means no more greenhouse gas can be added to the atmosphere in any given year than is taken out. Achieving net zero carbon emissions is done by reducing emissions where possible and compensating for the remainder by investing in carbon offset projects to achieve net zero overall emissions.

To track progress towards net-zero emissions, it is essential not only to check off tasks in each stage but also to monitor the reduction of greenhouse gas (GHG) emissions achieved.

Figure 1 provides an indicative feedback on the GHG reductions expected when progressing through each stage

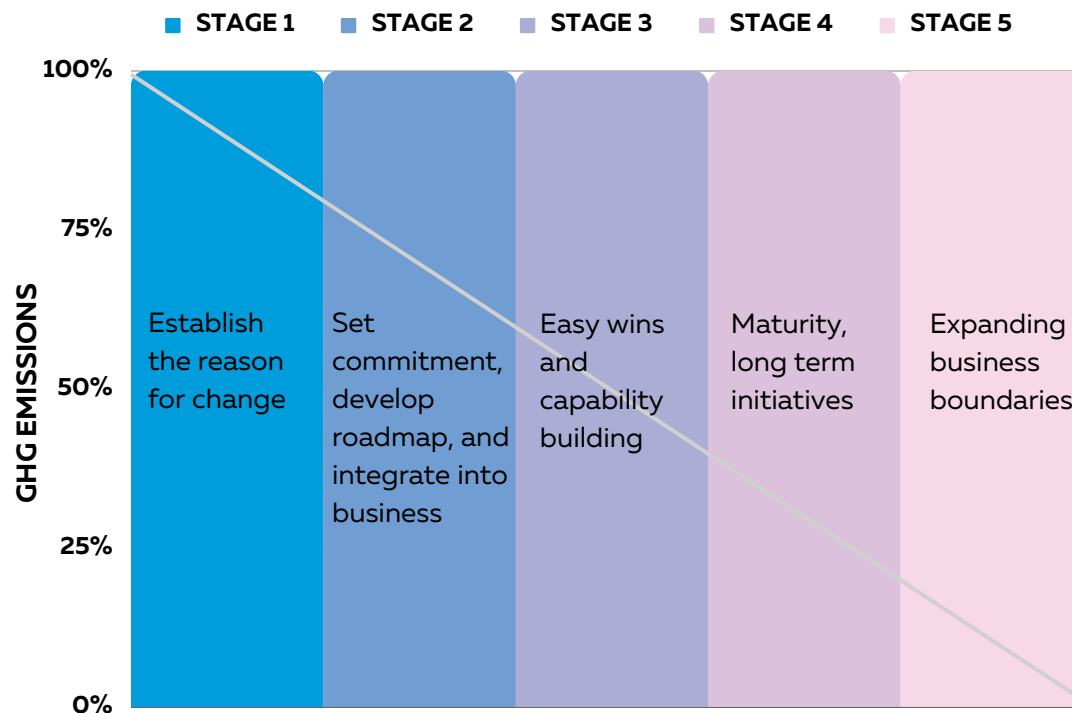


Figure 1 The stages designed to achieve a net zero GHG emission outcome.

How to Use This Guide

The first part helps to identify the pathway and key steps that leaders can take. Aiming to answer the strategic questions. Suited for Senior Managers, Executives, Governing Bodies and Boards. While the detailed tables in the follow sections are designed to provide practical assistance to practitioners.

Categories of Emissions

Understanding that emissions are defined as being a particular 'Scope' based on how they are produced, as shown in Figure 1, is an important foundation for Accelerating to net zero emissions.

Examples of how utilities around Australia are tackling each of the three emissions types can be found in the [WSAA Towards Resilience paper](#). They include:

- SCOPE 1** Producing biogas and hydrogen from the wastewater treatment process reduces or offsets emissions from imported energy to run those processes.
- SCOPE 2** Purchasing renewable power utilizing a joint Power Purchasing Agreement replaces the need for high emissions grid electricity.
- SCOPE 3** Scope Three emissions - Supply chain integration that reduces embedded carbon such as trenchless technologies and innovative pipe linings.

