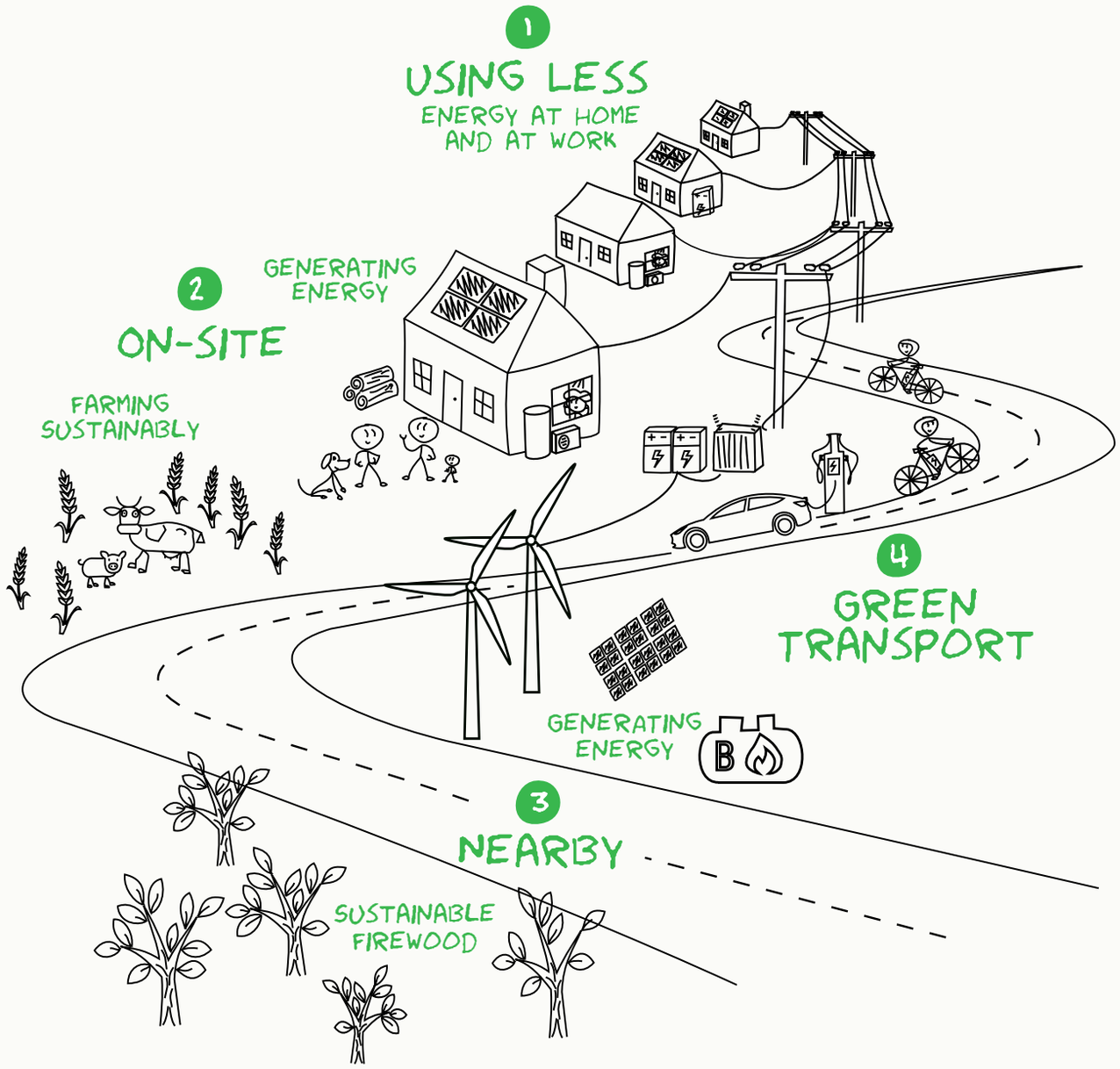
Community Transition Plan Snapshot Report



znet
HEPBURN SHIRE

Baseline year emmissions

Tonnes of carbon dioxide equivalent in 2018

262,041

The vision for the Hepburn Shire is a three phased roadmap

Phase 1:
2019 - 2021
(quick wins)

Phase 2:
2022 - 2024
(zero-net energy)

Phase 3:
2025 - 2029
(zero-net emissions)

Introduction

A 10-year Masterplan for the Hepburn Shire to reach 100% renewable electricity supply, zero-net energy and zero-net emissions 2019 - 2029.

In the 2018 baseline year, emissions were

262,000 tCO2-e

(tonnes CO2 equivalent)

These will increase by 13.1% in the "business-as-usual" scenario, i.e. we do nothing, by 2029 to

296,000 tCO2-e

(tonnes CO2 equivalent)

Hepburn Shire has a vision to achieve Zero Net Energy by 2025 & Zero Net Emissions by 2030

Zero-net energy:
Defined as a community that reduces and matches its local energy needs with a 100% renewable energy supply

Zero-net emissions:
Defined as reaching carbon neutrality, where local carbon emissions are 100% offset by measures that reduce, avoid or sequester carbon emissions

The challenge to source 100% of energy from renewable sources and completely offset carbon emissions by the 2030 target will be met in three phases

Phase 1:
2019 – 2021(quick wins – low hanging fruit)

Phase 2:
2022 – 2024
(zero-net energy)

Phase 3:
2025 – 2029
(zero-net emissions)

Z-NET is Zero-Net Emission Transition, an open-source pathway for a local community to set targets and achieve zero-net emissions.

There are hundreds of operating 'energy towns' around the world, and a desire or official mandate from several communities across Victoria. However, there is only one operating zero-net energy town example as yet in Australia - Hepburn Wind which generates enough renewable energy to offset Daylesford. As yet, there is no local government area. This project has established clear targets and pathways to answer the question of 'what will it take' for the Hepburn Shire to reach and go beyond zero-net energy and how to tackle the broader objective of zero-net emissions.

In August 2018, Hepburn Shire declared an ambition to be the first Shire in Australia to source 100% of its energy requirements from renewable sources. The declaration was made in collaboration with Hepburn Wind, with the support of: SHARE, Hepburn Relocalisation Network, Trentham Sustainability Group, Transition Creswick and Clunes Sustainability Group. This declaration sets out the aspiration to become a "lighthouse community" demonstrating the economic, social and environmental benefits of locally owned, renewable energy generation facilities. In addition, the declaration sets out a zero-net energy target for the Shire by 2025, with an aspiration to achieve this by 2021.

Hepburn Shire has a population of 15,000 residents. In the 2018 baseline year, emissions within the Shire were 262,041 tCO2-e (tonnes CO2 equivalent) per year. In a do-nothing, i.e. business as usual scenario, emissions are forecast to increase 13.1% to 296,000 tCO2-e by 2029.

The Hepburn Shire community is the first in Australia to strive for zero-net energy and zero-net emissions.

