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Strategy 3

Generating energy (distributed energy systems)

Distributed energy systems draw on local resources, for example natural gas, to generate electricity and, as a by-product, heat.

Co-generation is the generation of both electricity and heat at or near the point of use, most commonly using natural gas as fuel. Electricity generators fuelled by natural gas are less greenhouse gas (GHG) intensive than those which are fuelled by coal, which is the feedstock used for the majority of Victoria's grid electricity. Although biomass and biogas fuelled generators are even less GHG intensive, it is extremely difficult to guarantee a sufficient, secure supply of biomass and biogas, and the generation technology which use these feedstocks is less mature and reliable.

A tri-generation system is created by adding an absorption chiller to a co-generation system to provide cooling. Absorption chillers provide a way of using thermal energy to deliver cooling to buildings, as an alternative to conventional electrically driven refrigeration. By using the heat stream from a co-generation system as the thermal energy source, absorption cooling offers the potential to expand the range of co-generation's applications.

The key benefits of tri-generation for the City North precinct include:

- Reduced electricity and heating costs for energy customers.
- A 30 - 40 per cent overall improvement in energy generation efficiency through the avoidance of transmission losses (typically 7 - 11 per cent) and by using waste heat.
- A significant and cost effective reduction in GHG emissions, as tri-generation is widely acknowledged as one of the most cost effective carbon abatement technologies available.
- In-built redundancy through the establishment of multiple plants - if one system is down (due to failure or routine maintenance) other adjacent local systems can provide the shortfall supply.

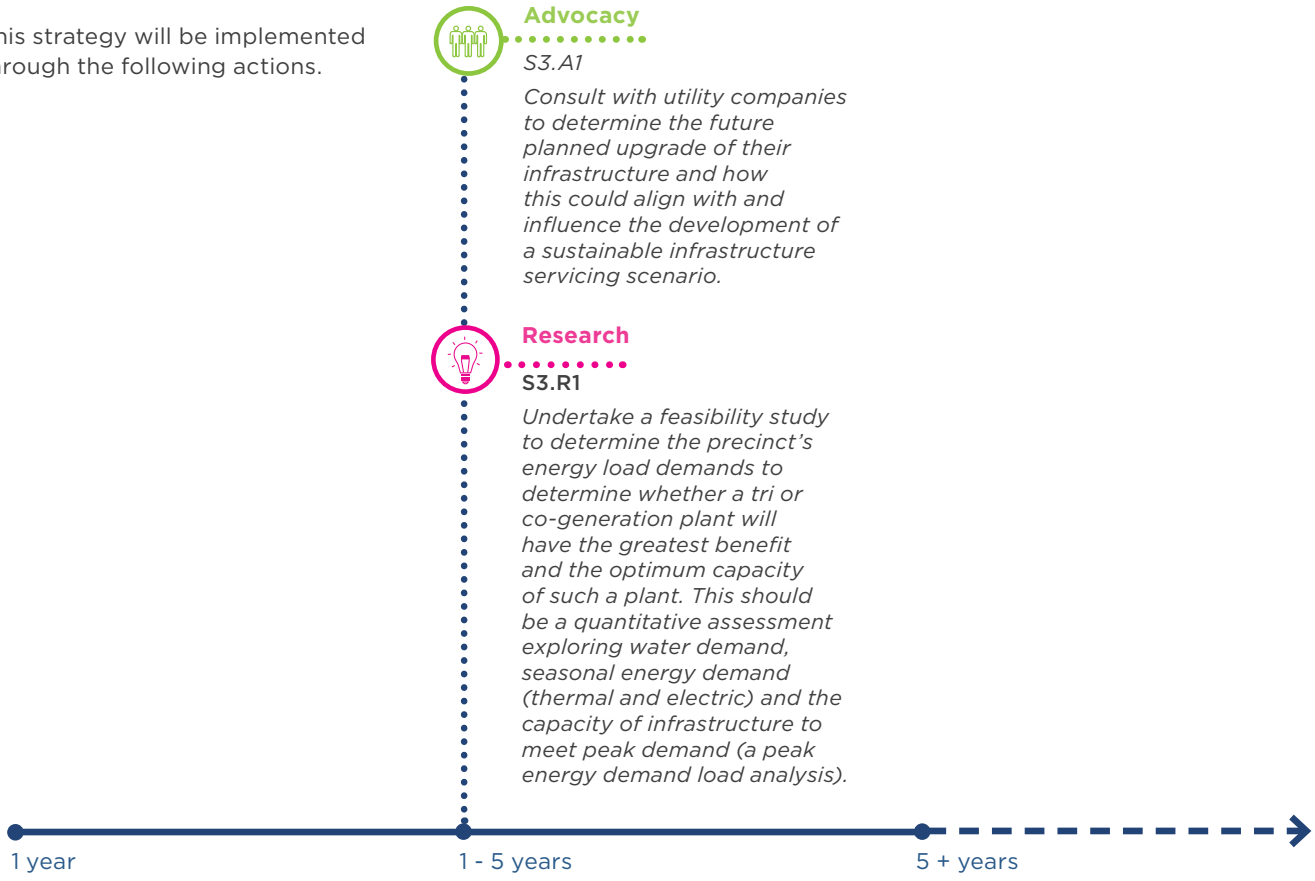
Gas fired tri- or co-generation plants are proposed within the CSHs to help meet the City North precinct's future energy needs (see Figure 7.1). The hot and chilled water generated at these hubs would be distributed across the precinct in pipes via a central service tunnel.