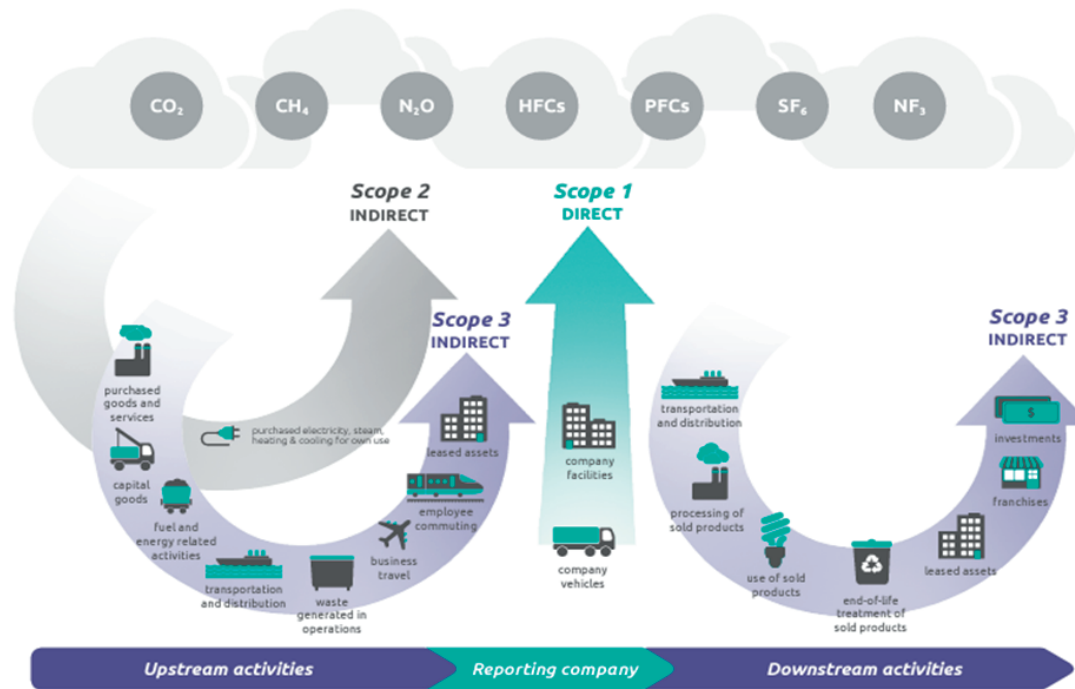
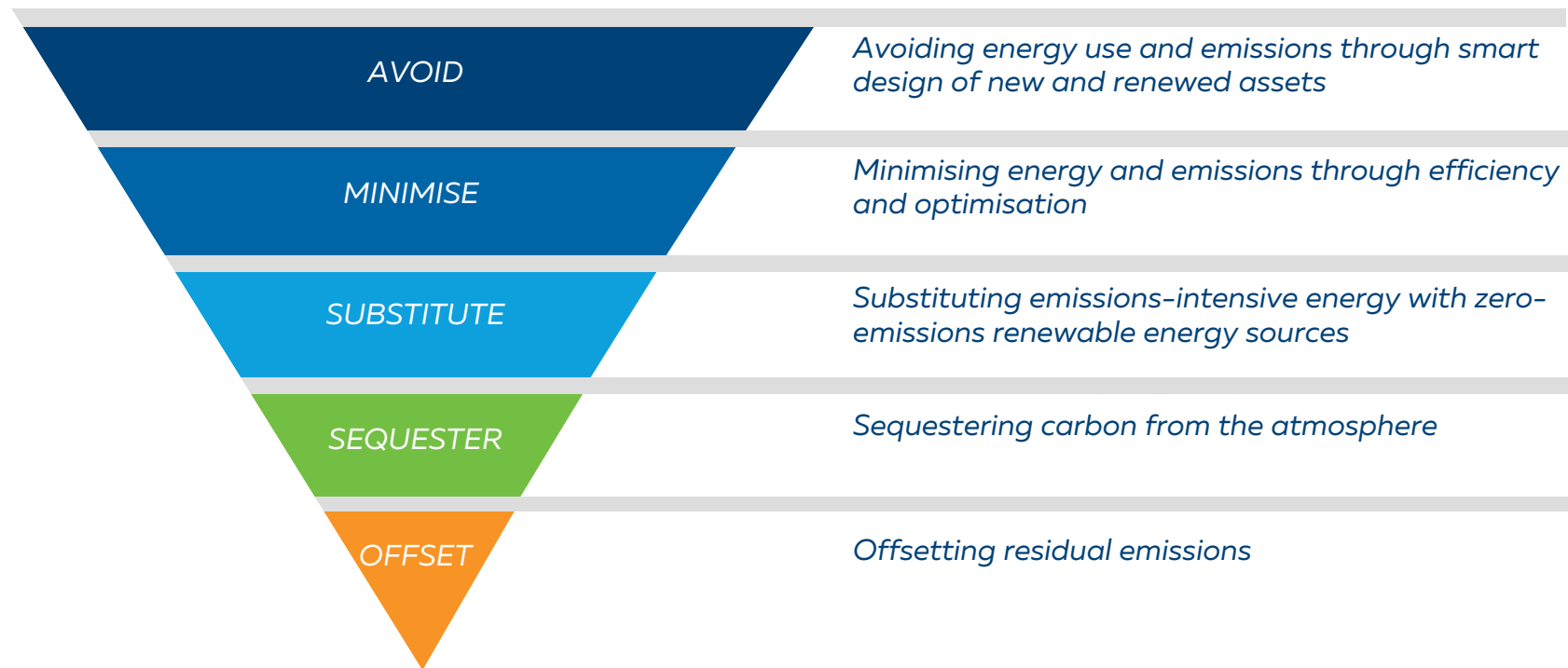
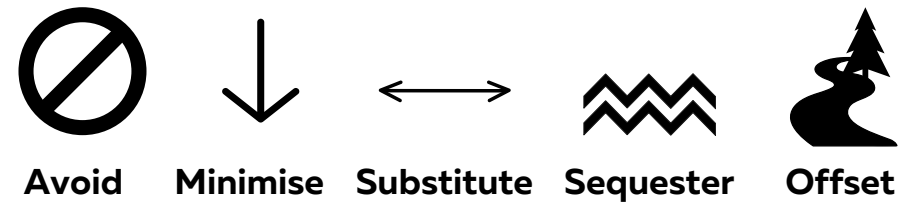


Figure 2 Overview of GHG Protocol scopes and emissions across the value chain.
Source WRI/WBCSD (2013)

The Emissions Reduction Hierarchy

Also important is the carbon emissions hierarchy which suggests a priority order for the implementation of actions to achieve a net zero goal. Ideally minimizing the selection of options further down the hierarchy.

In the 'how to' guide, the following symbols are used to delineate where each recommendation fits within the carbon emissions hierarchy:



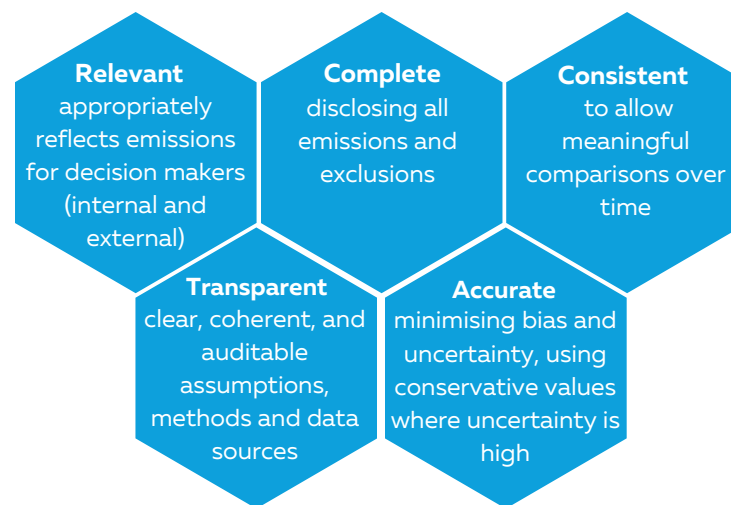
Key principles for Accelerating to net zero