This document is a Snapshot Report of the full Community Transition Plan (CTP) that provides a roadmap for achieving zero-net energy by 2025 and zero-net emissions by 2030. The full CTP can be downloaded from www.z-net.org.au/hepburn

Community transition pilot
Hepburn Shire was selected to conduct Victoria's first Z-NET pilot, because of its track record in community-owned energy generation through Hepburn Wind, strong support from Hepburn Shire Council, local sustainability groups and a commitment from community members and business to pursue 100% renewable energy generation. The pilot aims to act as an incubator for locally appropriate best practice actions and strategies to meet a target of zero-net emissions.

The Z-NET community Transition Pilot was funded by Sustainability Victoria, Hepburn Shire Council, Hepburn Wind, Samsø Energy Academy and Diversicon Environmental Foundation.
This project is an initiative of the Coalition for Community Energy, led by Renew and Little Sketches, with support from Starfish Initiatives, Moreland Energy Foundation, Hepburn Shire Council, Hepburn Wind and many other local and sector partners.

The purpose of the project was twofold:
1. To provide an expanded blueprint for how rural communities could satisfy 100% of their energy needs, 100% of the time from renewable energy sources in a cost competitive way (price, quality, reliability, security of supply, etc)
2. To create a holistic masterplan – The CTP - to achieve this transition to 100% renewable energy and, ultimately, zero net emissions.

The project was undertaken from February through December 2018 and is the most in-depth, place-based, carbon emissions profile ever created in Australia. It is also the first local government area CTP for Zero-Net Energy and Zero-Net Emissions.

This CTP was co-developed with the local community. It is written for them as well as stakeholders from important sectors to engage on the journey, all levels of government, technical experts and industry. The CTP applied a social justice lens to better enable fair distribution of benefits and mitigate potential burdens on vulnerable community members. Such an assessment is important to bring awareness of who benefits, and who is burdened, by the particular transition path taken. Energy choices must be justified not only in terms of how they will help mitigate climate change, but also in terms of their fairness to those already disadvantaged.

Outcomes
The project has delivered:
- A Z-NET blueprint for Hepburn Shire, including a detailed carbon emissions inventory
- A co-developed CTP
- Feasibility analysis and business cases for local energy options
- Energy and emissions related resources and capacity building within the community

Opportunities
The following opportunities have been identified to progress towards zero-net energy and zero-net emissions. These are broadly grouped as:
- Using less energy
- Generating energy on-site
- Generating energy nearby
- Switching fuel

These opportunities respond directly to emissions associated with:
- Stationary Energy
- Transportation
- Agriculture
- Waste & waste water
- Land use change

Some elements of the CTP are easier to implement than others. To make the CTP as meaningful and real as possible, it was necessary to pioneer new approaches to tricky problems. This CTP is designed to be a living document that will need to be continually updated.

2018 Baseline energy use

To provide a context for achieving zero-net energy, it is firstly important to understand the current mix of energy consumption.

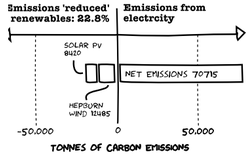
The emissions context

Electricity baseline for Hepburn Shire

Shire Summary

Hepburn's emissions from electricity amounts to 70,715 tonnes of carbon emissions annually. Electricity is used for a range of daily business and household needs such as lighting, heating, hot water,equipment and appliances.

We reduce 22.8% of electricity emissions through local generation of renewable energy from rooftop solar and Hepburn Wind.



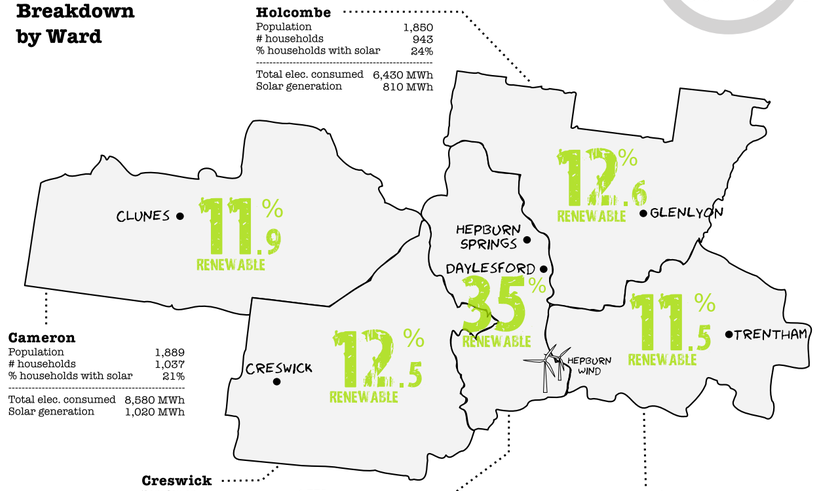
Shire facts

Population	15,753
# households	8,648
Electricity supplied by:	
Solar	7,260 MWh
Wind	10,760 MWh
Supplied by grid	60,960 MWh
Total elec. consumed	78,980 MWh
% Renewable electricity	22.8%
Net emissions	70,715 tCO2-e

Data sources

Australian Bureau of Statistics (ABS), Powercor and Hepburn Shire Council (Rates data), openNEM, Clean Energy Regulator

Breakdown by Ward



Holcombe

Population	1,850
# households	943
% households with solar	24%
Total elec. consumed	6,430 MWh
Solar generation	810 MWh

Cameron

Population	1,889
# households	1,037
% households with solar	21%
Total elec. consumed	8,680 MWh
Solar generation	1,020 MWh

Creswick

Population	4,338
# households	2,381
% households with solar	21%
Total elec. consumed	17,880 MWh
Solar generation	2,240MWh

Birch

Population	5,570
# households	3,057
% households with solar	16%
Total elec. consumed	36,810 MWh
Solar generation	2,130 MWh
Wind generation	10,760 MWh

Coliban

Population	2,107
# households	1,157
% households with solar	23%
Total elec. consumed	9,280 MWh
Solar generation	1,070 MWh

About grid electricity

Electricity from the grid that is generated outside Hepburn is also partially supplied by renewable energy. In April 2018, this totaled around 16% of Victoria's electricity generated

Table 4: Renewable Electricity Mix

Electricity Source		MWh	Energy (TJ)
Grid electricity	(77.2%)	60,961	219.5
Solar	(9.2%)	7,258	26.1
Wind	(13.6%)	10,761	38.7
Total electricity demand	**(per annum)**	**78,980**	**284.3 TJ**

As is represented in Table 4 and in the accompanying postcard, (figure 3) the electricity data is a highly accurate baseline as at 2018, bringing in data sources from Powercor, Clean Energy Regulator, OpenNEM, Hepburn Wind, Australian Bureau of Statistics and Hepburn Shire Council. The current demand is 79,633MWh.

Stationary energy and transport

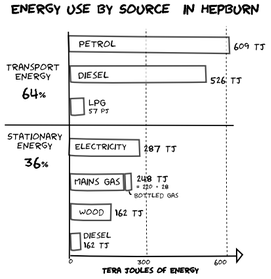
The broader energy context in regards to emissions is described in the above postcard and considers electricity, natural gas, LPG, firewood, diesel and petrol - this relates to energy usage in buildings as well as transport fuels..