As a technology co-generation is considered to be reliable and mature. Tri-generation technology, while not as mature, is becoming increasingly utilised globally.

Whilse this technology is less greenhouse gas intensive the increased energy demands within this precinct will lead to increased emissions for the municipality. Investment in co-generation and tri-generation plant sites will need to be considered alongside lower and zero emission technologies in the next ten years.

Actions

This strategy will be implemented through the following actions.



Legend

- Central Services Hub (CSH)
- Local generation plant
- Closed loop system
- Water treatment plant
- Tri-pipe system distributing chilled, heated and recycled water
- Tri-pipe system interconnectors
- Stormwater collection points to CSH for treatment and storage
- Electricity and water distribution from CSH
- Stormwater flows to CSH for treatment and storage
- Green wall/roofing treatment
- Existing train routes
- Existing train station
- Subject to future masterplanning
- Proposed Melbourne Metro alignment
- Proposed Melbourne Metro station
- Structure plan study area
- Open space

1 : 10,000 @

Figure 7.1: sustainable infrastructure concept plan

Strategy 4

Distribution of resources via a Combined Services Tunnel

The construction of a combined services tunnel is proposed for the City North precinct. It would be approximately 3m in width and breadth and be constructed as a trench under the road network across the precinct to distribute the energy and water resources created within the CSHs. Three separate water pipes, containing chilled, hot and non-potable water would be housed in the tunnel.