When looking at implementing carbon reduction schemes a three-step process should be considered[i]:

1 Achieving genuine, cost-efficient emissions reductions in line with any regulatory and Statement of Obligations requirements. This includes considering the need for carbon reduction against the timing for replacement of infrastructure or large-scale changes in business practices utilising both backcasting and the value of secondary benefits. Backcasting from the end goal or zero emissions may well deliver a more cost-effective long-term solution than incremental improvements, with secondary benefits further improving the business case. For example, replacing a sludge drying process that generates a lot of emissions, may well also reduce odour, reduce space, and deal with emerging contaminants.

2 Reflecting customer needs and values in decision making for project type, location, and price. This includes consideration of externalities such as community values in terms of co-benefits such as biodiversity outcomes, local jobs and investment.

3 Demonstrating accountability and compliance with stated requirements. Recognising that carbon accounting is relatively new and is challenged with avoiding double counting. It may continue to be refined over time. Hence it is important to stay abreast of best practice. The present starting point for looking at these is outlined in the [Australian Government Carbon Active Carbon Neutral Standard](#) (CACNS), along with GHG Protocol – Corporate Standard (BCSD and WRI, 2004) and international standards AS ISO 14064 and ISO 14040 Series. Considering that the measures should be:



The purchase of offsets to reduce carbon emissions should only be used as a last resort, primarily for residual hard to reduce emissions. In purchasing offsets, it is important to recognise that many consider this a poor solution. Where they are purchased, your utility needs to understand the arguments against such a choice, to ensure that your decision is congruent with your organisation's principles. Firstly, offsetting is considered a weak solution where an organisation adopts them without any effort to reduce emissions. Hence the requirement to abide with the waste hierarchy principles of adopting all other options.

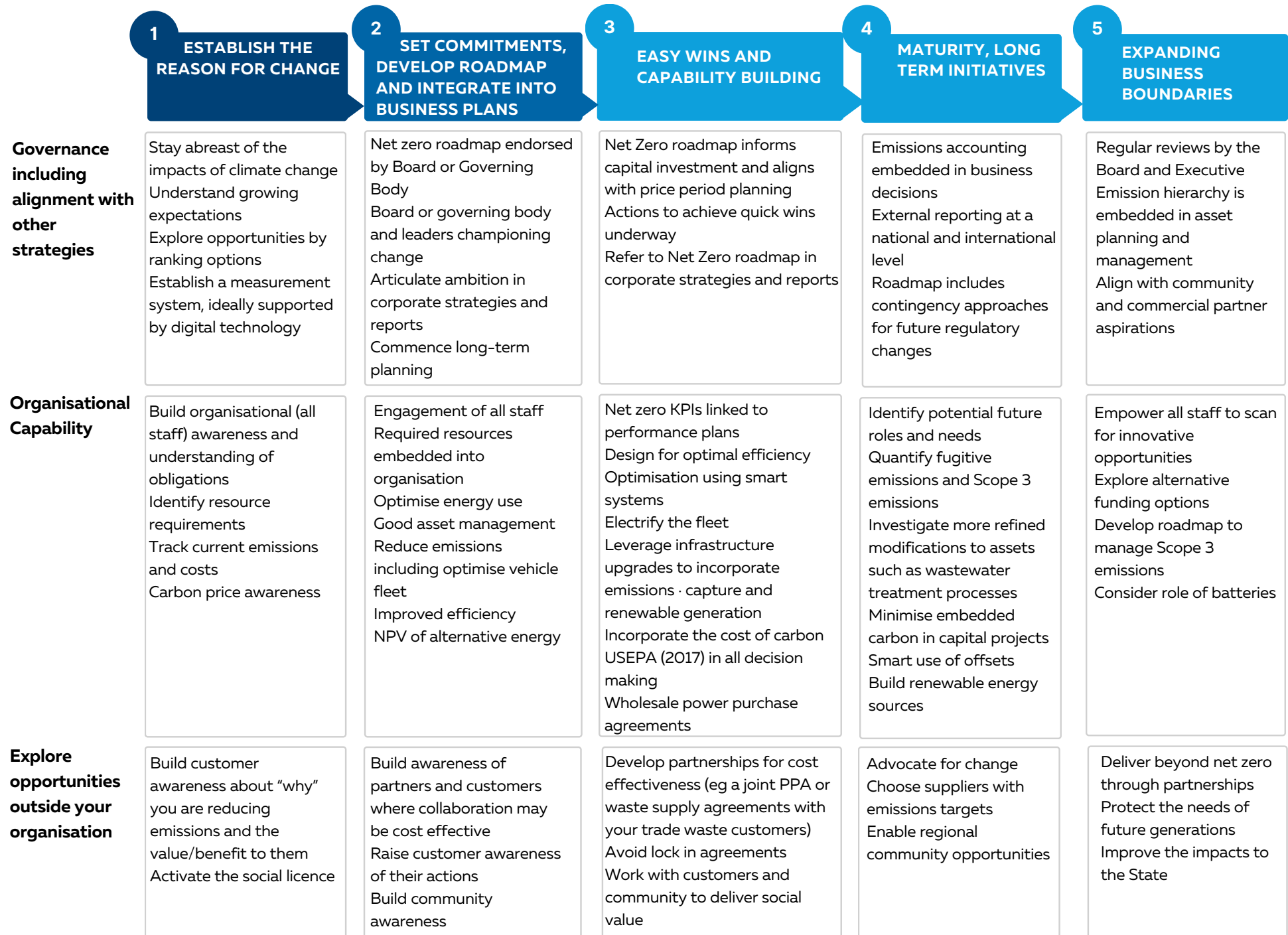
Secondly, while using international offsets are a good way to get started, it is important to recognise that some people consider these a poor choice. While they can reduce the net GHG emissions, the environmental impact such as photo oxidant pollution and subsequent health impacts still remains for the local communities. Hence the closer one can generate the offsets, the better. For example, producing offsets on a water business'land would be seen as more favourable.