The emissions context

Energy use in Hepburn Shire

What energy is used

Hepburn's energy needs are met by natural gas, electricity, firewood, diesel and transport fuels (petrol, diesel and LPG). We use about 1,870 TeraJoules of energy per year.



The energy 'boundary' for ZNET Hepburn incudes all stationary energy used by local residents and visitors, but only transport energy from the local community.

Stationary energy

About 36% of Hepburn's energy needs come from 'stationary' energy sources that power our homes, businesses and infrastructure. A closer look at our stationary energy mix is provided below

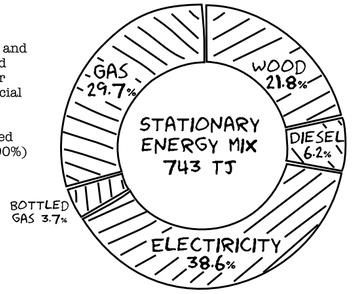
Transport fuels

Transport fuels power the vehicles we use to get around: they account for 64% of energy used by Hepburn's residents and businesses. Petrol is the most used fuel type (51%), followed by diesel (44%) and LPG (5%). All of these fuels produce greenhouse gases and air pollution.

Natural gas: 247 TJ

Natural gas is used by households for cooking and heating both spaces and water. It is also used for industrial and commercial applications.

Most natural gas is piped directly to end users (90%) with the remaining consumed from bottled gas.



Firewood: 162 TJ from 10kt of wood

Neary 60% of households use firewood for heating sourced, which mostly comes from fallen timber on farming land.

Diesel: 46 TJ from 1,728 kL of fuel

Diesel is used for farming and agriculture activities (e.g. to power diesel pumps and generators, and for off-road vehicles like tractors).

Electricity: 287 TJ or 80 GWh

Electricity is used for a range of daily business and household needs such as lighting, heating, hot water, equipment and appliances. 23% of electricity comes from local renewable sources: including the households with rooftop solar PV installed (supplying 9.9% of total consumption), and Hepburn Wind (13.5%).

Whole of Shire findings

Global Standards and Going Beyond
The purpose of the baseline emissions profile is to identify, quantify and report on Hepburn Shire's distinct greenhouse gas emissions (GHG). The baseline emissions can also help guide where action must be taken to have the greatest impact. Whilst there are global standards for emission profiles, methods for meeting the global standards are often based on aggregated data sets (scaled down data from Victoria for example). This reduces duplication and gaps with other communities, but can lack meaning for community members and makes it difficult to measure progress in emissions reduction. It is hoped that this approach of developing a bottom up profile will allow projects to be monitored over coming years and for their impact to be quantified. This will help to display to community how local actions, however small, can help contribute to achieving Z-NET.

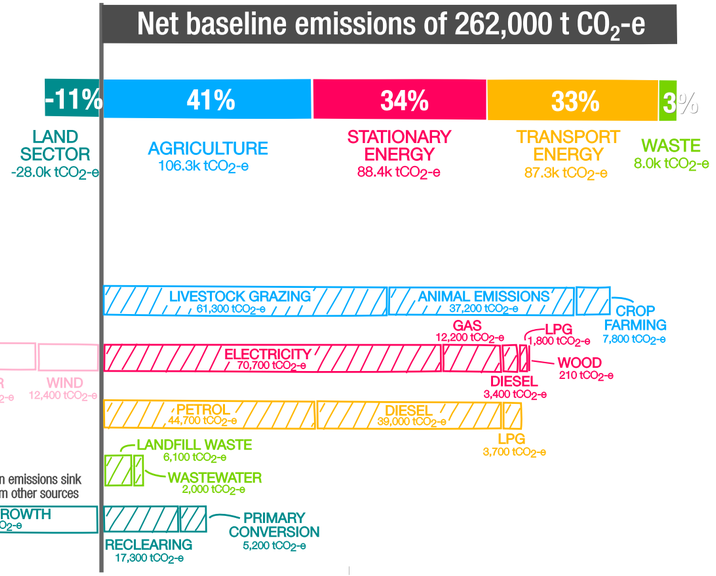
This project has created a bespoke profile, which not only meets the global reporting standards, but uses more granular data when available. It has brought together household survey data, local farming data sets, inputs from Hepburn Shire Council and data from Powercor, the electricity network distributor.

The 2018 baseline year shows that agriculture, stationary energy and transport dominate the sources of the Shire's emissions. More than 20,000 tonnes of emissions are offset through renewable energy (solar and wind). The land sector provides a net carbon sink with forestry activities in the Shire estimated to draw down 11% of gross emissions (i.e. emissions prior to carbon credit activities).

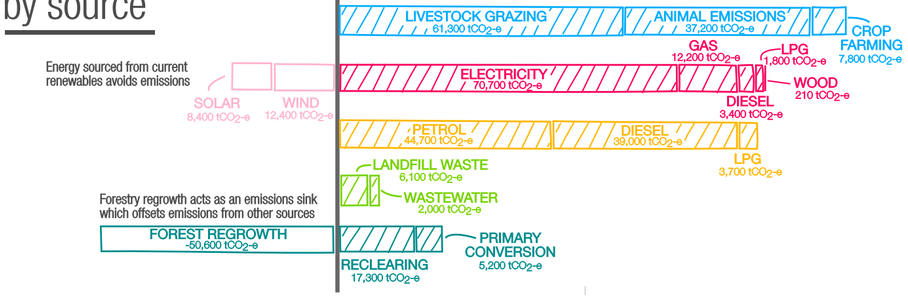
HEPBURN SHIRE BASELINE EMISSIONS

Emissions by sector

with proportion of net emissions



Emissions by source

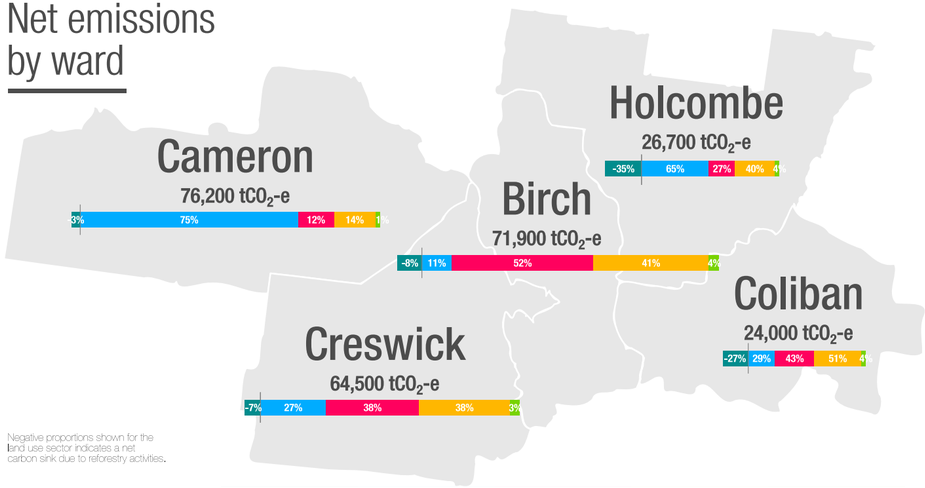


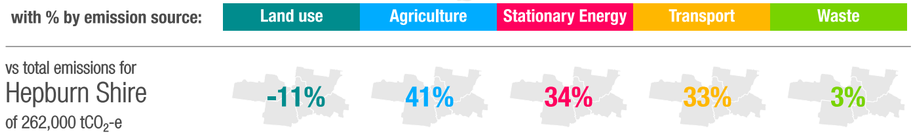
Ward by Ward
The Hepburn Shire has many distinct towns, villages, and hamlets located across the 1,470 square kilometres, inclusive also of native forests and farmland. Within those locations, there is strong local pride and identification. In order to give visibility to the distinct footprints of some of these areas, the following chart, reflects a high-level breakdown across the five local government Wards in the Shire.