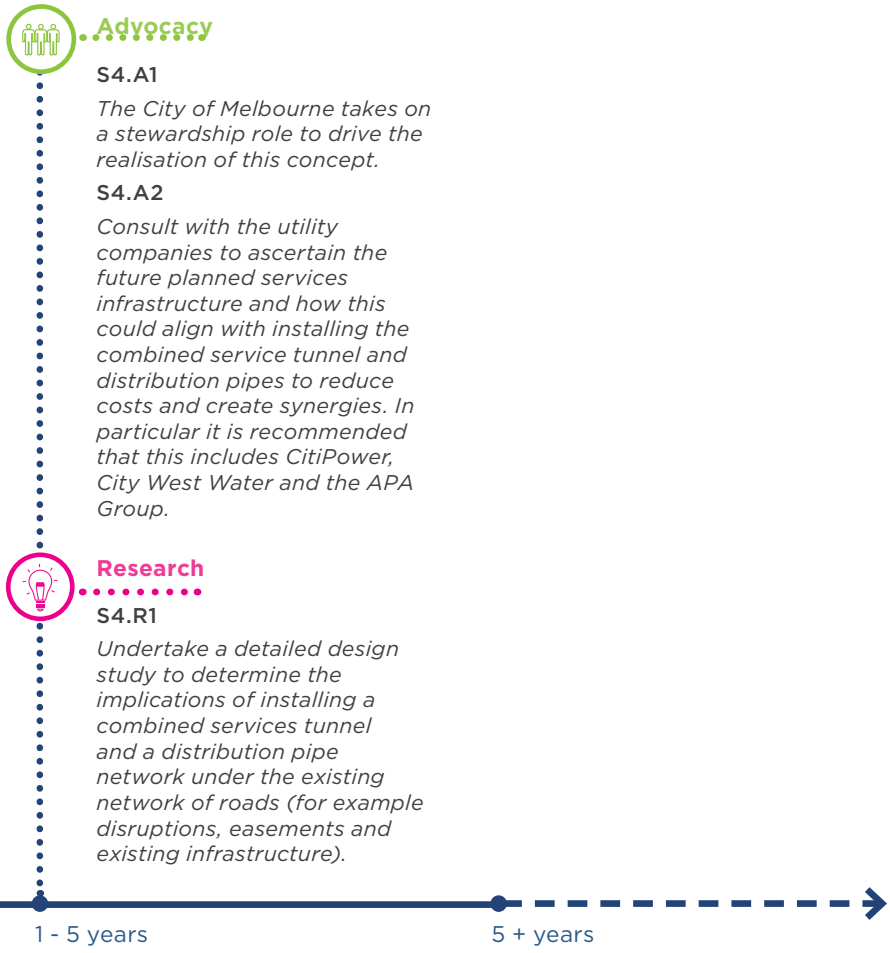
An initial capital investment will be required to construct the tunnel and install the pipes so that the resources created within the CSH can be distributed. Installation of the pipes should be aligned with any future upgrade of services to reduce installation costs, such as the electricity infrastructure. Financial returns will only commence once customers (or buildings) connect into and draw from the distributed resources contained in the pipes. Existing utility services such as gas, electricity, communications and potable water could be co-located in the tunnel.

The advantages of a combined services tunnel include ensuring that pipes are easily accessed for maintenance and upgrades, providing easy accessibility for future network infrastructure roll-outs, and minimising precinct disruption in future.

Combined services tunnels exist across Australia and internationally. The technologies involved are mature and reliable and this is considered appropriate for the unique context of the City North precinct.

Actions

This strategy will be implemented through the following actions.



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Strategy 5

Construct efficient buildings

A significant proportion of a building's performance is determined in the early stage of the design process, with residential and commercial buildings being responsible for 23 per cent of Australia's total greenhouse gas emissions (Australian Sustainable Build Environment Council, 2010). There is an opportunity for the City of Melbourne to mandate the delivery of higher environmental performance in buildings in the City North precinct.

This involves mandating building efficiency standards above the Building Code of Australia standards for new and existing buildings, and the potential adoption of energy generation technologies, such as photo voltaic cells and solar hot water units.

Efficient buildings consume fewer resources, minimise adverse impacts on the built and natural environment, save money, increase worker productivity and create healthier environments for people to live and work in. By mandating that all new buildings meet minimum levels of performance the resources consumed by buildings will decrease.

There are barriers within the property industry that prevent efficient building measures being adopted, despite a strong business case for their implementation often existing. These barriers relate to the owner/tenant and developer/contractor/owner divisions, or 'split incentives', that result in the benefits of energy efficiency measures not accruing to the party that funded their costs.

The City of Melbourne has developed a policy for inclusion in the *Melbourne Planning Scheme* that will ensure all new buildings have higher environmental credentials. This will drive improvements in line with current best practice, in the energy, water and waste efficiency of new urban development.

Melbourne Planning Scheme Amendment C187 seeks to incorporate the new energy waste and water efficiency policy into the *Melbourne Planning Scheme*. It will apply to buildings used for office, retail, education, research and accommodation purposes.