ACCELERATING TO NET ZERO – SUMMARY OVERVIEW

This section begins with a summary overview of how utilities can accelerate to net zero. With a more detailed guide itemising all the potential tasks in the following section.

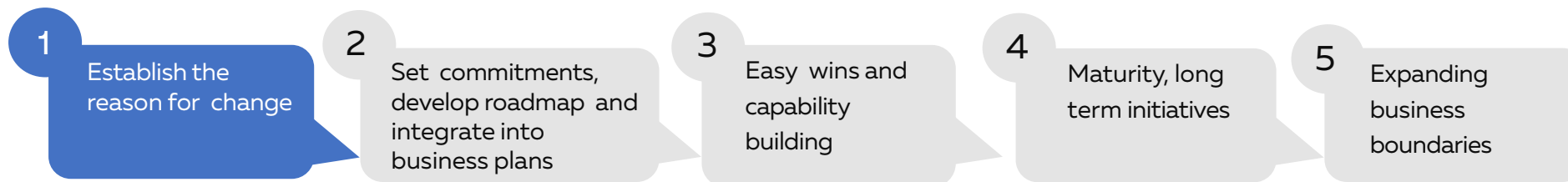
The summary has three frames of reference. Firstly, it is color coded to address the overarching questions of **why**, **what** and **how**. Secondly, it is segmented into five stages, to capture the different phases of maturity as one gains information and can show that options do actually deliver value. While the third perspective considers the three different functions across an organisation.





DETAILS FOR HOW TO GET TO NET ZERO FOR EACH OF THE MATURITY STAGES





Action	Impact	Case Study Appendix 1
Governance		

Stay abreast of the impacts of climate change



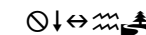
- The science in the most recent IPCC reports
- International agreements in the United Nations COPs
- Understand the impact of climate change on your organisation
- Draw upon industry networks such as WSAA's [Climate Change, Energy and Environment Network](#)

Understand growing expectations



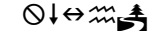
- Government directives
- Legislative obligations specific to your jurisdiction
- Licence and Statement of Obligations requirements for your business
- Regulatory requirements as set by the economic or environmental regulators
- Identify the increased call for action from customers and the community
- Note that businesses are now expected to do more than just deliver profit
- Consider the imminent increase in organisation transparency of actions

Explore opportunities by ranking options



- Awareness of what other Australian water utilities are doing
- Understand how others are making their business cases
- Produce a Marginal Abatement Cost Curve; City Switch (2021), or equivalent, ranking the costs or savings expected from different opportunities, alongside the potential volume of emissions that could be reduced if implemented.

Establish a measurement system - Follow a system such as CACNS described in VicWater (2020) to:

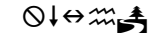


- Establish the emissions boundary (the coverage and extent of carbon accounting) for items that are material and relevant.
- Set a base year as a starting point for emissions comparison
- Collect data on emissions sources
- Calculate the carbon account balances

Organisational Capability

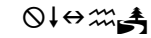
People

Build organisational (all staff) awareness and understanding of obligations through clear and transparent messaging, and incorporation of governance around roles, responsibilities and accountability.



1

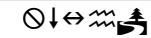
Identify resource requirements based on the initial measurements and scorecards identify areas where resources are likely to be required, particularly in terms of people, technology and processes.



1

Process

Track current carbon emissions particularly focusing on Scope 2 and directly measurable Scope 1 emissions.



Financial

Track current costs. In terms of the cost to procure electricity and inputs for measured Scope 1 emissions.



2

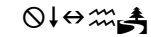
Carbon price awareness. Become aware of the spot market for carbon in New Zealandⁱⁱⁱ and other regions. Ongoing awareness of changes in relation to carbon pricing in Australia.



Exploring opportunities outside your organisation

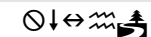
Customers

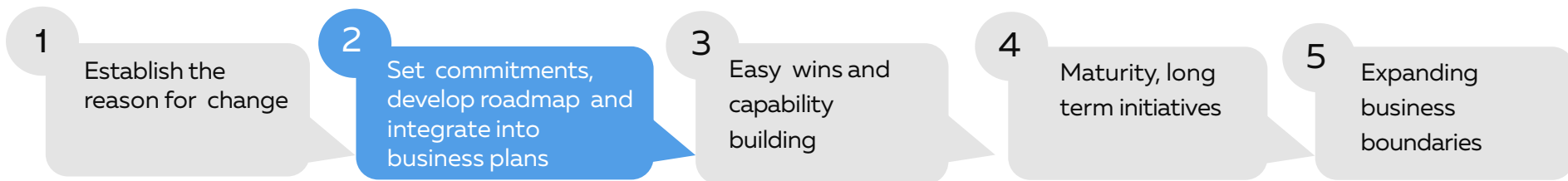
Build customer awareness – establish communications with customers about “why” you are seeking to reduce carbon emissions (based on the drivers above) and the value/benefit to them.



Social licence

Activate the social licence in relation to zero carbon emissions through communications with the community and regulators.