The Ward of Cameron has high emissions and is largely skewed from the agriculture sector due to its relatively high share of grazing area compared to the other Wards. Birch has the highest electricity emissions among the Wards and produces more than twice as many emissions in total as Coliban. This can be explained by higher population in comparison to other Wards, but also due to the impact of business and tourism. Hepburn Wind is located in Birch and all electricity generated by the wind farm is allocated to the Ward for the purpose of modeling the local on-site generation impact. Coliban produces the lowest emissions among the Wards in Hepburn Shire and is fairly balanced across the sectors, including a significant carbon sink due to forestry activities that reduced the emissions profile by 27%. Holcombe ward hosts the largest forestry carbon sink, which creates a reduction of 35% to their emissions.

HEPBURN SHIRE BASELINE EMISSIONS

Net emissions by ward





Key elements of phase 1 2019-2021

The first stage celebrates Hepburn's leadership in sustainable energy, with a concentration on energy efficiency opportunities and energy generation on-site. This is consistent with adopting the least-cost approach, which will help to reduce the amount of 'nearby' renewable energy projects required to achieve a 100% renewable energy supply. These options are also based on proven technologies which have a high level of social support.

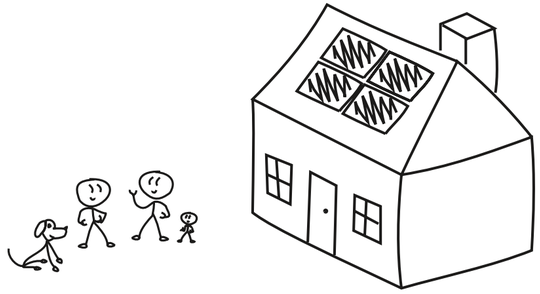
This phase includes the delivery and celebration of a second stage solar farm at the Hepburn Wind site to complement the existing 4.1MW capacity of Gale and Gusto (wind turbines). It also includes the delivery of a local bioenergy demonstration project of 65kW capacity.

The first phase helps lay the development work for mid-scale renewable energy projects via Hepburn Wind's leadership and local sustainability group engagement, as well as a micro-grid / virtual power plant project (VPP), which would then be delivered in Phase 2. This project is essential to allow continued growth in on-site generation.

Similarly, this first phase is also proposed to develop capacity and commence delivery of reforestation, capable of balancing a renewable, sustainable supply of firewood and ultimately creating the land use change required to offset agricultural emissions. Further, improvement in detailed knowledge around opportunities to reduce transport, agricultural and land use emissions will ready the community for a shift in focus away from stationary energy towards other emissions sectors in the later two phases.
The first phase includes improving upon knowledge and delivery of early transport actions, with an early focus on improving fuel efficiency at vehicle replacement, rideshare and active transport. A waste to energy project would be delivered by Council, capturing a portion of emissions associated with organic waste; Council's commitment to meet zero net emissions from waste would be met during the latter part of this phase.

The Central Highlands Water plan to reduce emissions from wastewater commences in earnest.

These listed actions are considered 'quick wins' that are largely underway through various initiatives with different stakeholder groups.



Key elements of phase 2 2022-2024

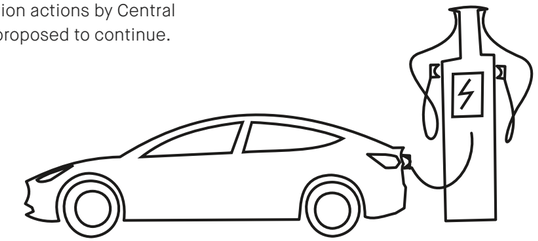
Phase 2 includes delivery of significant investment in mid-scale renewable energy projects (40MW of new capacity) to create a 100% renewable electricity supply and achievement of zero-net energy. The potential of battery storage should be considered for some of the mid-scale projects as this will allow higher levels of generation to be achieved, without network capacity constraints. Delaying delivery of these projects to approximately 2022 - 2024 will also allow for costs of solar and wind generation to further decline (somewhat absorbing the cost of battery storage required). Should the level of required mid-scale community wind and/or solar projects not be pursued (due to financial viability or network constraint reasons), the option of procurement from larger solar or wind farms outside the Shire will need to be considered.
The output from these mid-scale 'nearby' projects would involve some export of electricity to other communities when solar or wind production is high and usage in Hepburn Shire is low. The delivery of a local micro-grid / Virtual Power Plant (VPP) project is required during this phase to maintain growth in on-site electricity generation.

Waste reduction measures would continue to further reduce reliance on waste offsets. The emissions reduction actions by Central Highlands Water are proposed to continue.

Knowledge and capacity would be further built around key agricultural production changes required to reduce emissions; including 'climate smart' farms, with pilots occuring for a number of strategies designed to reduce emissions associated with meat and dairy livestock and carbon sequestration into soil. These are scheduled to be piloted in 2024, informed by industry research that improves the animal welfare associated with responses to reduce enteric emissions. Programs will be designed in this phase which can forge a new kind of leadership in Hepburn around reduction of agricultural emissions.

Significant sector partnerships will need to be established to usher in this phase, as well as financing to actualise it.

Implementation of the CTP will occur in three phases. The three phases are explored in the following section with accompanying flow diagrams to illustrate the conceptual implementation journey.