The new policy will ensure that future development across the city will:

- Achieve a high level of environmental design, construction and operation.
- Minimise the city's contribution to climate change impacts by reducing greenhouse gas emissions.
- Improve water efficiency of buildings and encourage the reuse of mains water.

Melbourne Planning Scheme Amendment C187 proposes specific standards for energy, water and waste efficiency depending on use and the size of the proposed building. The measures/rating tools are industry accepted and recognised.

On top of the efficiencies of individual buildings, *Melbourne Planning Scheme Amendment C187* also recognises additional efficiency contributions that could come from district based energy, water and waste systems within urban renewal areas defined in the new *Municipal Strategic Statement*. The policy encourages new buildings in urban renewal areas to be capable of connecting to planned or established alternative district water supply, energy supply, waste collection and waste treatment systems. The introduction into the *Melbourne Planning Scheme* of new built form controls that target overall environmental performance would provide a mechanism to influence sustainability outcomes within City North.

Actions

This strategy will be implemented through the following actions.

7 Sustainable infrastructure

Strategy 6

Implement water sensitive urban design (WSUD)

The application of water sensitive urban design (WSUD) principles within the streetscape and landscape of open spaces provides the opportunity to harvest run-off for irrigation that would otherwise be lost to the stormwater drainage system. The implementation of WSUD measures would also improve the quality of collected stormwater through the filtration of pollutants.

As the precinct develops, it is proposed that WSUD is delivered by taking land from roads and redesigning active recreation areas. WSUD within the City North precinct can be used to replace between 2 - 3 per cent of the impervious surface area of the precinct with porous and permeable pavers.

When implementing WSUD features, there needs to be a balance between WSUD and the provision of active and useable community open space. Seasonal influences are also a critical factor. Periods of peak demand in summer and peak supply in winter are not synchronised. As a result, some proportion of irrigation is likely to be required during summer when rainfall is low and temperatures are high. This need can be met through the supply of recycled water generated within the CSHs, and from the stormwater collected in the distributed stormwater collection points (small underground tanks).

This approach supports the delivery of the integrated water management requirements of Clause 56 of the *Victoria Planning Provisions* (VPPs). Clause 56 is the residential subdivisions component of the VPP and the basis for all local council planning schemes in Victoria.

The benefits of WSUD are that it:

- Reduces pollutant loadings in stormwater and downstream receiving waters.
- Helps mitigate against flash flooding by reducing flow rates.
- Provides vegetated public spaces with the interrelated benefit of shade, air quality, habitat and visual amenity.

For further information on designing WSUD landscapes refer to the City of Melbourne's WSUD guidelines.

Actions

This strategy will be implemented through the following action.

Research

S6.R1

Develop a WSUD concept for the City North precinct that considers the yearly water balance requirements of the system, the location and size of the distributed stormwater collection points and does not reduce public open space.

1 year | 1 - 5 years | 5 + years

Strategy 7

Incorporate a vehicle-to-grid system

In City North it is proposed that a vehicle-to-grid (V2G) system could be implemented in car parks to generate electricity. This involves electric drive vehicles (EDV) plugging into the electricity network to feed electricity back into the grid during peaks in demand and charge when electricity demand is low. This increases the efficiency of the electricity grid by reducing troughs in demand and reducing the need for back-up. The main examples of potential applications include converting commercial fleets, car rental companies and parking lots into 'car parking power plants'.

EDV technology is likely to play an important role in the future of motor vehicles in Australia. EDVs may reduce greenhouse gas emissions and ambient air pollution, while reducing energy consumption and thus Australia's exposure to crude oil prices and oil import dependency. Importantly, the emissions reduction potential of EDV technology depends on the carbon intensity of electric power generation and the size of the vehicle fleet. Currently implementation of this system would lead to greater greenhouse emissions in the absence of low or zero carbon electricity generation availability.

Strategy 8

Incorporate opportunities for sustainable infrastructure into any street upgrades.

Refer Strategy 2 Chapter 5 Public Realm.

Actions

This strategy will be implemented through the following action.