Action	Impact	Case Study
Governance		
<p>Board and leaders championing change. With the drivers for change understood, the Board should be driving the organisation to deliver meaningful change. Within the business, a leadership group led by one of the Executive Leadership Team should be formed to enact the changes.</p>		Appendix 1
<p>Net zero roadmap endorsed by Board or Governing Body authorising the direction and long-term goals.</p>		
<p>Board or governing body and leaders championing change ensuring that projects are integrated into normal business activities with funding support.</p>		
<p>Articulate ambition in corporate strategies and reports making transparent the commitment and ensures targets are achieved.</p>		
<p>Commence long-term planning that provides the framework of what has to be achieved and incentivises innovators to pursue alternative better options.</p>		

Organisational Capability

People

Engagement of all staff in the development of an emissions reduction roadmap. This is important to ensure ownership and better enable implementation. Understanding the need to both engage both the hearts and minds of all staff.

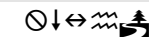


It will include training so that all employees understand:

- the drivers to move towards net zero
- how to use the emissions reduction hierarchy and what it means for their role/business unit
- changes to the approach for delivering business case
- how their roles influence the relevant KPI's for achieving the net zero emissions targets
- supported with business planning tools for measuring and comparing lifecycle emissions for project options e.g. Sydney Water's Energy & Carbon Estimator.

Process

Required resources embedded into the organisation. Based on the Roadmap evaluate the resource gaps that are required to ensure that the goals and milestones are able to be met. Develop approved business requirements in a manner that is able to ensure smooth execution of the roadmap.



Optimise energy use by considering options in relation to:

⊙↓

[3](#)

Efficiency of pumps and motors (refer WSAAs report)

- Management of drinking water mains pressure and storage tank levels
- Treatment plants, WSAAs (2021), particularly hydraulic movement, pumping, aeration, and in colder climates recovery of heat.
- Reduce the transport of personnel, supplies and by-products including through route planning.

Good asset management through:

⊙↓

[4](#)

- Material selection, installation, maintenance, rehabilitation and replacement.
- Speed and quality of asset repairs: repairs done quickly and to a suitable standard.
- Benchmarking asset energy performance through KPIs and reporting. Implementing investment programs to rectify where appropriate.
- Minimise leaks and bursts through smart technology.
- Consider energy efficiency, self-generation, demand flexibility.

Reduce emissions through:

⊙↓

[5,6](#)

- Minimising the use of treatment chemicals
- Optimising the quality of drinking source water through means such as catchment protection, and monitoring wastewater to reduce non-compliant industrial wastewater inputs
- Meeting environmental needs without over-treating
- Minimising the use of petrol and diesel engine vehicles
- Reducing the reagents needed for treatment through optimising hydraulic movement
- Reuse of grit, soil and spoil

- Optimisation of secondary processes for fugitive emission reduction
- Improved monitoring and control of assets for energy and carbon performance
- Investments into energy efficiency, renewable energy, demand flexibility
- Guidelines for energy and carbon reduction through system, process, asset management

Technology

Improved efficiency



Z

- Vehicle fleet - purchasing fuel efficient vehicles, considering replacing the fleet as it ages with hybrid and/or electric vehicles
- Efficient pre-treatment and aeration technology

Financial

Net Present Value (NPV) of alternative energy sources – develop methods that are embedded in the business plan approval process to consider alternative energy sources for new and existing processes. Seeking to approve alternative energy sources that have a positive NPV consistent with governance and regulatory requirements.



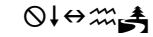
Incorporate cost of offsets into decision making. As a last resort using offsets to reduce emissions from existing or new assets to zero.



Explore opportunities outside your organisation

Partnerships

Build awareness of partners and customers where collaboration may be cost effective, engage with the supply chain, particularly industries within the local region, to understand their net zero ambitions and seek to partner with organisations, including your larger customers, that can assist your business achieve net zero, or work towards net zero carbon emissions for the community.



Customers

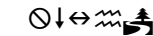
Raise customer awareness of their actions and how water loss, water efficiency and valuing water appropriately contribute to better environmental outcomes and support Accelerating to net zero.



[4,8](#)

Social licence

Build community awareness of the business net zero emissions targets and the roadmap to achieving them.

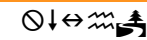


[1](#)



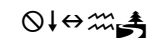
Action	Impact	Case Study
Governance		

Net Zero roadmap informs capital investment and aligns with price period planning. Activating the roadmap by seeking regulatory approval for the required actions and ensuring that these are reflected in the pricing submission. Particularly important where significant capital investment in assets required is required. Also, an opportunity to link planning with meeting policy and legislation targets.



Actions to achieve quick wins are underway. These include:

- Avoiding the use of excess electricity
- Maximising energy efficiency of existing assets
- Substitute grid energy with green energy (solar, wind, thermal)
- Substitute petrol and diesel only vehicles with hybrid or electric vehicles

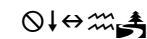


[7,9,10,1](#)

[1,12,13,](#)

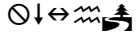
[14,15,16](#)

Refer to Net Zero roadmap in corporate strategies and reports. Ensuring that all relevant corporate documents are aligned with the roadmap and outline the path to achieving the KPI's and goals. Translating the overall targets down to projects (strategic, system, facility, asset plans). Otherwise there is the risk of having to rely on justifying each opportunity and investment decision.




Organisational Capability

People

Net zero KPI's linked to performance plans. Establish a clear line of sight between net zero KPI's and key aspects of performance plans, ensuring that the requirements are SMART. 

Process

Design for optimal efficiency. Incorporate design principles into business processes that minimise the generation of carbon emissions and maximise the potential for beneficial effects, based on the hierarchy of: 

- Build nothing
- Build less
- Build smart
- Build efficiently (linked to best practice energy benchmarks – See WSAA reports on pumps and treatment plants).
- Optimise in use (such as intermittent aeration to reduce fugitive N₂O emissions)¹

Technology

Optimisation using smart systems to: 

- Minimise energy consumption and emissions in network and treatment plant operations.
- Automate load shifting away from peak periods.
- Provide improved ways of detecting problems before they escalate e.g. sensors for the early detection of water mains breaks.