Key elements of phase 3 2025-2029

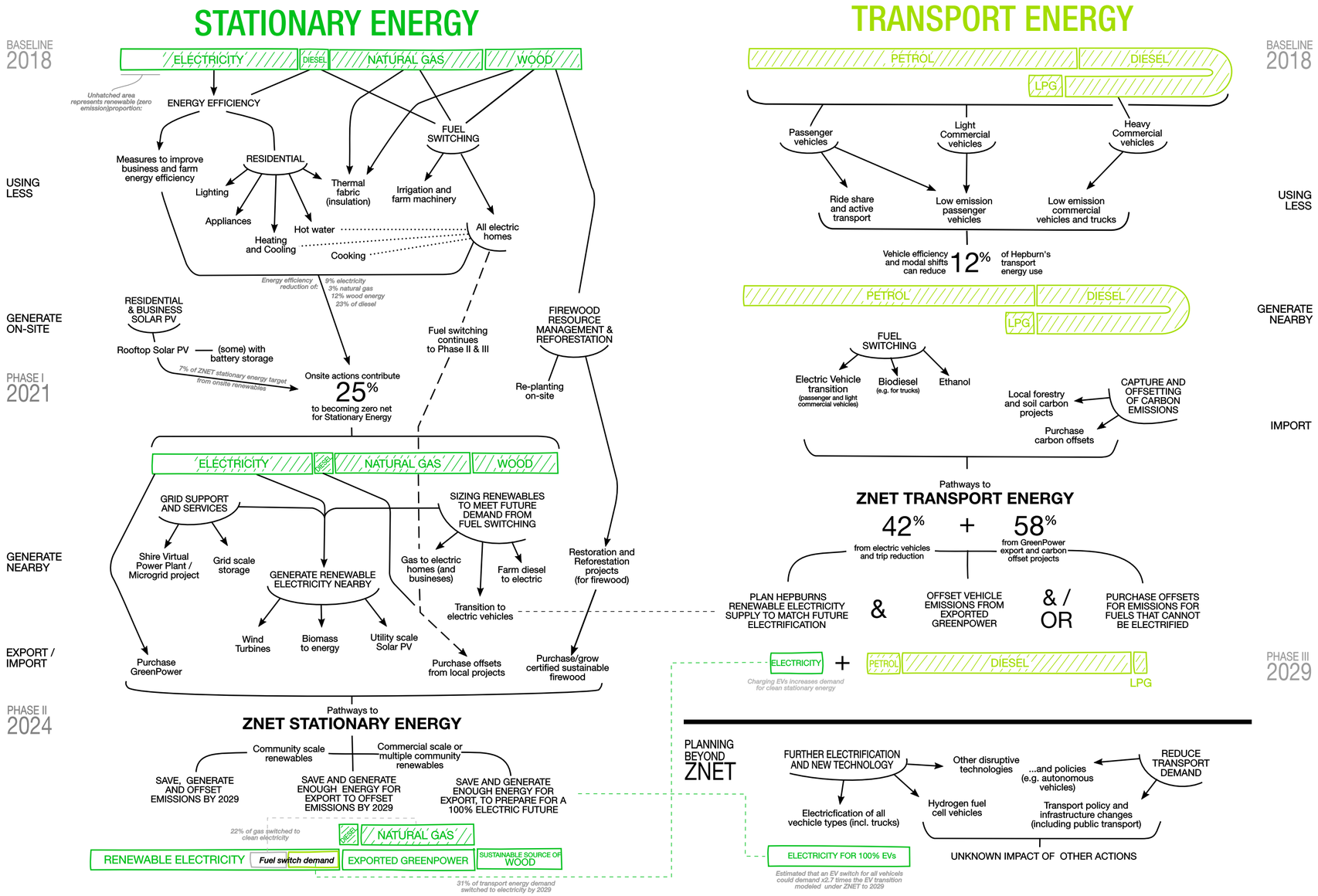
During Phase 3, the electric vehicle transition will commence in earnest. It is proposed that this is matched with increasing deployment of renewable electricity generation to meet the charging requirements. Programs involving on-site energy actions come to fruition with the transformation of building stock through energy efficiency and on-site solar investments.

Through a combination of further efficiencies and reduction in travel demand, but predominantly as a result of electric vehicle transition, transport related emissions decline to approximately two-thirds of the 2018 benchmark. The Hepburn Shire is forecast to continue to be a net exporter of renewable electricity, which offsets the remaining balance of transport emissions.

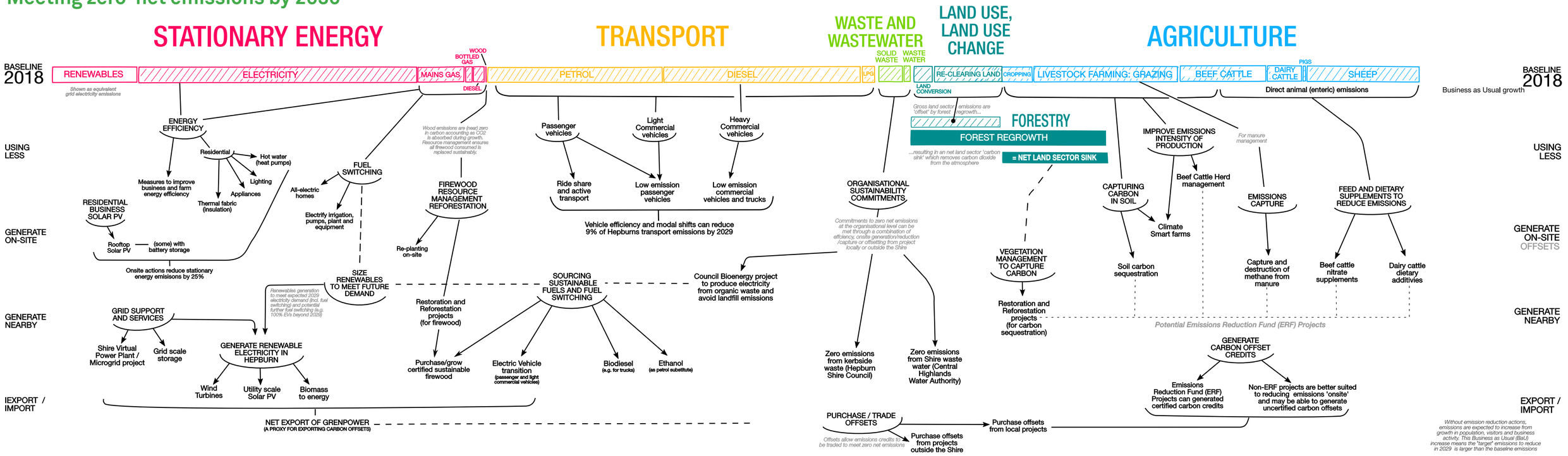
Agricultural emissions are forecast to reduced to approximately half of the 2018 benchmark, through soil carbon actions and livestock initiatives. The remaining agricultural emissions are offset through land use change (reforestation) within the Shire, resulting in zero net emissions by 2030. Reforestation also supplies (above and beyond land use change) a local 'renewable' firewood supply.

The commitment from Central Highlands Water will be met in 2029. Council and community actions continue to reduce waste emissions. The combination of these activities can reduce total waste emissions to a negligible level by the 2030 target.