Electrify the vehicle fleet – move to electric vehicles for entire fleet and provide EV charging stations at work, and potentially support their installation at other locations, such as the homes of staff members.

⊙↓↔

[7](#)

Leverage infrastructure upgrades to incorporate emissions capture and renewable generation – can methane be captured and co-generated into renewable electricity at your water reclamation plant? Can biogas be generated by biosolids and other organic waste streams?

⊙↓

Financial

Include the cost of carbon USEPA (2017) into all decision making considering both:

⊙↓↔

[17](#)

- Shadow carbon pricing implemented. Adding a hypothetical surcharge to costs in business cases and planning decisions to support initiatives that are more emissions efficient.

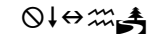
Wholesale power purchase agreements from renewable energy sources. These can be physical agreements – where the power is transferred directly to the utility or synthetic – where the power is transferred via the National Energy Market (in Australia). Physical PPA's include initiatives such as behind the meter (BTM) Solar.

⊙↓↔

[18](#)

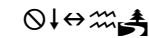
¹ Climate Council of Australia (2020) highlights this can reduce N2O emissions by ~30%

Develop partnerships for cost effectiveness



- Are there water corporations or organisations in your region who may want to develop a joint Power Purchasing Agreement?
- Are there customers/organisations in your region with large sources of organic waste that could be combined with biosolids to produce renewable energy and biochar?
- What are other agencies in your region doing and can you innovate together?
- Connect with technology providers, researchers and government to assist in Accelerating to net zero for Scope 1 and 3 emissions
- Get good advice to ensure clear and measurable partnership deliverables and that long term agreements foresee and manage risks.
- Actively engage with key stakeholders and the community to understand the economic, environmental, social and cultural opportunities for partnership and investment in emissions reduction activities.

Avoid lock in agreements

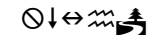
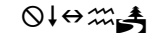


- Arrangements are best designed to allow future technology options and/or different stakeholders

Customers

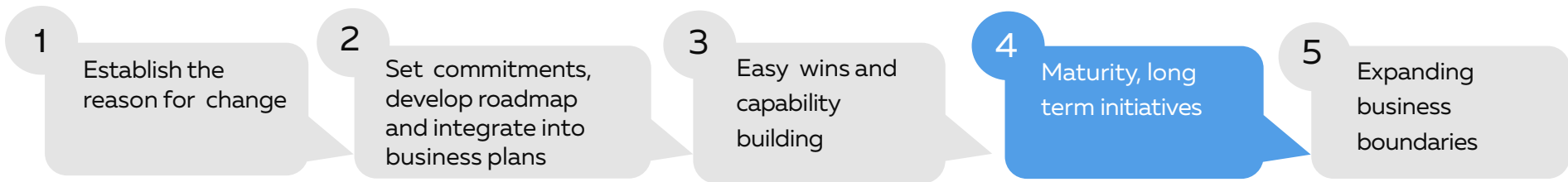
Working with customers and the community to deliver social value by:

- Empowering customers with technology such as digital meters that can inform their decisions around water use
- Engaging with customers and assessing willingness to pay for climate mitigation and adaptation. Engage the local community to identify options to improve social value.



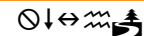
[3,4,20,2](#)

[1,22](#)



Action	Impact	Case Study
<i>Governance</i>		

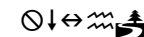
Emissions accounting embedded into businesses decisions:



- Implementation of mechanisms that assess whether projects are delivering against the corporate ambitions
- Annual Board review of progress against the high-level ambitions

External reporting at a national and international level making transparent utility commitments to stakeholders and customers ↓

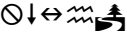
Roadmap includes contingency approaches for future regulatory changes.



Develop contingency approaches to respond to national or state regulatory or guidance changes around items such as a carbon price/tax or carbon credits.

Organisational Capability

People

Identify potential future roles and needs. Undertake regular competency gap analysis for roles required to meet the long-term net zero goal and to maintain that status beyond the target date. 

Process

Quantify fugitive emissions and Scope 3 emissions and develop actions to address from: 

- Treatment plants
- Sewer networks
- Other sources

Currently a WSAA project is seeking to develop an appropriate methodology.

Investigate more refined modifications to assets such as wastewater treatment processes: 

- Capture and treatment of fugitive emissions. Consider technologies such as membrane aerated biofilm reactors (MaBR) and anaerobic treatment to reduce nitrous oxide emissions.
- Side-stream nutrient removal that results in emissions reduction
- Investigate the possibility of different options that come with different scale
- Consider nature-based solutions
- Biosolids as fertilizer

[23](#)

Minimise embedded carbon in capital projects 

Smart use of offsets - Cut emissions first then use high quality offsets



[3,10,](#)

- Afforestation, reforestation and urban tree planting
- Biochar and dung beetles to sequester carbon and reduce nutrient runoff in open drinking water catchments
- Blue carbon sequestration - refers to stored carbon in coastal ecosystems like mangroves, seagrass and salt marshes
- Consider the use of Large-Scale Generation Certificates for offsets.
- Using technology to enhance offsets through:
 - o Shift to long lived carbon storage
 - o Support the development of net-zero aligned offsetting

[24](#)

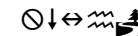
Build renewable energy sources (solar, wind, mini-hydro, cogeneration and biosolids pyrolysis) on land owned by the utility, possibly coupled with battery storage and fuel cells powered by natural gas or geothermal energy. Note that this option should be pursued in preference to purchasing renewable energy. This could include piloting emerging treatment technologies such as decoupling nitrogen removal from aerobic processes, algae processes, decentralised treatment, and other anaerobic processes



[10,15,25](#)

[,26,27,2](#)

[8,29,30](#)



- o Low impact wastewater treatment using green/blue infrastructure such as wetlands, green roofs, especially in rural areas.