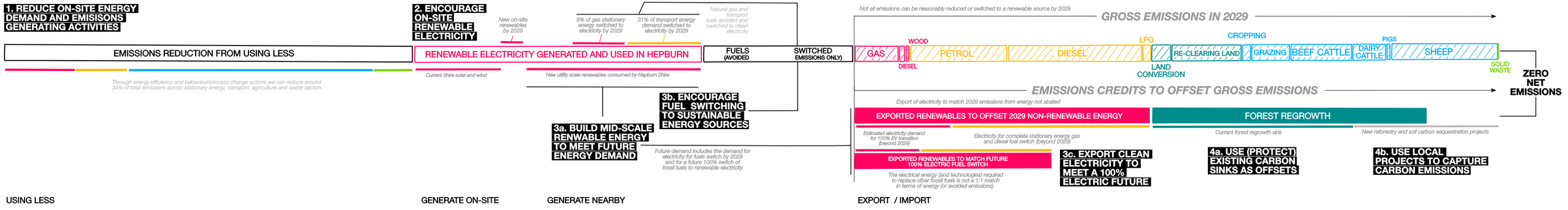
Meeting zero-net energy by 2025



Meeting zero-net emissions by 2030

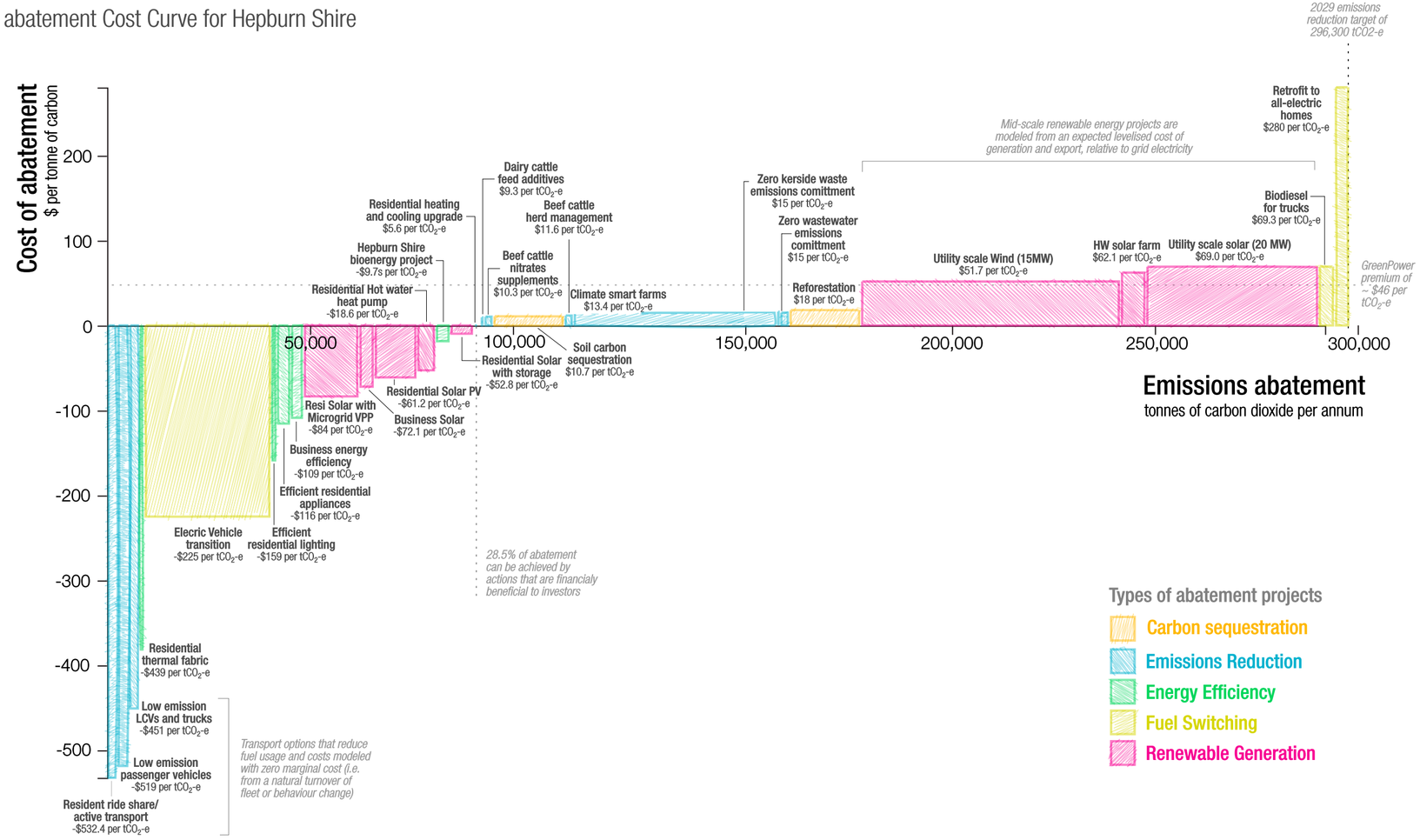


ZERO NET EMISSIONS TRANSITION



COMPARING OPTIONS TO TRANSITION TO ZERO NET EMISSIONS

An emissions abatement Cost Curve for Hepburn Shire



The CTP is underpinned by the least-cost pathway. That is, it is a strategic prioritisation and planning tool as well as a 'communication' tool. In order to communicate the relative costs of opportunities to reach zero net emissions, a cost curve has been developed which summarises the impact against the goal of zero net emissions and the relative cost or benefit.

How might it work?
The role of enablers

Sector Partnerships
There is a broad spectrum of sectors that contribute to local emissions and stand to gain from reduction strategies. To engage with these sectors and enhance the effectiveness of the various Z-NET phases, we will need to:
- Develop new partnerships and collaboration approaches early on.
- Form roundtable or working groups.
- Deepen engagement with the agriculture, transport, waste, land use, tourism and local business sectors.
- Develop local solutions, firstly as trials and then for broader implementation.

Role of Households and Businesses
Individual householders, farmers, landowners and business owners have a very important role to play. The realisation of the CTP is in part based on all of those stakeholders undertaking actions in key areas - particularly demand reduction, energy efficiency upgrades, shifting to sustainable transport and expanding micro and small-scale renewable energy generation.

Supporting local households, farmers and businesses to understand what they can achieve is an engagement and educational goal of the Plan. Pivotal to this is:
- Increasing awareness of the economic benefits for households and businesses.
- Providing timely and readily understandable information for builders, renters and homeowners about the potential for energy savings.
- Practical workshops about these measures.
- A free energy audit program.
- Target space heating and water heating in Hepburn homes.
- Target space heating/cooling, lighting and computing in Hepburn businesses.
- Target energy efficiency and renewable energy opportunities for farming practices and onsite carbon farming opportunities

The Role of Local Government
The collaboration of local government with industries and communities is vital for the success of the CTP. As industries and communities seek lower carbon alternatives to current practices, there are a number of changes which need to occur to facilitate these transitions. Hepburn Shire Council is already active in these areas and has the potential to amplify their work proactively to further facilitate these changes.

Key to supporting these specialised sectors will be the role of local government leadership in regards to:
- Engagement with peak bodies and complementary programs such as the Cities Power Partnership, an initiative of the Climate Council, the Victorian Government's TAKE2 program delivered by Sustainability Victoria.
- Staff resourcing to assist the coordination of the governance and programs.
- Monitoring, refining, expanding and promoting the Z-NET CTP and Blueprint.
- Continuation of targeted projects which support an increase in energy efficiency or renewable generation in the broader community.
- Programs which assist vulnerable groups and individuals within the community to access energy efficiency and renewable generation technologies, including financial support.
- Facilitating and advocating for improved planning and building outcomes to ensure a more sustainable shire into the future
- Continuation of current goals to achieve emission neutrality for Council operations
- Proactively seeking other innovative methods to improve the environmental and economic sustainability of the region.
- Considering additional supportive policies or resolutions to ensure that new developments and the transition occurs in a highly effective and beneficial way such has been deployed in Germany and Denmark around community power.

The Role of Networks
In planning for utility-scale renewable, a partnership approach is needed for the network to respond to the intentions of the community to transition. As detailed earlier, Powercor has advised that the capacity of the Hepburn Shire distribution network (i.e. the total power rating of feeders and transformers) in and around Hepburn Shire is relatively low. This is particularly the case given the historical development of the area, without significant amounts of large industrial or commercial electricity users. At the same time, there is no major expansion (or "augmentation") of the distribution network in Hepburn Shire planned for the next decade. The 220kV Ausnet transmission line, however, appears to offer significant opportunity for a utility-scale renewable generation project. DNSPs and TNSPs can and should work with communities to assist in the transition to high penetration of renewables - through network planning, joint projects, partnerships and being clear and transparent about what is required from a technical standpoint.

The following aspects are key to the role of the networks:
- To understand how constrained the three 22kV feeders in the project area are, what ability they have to be able to connect mid-scale renewable generation projects, and at what cost.
- Undertake feasibility work, in partnership with Powercor, to assess (in particular) the 22kV feeders for their level of capacity and ability to accommodate larger (i.e. 5MW to 10MW) renewable energy projects, with and without storage.
- Identifying parts of the network in which significant penetrations of renewables can be accommodated; advising on the best locations within the project area to locate small and utility-scale battery storage – to deal with reliability and network constraint issues.

Knowledge Generation, Education and Engagement

As a community energy leader, there is a high level of energy literacy in the Hepburn Shire regarding renewable energy generation and the perception of what is possible to achieve locally. However, like all other communities in Australia, local data on emissions from other sectors has previously been somewhat invisible so there hasn't been an opportunity for detailed engagement and awareness raising on the task ahead to reach carbon neutrality. There is a need for continuing to build this awareness locally via the following actions:

- Community engagement must be seen as the cornerstone of local actions.
- The Community Transition Plan can be seen as a 'next-step' and be used for localised place-based planning and engagement across the Shire to stimulate local activity such as a ward level action plans with local sustainability groups.
- A dedicated website to host elements of the Plan.
- Ensuring there is an engagement component to all programs and projects deployed as part of the Plan.
- Local education curriculum and school based engagement around the Z-NET Plan
- Citizen science projects to be initiated with the broader community.
- University partnerships which already exist with the University of New South Wales (working on social justice) and Melbourne University (technical support), should continue to be maintained and explored.
- Celebrate local resources such as RetroSuburbia by David Holmgren which is a manifesto for household action.

Governance
Harnessing existing local capacity and establishing and developing a framework to formalise an engaged local group with agency over the Z-NET Community Transition Plan was a mandate of the project. In the case of the Hepburn Shire, there is an abundance of existing community organisations: community energy co-operative Hepburn Wind, sustainability groups and others of relevance such as community banks. The original Community Advisory Panel (CAP) was comprised of 17 community representatives who came together on three occasions to learn about the Z-NET Hepburn program, what current strategies and opportunities exist; and to develop and recommend a set of goals and priorities for the Community Transition Plan.

Taking the Plan forward, it is proposed that the following steps occur:
- Given the pre-existence of many formal organisations, it is more efficient for the governance to be a collaborative/ collective impact group – with a set of guiding principles and mandate in the form of Roundtables, rather than forming a new incorporated association.
- The Council will convene the primary Roundtable, with future sector based Roundtables to be convened by sector partnership experts.
- The CAP is proposed to transform into the Z-NET Roundtable, with participation from the five sustainability groups, Hepburn Wind, Hepburn Shire Council and interested individuals for the first phase which is highly focused on energy.
- As the Plan reaches the implementation and action phase it is considered that over time the Z-NET Roundtable may be replicated for new sector engagement.
- The Z-NET Roundtable would look to: create and/or recommend local projects that could be funded by the Z-NET Climate Resilience Fund; be local advocates for Z-NET; and, ensure local community members and businesses are aware of Z-NET.

An overview of the Z-NET Roundtable mandate is proposed to be:
- Z-NET Targets: having a common agenda for change including a shared understanding of the problem and a joint approach to solving it through agreed upon actions.
- Tracking implementation and emissions reduction: overseeing and measuring results consistently to ensure shared measurement for alignment and accountability.
- Championing the CTP: a plan of action that outlines and coordinates mutually reinforcing activities.
- Collaborating around Z-NET programs: enhance the impact of individual sustainability groups.
- Council role: provide backbone support to help participating organisations coordinate.
- The Z-NET Leadership Group which would further support the Roundtable and be made up of a Hepburn Shire Council representative, Hepburn Wind and members of the Z-NET project team dependent on funding and resourcing.

How might it work?
The role of enablers

Funding
A significant amount of personal and institutional funding and finance will need to be leveraged for implementation. Some of this will be through government and philanthropic initiatives, some will be bank or impact investment financed, others will be through community donations and investment. In particular, key to the deployment of multiple mid-scale projects, will be the need for a stable long term support scheme for mid-scale community energy projects to unlock finance for such projects.

As government and philanthropic funding can wane, within the Hepburn Shire there are several grant-making entities dispersing micro-grants to various community projects, inclusive of Council, three community banks and Hepburn Wind. There is an appetite across these organisations to create more targeted, better quality projects and programs that create 'legacy' or 'intergenerational' impact. To create this, and to enable some of the objectives of Z-NET, it is proposed that a local Z-NET Climate Resilience Fund is established.

Tracking Progress
Effectively monitoring progress towards achieving the 10-year goals of the Z-NET Hepburn project is crucial to the ongoing success of the model. It is imperative to consistently understand where emissions are coming from and how successful the CTP's interventions are in meeting emission reduction targets. This understanding will enable future programs to be more targeted and effective.

Whilst the current emissions profile shows where Hepburn Shire emissions are coming from, it does not illustrate what is causing emissions to change over time. These dynamic factors range from local, state and federal policy to technology uptake and shifting social norms. Tracking progress is enabled by the setting of clear, tangible and measurable actions (see Phase 1, 2 and 3) that can be monitored effectively over the time period and will have to consider these dynamic influences.

The following methods are recommended to monitor and evaluate program effectiveness, track progress and create accountability within future project delivery to ensure actions are undertaken. The monitoring framework should create accountability of different stakeholders through an information sharing and feedback mechanism to improve program implementation.

1. Evaluating projects and programs - tracking implementation.
2. Evaluating methodology - improving the profile.
3. Updating the emissions inventory - Adapting baseline emissions as necessary and updating inventory.
4. Enhancing sector engagement - Monitoring how key partnerships are progressing.
5. Tracking behaviour change

As with other projects of this type, the ability to evaluate and develop the profile will be dependent on the level of funding available in the future. In order to strive towards the first goal of zero-net energy by the end of 2024 to meet the Shire-wide target of 2025 (and potentially the aspirational goal of zero-net electricity by 2021), the first three years should ensure at a minimum the focus on tracking the impact of renewable energy, demand management and energy efficiency projects.