Explore opportunities outside your organisation

Partnerships

Advocate for change with suppliers and others in the supply chain, for them to reduce emissions. ⓪↓↔

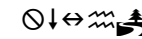
Harness partnerships with suppliers and use carrots rather than sticks where possible.

Choose suppliers with emissions targets, particularly those that align with your business aspirations. ⓪↓↔

Customers

Enable community regional opportunities in terms of the environment, economic, social, and cultural aspects including:

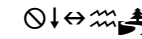
- Incentivise customers to reduce water usage and avoid water loss. Also consider incentives for customers to reduce hot water emissions by shifting to more efficient technology.

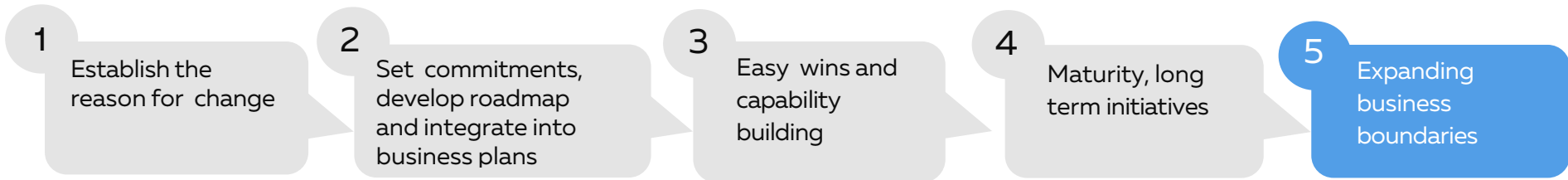


[21, 31](#)

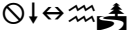
Social licence

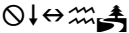
- Help prevent energy volatility by partnering with the local energy companies in relation to provide additional peaking capacity via renewables, load shedding during high demand periods and providing offsets.





Action	Impact	Case Study Appendix 1
Governance		

Regular reviews by the Executive and Board or Governing Body (at least annual) on changes to the external operating environment and how they impact Accelerating to net zero. Set targets for moving beyond net zero. 

Emissions reduction hierarchy is embedded in asset planning and management as part of business as usual. The hierarchy is part of the premise on which all business decisions are based. 

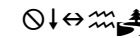
Align with community and commercial partner aspirations and pathways. Ensure strong alignment of KPI's, initiatives and reporting. 

Organisational Capability

Empower all staff to look for innovative opportunities to move beyond net zero emissions. Providing tools to assist presentation of relevant cost-effective business cases considering the following:

Circular economy/resource recovery:

- Consider using recovered glass sand as pipe embedment material
- Biomethane injection into the gas network from wastewater treatment
- Hydrogen production from electrolysis recycled water (producing hydrogen and oxygen), and from the Hazer process (cracking methane from biogas into hydrogen and graphite).



[10,](#)

[25,31,32](#)

[,34,](#)

[36,37,3](#)

[8,39](#)

- Regularly revise offsetting strategies as best practice evolves.
- Minimise embedded carbon in capital projects in the context of whole of life carbon emissions.



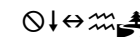
[33,](#)

Consider using the following hierarchy:

- Don't build
- Build less
- Use materials with lower capital carbon
- Use fewer materials/reduce waste



- Technologies that remove fugitive emissions from treatment lagoons and sewer networks
- Provide offsets to the market - Offset other (outside of our sector) emissions, moving beyond the water sector in the provision of offsets to other sectors.
- Employ emerging technologies, such as:

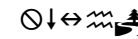


[10](#)

- Smart assets with automated procurement. Assets that are able to determine their deterioration rate and order replacement parts before the device begins losing efficiency.
- Zero emissions concrete that uses industrial by-products and avoids carbon emissions associated with cement
- The use of WSUD to reduce runoff and associated contaminants entering waterways, reducing treatment energy
- Onsite pipe manufacture
- Use of batteries at different stakeholder scale boundaries

Explore alternative funding options such as:

- Joint funding initiatives with the community and suppliers for net zero and beyond.
- Creating a market for offset options generated by the water business including biodiversity, reforestation. Creating options that don't currently exist. This includes the development of jobs that currently don't exist.

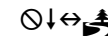


[10](#)



Develop roadmap to manage Scope 3 emissions

- Utilise industry networks and research to both utilise the most recent information and shape the future research agenda

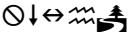


Consider role of batteries as technology advances and costs decrease

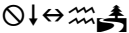


Explore opportunities outside your organisation

Partnerships

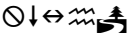
Deliver beyond net zero through partnerships that share expertise and long- term commercial arrangements.  [25,31,35](#)
[24](#)

Customers

Protect the needs of future generations by engaging with customers and understanding opportunities for partnering with communities. For example:  [21](#)

- Promotion of urban cooling – through the promotion and sustaining of urban green space.
- Inspiring and incentivizing industries and individual households to reduce their energy requirements for water heating.

Social licence

Improve the impacts to the State by contributing the overall management of externalities and taking advantage of economic opportunities.  [31](#)

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(2020) <https://www.climatecouncil.org.au/resources/what-does-net-zero-emissions-mean/>. (Viewed on 9/9/22)

City Switch (2021) Using Marginal Abatement Cost curves
<https://cityswitch.net.au/ResourcesArchive/CitySwitch-Resources/Planning-reporting-and-monitoring/Planning-reporting-and-monitoring-article/using-marginal-abatement-cost-curves>
(Viewed 22 Mar 2023)

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VicWater, (2020) Carbon Offsets: Report for the Victorian Water Industry <https://vicwater.org.au/wp-content/uploads/2020/10/Carbon-Offsets-Report-2020.pdf>. (Viewed on 29/09/22)

World Resources Institute & World Business Council for Sustainable Development, (2013) Greenhouse Gas Protocol. Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Supplement to the GHG Protocol Corporate Accounting and Reporting Standard