Implementation plan

MAIN INITIATIVES TO 2029	INITIATIVES	Engagement / sector partnerships	Analysis & Strategy	Tests & Demonstration	Implementation	Scaling up
Community Engagement	Education Curriculum				Phase I 2019 - 2020	Phase II 2022 - 2025
	Community Transition Plan engagement	Phase I 2019				
	Website - Z-NET practical actions				Phase I 2019- 2020	
	Tourism: Z-NET energy trail		Phase I 2021	Phase II 2022	Phase II 2023 - 2024	
	Sustainable streets program	Phase I 2019	Phase I 2019	Phase I 2020	Phase I 2021	Phase II 2022 - 2025
Sector Engagement	Tourism: carbon neutral tourism campaign for visitors	Phase I 2019	Phase I 2019	Phase I 2020	Phase I 2021	Phase II 2022 - 2025
	Agriculture	Phase I 2019				
	Business: network of ambassadors	Phase I 2019	Phase I 2019	Phase I 2019		
	Schools:					
	Network distributor: strategic feasibility for local generation, storage and demand management projects	Phase I 2019	Phase I 2019	Phase I 2020	Phase I 2021	Phase II & III 2022 - 2029
	Transport: options development for sustainable transport	Phase I 2019	Phase I 2019	Phase I 2020	Phase I 2021	Phase II & III 2022 - 2029
Energy	Home energy efficiency audits	Phase I 2019	Phase I 2019	Phase I 2019	Phase I 2019	Phase I & II 2020 - 2024
	Home energy efficiency retrofits and upgrades (including heat pump, solar hot water bulk buy etc)		Phase I 2019	Phase I 2020	Phase 1 & II 2020 - 2024	
	Farm energy efficiency audits and upgrades	Phase I 2019	Phase I 2019	Phase I 2019	Phase I 2020	Phase I & II 2020 - 2024
	Business energy efficiency audits and upgrades	Phase I 2019	Phase I 2019	Phase I 2019	Phase I 2020	Phase I & II 2020 - 2024
	Hepburn Solar Bulk Buy: households (including Solar Savers)				2018	Phase I & II 2019 - 2024
	Residential dual fuel to all electric: community campaign and appliance switch	Phase I 2020	Phase I 2020	Phase I 2020		
	Reforestation (for firewood)					
	Hepburn Shire council bioenergy project			Phase I 2019	Phase I 2019	Phase I 2020

Actions listed in the following table are community-based actions that have emerged through community engagement. Who will take responsibility for specific actions within the Implementation Plan will need to be explored with the local community, Council and the roundtable groups in the next phases of Z-NET.

MAIN INITIATIVES TO 2029	INITIATIVES	Engagement / sector partnerships	Analysis & Strategy	Tests & Demonstration	Implementation	Scaling up
	Hepburn Wind solar farm		Phase I 2019		Phase I 2020 - 2021	
	Additional mid-scale generation projects / community battery storage	Phase I 2019	Phase I 2020		Phase I 2021	Phase I & II 2021 - 2024
	Virtual Power Plant	Phase I 2019	Phase I 2020	Phase I 2020	Phase I 2021	Phase I & II 2021 - 2024
	Large-scale solar farm for 220kv transmission line	Phase I 2020	Phase I & II 2020 - 2022		Phase II 2023	
	Micro-hydro electric at Daylesford Lake		Phase I 2019		Phase I 2020	
Transport	Resident rideshare	Phase I 2019	Phase I 2019	Phase I 2019	Phase I 2020	Phase I & II 2020 - 2024
	E-bike share program	Phase I 2019	Phase I 2020	Phase I 2020	Phase I 2021	Phase II 2022 - 2024
	Safe walking and bicycle paths	Phase I 2019	Phase I 2019	Phase I 2019	Phase I 2020	Phase I & II 2020 - 2024
	Biofuel programs	Phase I 2019	Phase I 2020	Phase I 2020	Phase I 2021	Phase II 2022 - 2024
	Electric vehicle transition: EV public car charger stations	Phase I 2019	Phase I 2020	Phase I 2020	Phase I 2021	Phase II 2022 - 2024
	Electric vehicle transition: EV car share program	Phase I 2019	Phase I 2020	Phase I 2021	Phase II 2022	Phase II & III 2023 - 2029
	Community bus project: electric or biofuel	Phase I 2019	Phase I 2020	Phase I 2021	Phase II 2022	Phase II & III 2023 - 2029
Agriculture	Climate smart farms local pilot	Phase I 2019	Phase I 2019	Phase I 2020	Phase I 2021	Phase II & III 2022 - 2029
	Herd management for beef cattle awareness raising and pilot	Phase I 2019	Phase I 2020	Phase I 2021	Phase I 2022	Phase II & III 2023 - 2029
	Beef cattle - feeding nitrate supplements awareness raising and pilot	Phase I 2019	Phase I 2020	Phase I 2021	Phase I 2022	Phase II & III 2023 - 2029
	Dairy cattle - feeding dietary additives awareness raising and pilot	Phase I 2019	Phase I 2020	Phase I 2021	Phase I 2022	Phase II & III 2023 - 2029
	Soil carbon - sequestration in grazing systems awareness raising and pilot	Phase I 2019	Phase I 2020	Phase I 2021	Phase I 2022	Phase II & III 2023 - 2029
Waste	Reduce waste to landfill	Phase I 2019	Phase I 2020	Phase I 2020	Phase I 2021	Phase II 2022 - 2024

MAIN INITIATIVES TO 2029	INITIATIVES	Engagement / sector partnerships	Analysis & Strategy	Tests & Demonstration	Implementation	Scaling up
	Hepburn Council Zero Emissions Waste commitment				Phase I 2019 - 2021	
	Central Highlands Water Zero Emissions commitment				Phase I - III 2019 - 2029	
	Village scale composting	Phase I 2019	Phase I 2020	Phase I 2020	Phase I 2021	Phase II 2022 - 2024
	Plastic Free Town initiative, Plastic Wise Policy	Phase I 2019	Phase I 2019	Phase I 2019	Phase I 2020	Phase I & II 2020 - 2024
Land use change	Restoration and reforestation (carbon sequestration)	Phase I 2019	Phase I 2020	Phase I 2020	Phase I 2021	Phase II 2022 - 2029
	Land use: options for enhancing local carbon sinks	Phase I 2019	Phase I 2019	Phase I 2020	Phase I 2021	Phase II & III 2022 - 2029
Planning & housing	Sustainable building code	Phase I 2019	Phase I 2019 - 2020		Phase I 2021	
	Prefab / tiny house demonstration for affordable housing	Phase I 2019	Phase I 2019 - 2020	Phase I 2021	Phase I 2021	

This project is a strategic initiative of the Coalition for Community Energy

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Additional support, data and information
Trentham Sustainability Group
Transition Creswick
Clunes Sustainability Group
SHARE
Hepburn Relocalisation Network
Localising Leanganook
Powershop
Powercor
Latitude Group
Climate Council
Engineers Without Borders
DNV GL
Daylesford and Macedon Tourism
Ausnet
Meat and Livestock Australia
Central Highlands Water
Farmers for Climate Action

The project team would like to recognise and thank the seventeen members of the local community advisory panel who helped to guide the CTP.

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For the full Z-NET Community Transition Plan and associated documentation go to
www.z-net.org.au/hepburn