OTHER USEFUL RESOURCES

Standards

AS ISO 14064.1:2006 – Greenhouse gases Part 1: Specification with guidance at the organisation level for the quantification and reporting of greenhouse gas emissions and removals

AS ISO 14064.2:2006 – Greenhouse gases Part 2: Specification with guidance at the project level for quantification and reporting of greenhouse gas emission reductions and removal enhancements

AS ISO 14064.3:2006 – Greenhouse gases Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions

BSI's PAS 2060:2014 – Specification for the demonstration of carbon neutrality European Standard PAS 2080:2016 – Carbon management in infrastructure

ISO 14040:2006 – Environmental management – Life cycle assessment – Principles and frameworks

ISO 14044:2006 – Environmental management – Life cycle assessment – Requirements and guidelines

PAS 2050:2011 – Specification for the assessment of the life cycle greenhouse gas emissions of goods and services

ISO 14065:2013 – Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation of other forms of recognition

Publications

Climate Champions – net zero report – <https://climatechampions.unfccc.int/wp-content/uploads/2022/04/Working-Group-1.-Operationalisation-Recommendation-Submission-April-15-2022.pdf>

<https://www.wsaa.asn.au/sites/default/files/publication/download/Towards%20Resilience%20WSAA%20Nov%202021.pdf>

IWA publication (11 July 2022), Reducing the Greenhouse gas emissions of water and sanitation services.

PMO project governance – 7 principles, <https://pmo365.com/project-governance/>

Resource for the price of carbon in New Zealand, <https://www.carbonnews.co.nz/tag.asp?tag=Carbon+prices>. (Viewed on 27/09/22)

UK Papers – roadmap for Accelerating to net Zero – Figure 3-3 provides the emissions breakdown (P10/46), Figure 4-4 the emissions hierarchy in simple form (P12/46), (P14/46) the Marginal Abatement Cost Curve <https://www.wsaa.asn.au/system/files/attachments/Water-UK-Net-Zero-2030-Routemap.pdf> Figure 3-3

UNEP (2021) Emissions Gap Report 2021. <https://www.unep.org/resources/emissions-gap-report-2021>

VicWater – Victorian water corporations emissions report – <https://www.datocms-assets.com/38603/1607925874-proudmarywaterreport.pdf>

WSAA Towards Resilience Paper (2021) P25-36 Climate Change Mitigation

WSAA Climate Change Position Paper (2022) – <https://www.wsaa.asn.au/sites/default/files/publication/download/Urban%20Water%20Industry%20Climate%20Change%20Position%20May%202022.pdf>

Race to zero commitments (primarily by Victorian water businesses) <https://www.wsaa.asn.au/system/files/attachments/WSAA%20COP26%20Race%20To%20Zero%20Wrapup%20211111.pdf>

APPENDIX ONE – CASE STUDY DESCRIPTIONS

Case Study No	Description
1	South East Water. Towards Resilience Case Study - Whole-of-business climate change preparedness
2	Proud Mary Consulting 2019 What goes up – Victorian Water Corporations Greenhouse Gas Emissions Report
3	WSAA has several benchmarking reports: WSAA and GHD 2018 WWTP Energy Benchmarking 2015-2016 Part 1 – Summary Report WSAA 2018 WWTP Energy Benchmarking 2015-2016 Part 2 – Technical Report WSAA and GHD Sept 2014 Pump Station Energy Efficiency Benchmarking Report.
4	Sydney Water. Conserving water through advances in leak prevention
5	Wannon Water. Warrnambool Roof Water Harvesting Initiative
6	Water Corporation - Yet to be published - Alkimos Trunk Main Size Assessment for the proposed desalination plant
7	Water Corporation. Water Corporation moves to greener fleet with electric vehicles
8	Mackay Regional Council. Towards Resilience Case Study - Conserving water through digital transformation

- 9 East Bay Municipal Utility District cogeneration
- 10 Logan City Council. Carbon neutral Logan
- 11 Melbourne Water. Hydropower
- 12 Decarbonising Sydney. The role of transport, buildings and grid infrastructure on Greater Sydney's path to net zero
- 13 SA Water. Deploys world's largest moveable solar site
- 14 Wannon Water. Brierly Basin Floating Solar Array
- 15 Water Care NZ. 1MW floating solar array, Rosedale Wastewater Treatment Plan
- 16 Yarra Valley Water. Solar panels car park
- 17 Coliban Water, Application of a shadow carbon price in capital decision making.
- 18 VicWater. Zero Emissions Water. Kiamal Solar Farm
- 19 City of Hobart. The Doone Kennedy Hobart Aquatic Centre Energy Systems
- 20 Yarra Valley Water. Determining customer support to mitigate greenhouse gas emissions and climate change impacts
- 21 Hunter Water. Customer perceptions of climate change and willingness to pay for climate change programs
- 22 City West Water. Next Gen Urban Water Case. Greening the West Green the West.
- 23 STP Strass, Austria. Achieving energy neutrality in wastewater treatment plants through energy savings and enhancing renewable energy production

24 Water Corporation. Carbon farming

25 Barwon Water. Renewable Organics Networks. Barwon Water is partnering with major businesses and local councils on two Renewable Organics Networks RONS

26 Hamburg Wasser. Excess heat from sewage in Hamburg and Singen, Germany

27 Hamburg Wasser. Wind turbines

28 Yarra Valley Water. Waste to energy facility

29 Wannon Water. Wind turbines

30 Water Corporation. Wind is powering our way to net zero

31 Sydney Water. NSW sustainability bonds

32 Goulburn Water. Hydrogen

33 Watercare NZ. Plan to reduce embedded carbon, cost of work and number of injuries

34 YVW. Hydrogen

35 Barwon Water. Hydrogen

36 North East Water. Hydrogen

37 Sydney Water. Malabar Biomethane Project

38 Sydney Water. Wastewater converted to hydrogen in Port Kembla trial

39 Water Corporation. Fuelling an Australian-first hydrogen project

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