Online email: Gas.Roadmap@delwp.vic.gov.au

August 6, 2021

RE: Victoria's Gas Substitution Roadmap Consultation Paper

Thank you for the opportunity to provide a submission to the consultation paper on Victoria's Gas Substitution Roadmap.

The South East Councils Climate Change Alliance (SECCCA) is made up of nine local government councils to the south east of Melbourne. SECCCA councils span the metropolitan, peri urban and rural divide and have some of the fastest growing residential developments on the fringe of metropolitan Melbourne. Together, SECCCA councils serve over one million residents. Through SECCCA, these councils collaborate to act on climate change. This action includes mitigation and adaptation projects and advocacy for the community.

SECCCA's vision is for a thriving and productive southeast Melbourne region that has a safe and sustainable climate. Together with a majority of member councils, SECCCA has declared a climate emergency recognising the existential threat climate change poses to our communities and to our environment and calls for urgent action to address the risk. Most members have developed or are developing climate emergency action plans. SECCCA member councils have ambitious emissions reduction targets and we have also advocated for an ambitious Victorian Interim Emissions Reduction Target for Victoria that aligns with the Paris Climate Agreement ambition to keep temperature increases to 1.5 degrees. We are also exploring how local governments can most effectively assist our communities to work towards a 1.5 degrees Science Derived Target for the region.

SECCCA's community emissions profile using data from Snapshot shows that gas makes up 17% of regional emissions as a source of stationary energy in residential buildings, commercial facilities, and manufacturing and construction industries.

Emission reduction and a transition to a zero-carbon, fossil free, economy is an economic imperative. Businesses must be ready for zero emissions and be supported to embrace the exciting economic opportunities presented by technologies such as renewable energy, industrial and residential energy efficiency, electrification, public transport and improved land use.

The south east produces $85 billion in Gross Regional Product and is one of Australia's largest manufacturing regions, with more manufacturing jobs than greater Adelaide and Western Sydney. The region presents exciting opportunities for the development of the renewable energy industry. The Greater South East Melbourne organisation has identified that the south east Melbourne region will be sustainable, resilient and future proof and have high "a renewables sector that catapults industry performance"

Global economies and businesses have recognised the imperative to reduce emissions are setting ambitious emission reduction targets. The pace of transition away from fossil fuels, in Victoria, including gas, must also be accelerated to both respond to the climate emergency and to also ensure that Victorian manufacturing, industry and commercial sectors remain competitive with the global economy.

Recent data shows that the methane in gas is up to 40 times more potent over a 100-year period, and nearly 100 times more potent over a 20-year period (*Climate Council 2020 Passing Gas - Why renewables are the future*).

Whilst it is recognised that in the short term there is a role for gas fuels in some industries, this is only a small proportion of the total gas use in Australia. Gas is also used by the community to provide energy for essential heating and cooking. However, gas is not required as a 'transition fuel'. The Australian Energy Market Operator (AEMO) suggest that over two-thirds of gas power stations will retire in the next 20 years, without being replaced by new ones (Climate Council 2020 Passing Gas - Why renewables are the future).

As evidenced by SECCCA's work in residential energy efficiency, there are affordable and currently available technologies that can enable the building of new homes to be done so without gas. That said, the community is concerned about how they will manage without the use of gas. Communications campaigns are needed to engage with community to discuss how to address the challenges of the transition.

We welcome the opportunity to provide comment on this Gas Transition Roadmap. We also commend the $1.6 billion the Victorian Government has put towards renewable energy and energy efficiency in the 20/21 budget.

We note the Victorian Greenhouse Alliances have made a joint submission. SECCCA has decided to provide this submission to reflect the specific circumstances of the southeast Melbourne region.

Aligning with the VGA submission however, our response is centred around the following three principles:

- Prioritise the speed of the transition – recognising the urgency required to mitigate the impacts of climate change, action should not be delayed when there are cost effective solutions available today.
- Seize the economic opportunity – the gas transition presents enormous opportunities to expand the clean energy industry, generate jobs, boost economic productivity, and position Victoria as a leader in clean energy technologies.
- Ensure the transition is socially inclusive and equitable – the transition needs to be managed to ensure that the benefits are shared equitably and that the costs are not unduly borne by vulnerable communities and those least able to afford it.

Please find below specific responses to most of the questions that were posed as part of the consultation process.

Please also note that this submission has been informed by SECCCA member councils however does not necessarily represent individual councils' view.

For further information about this submission, please do not hesitate to contact me.

Yours sincerely

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Key issue 1 - Maintaining electricity reliability with new sources of demand

1. What policies are needed to ensure that the electricity network can reliably serve new sources of demand from hydrogen production, electric vehicles and electrification of gas demand?

Policies, programs and regulations that drive an increase in the uptake of energy efficiency in the residential, commercial and industrial sector are critical to ensure the electricity network can reliably service demand.

These policies and programs and regulations include

- Better building efficiency, including improved electricity intensity requirements in new buildings, can reduce energy demands at neighbourhood scale and large scale to cover peak demand.
- Educational/promotional support and rebates and subsidies for the installation of induction cooktops in residential and commercial sectors.
- Support for solar installation, e.g., the promotion or PPAs in business, EUAs for business and households etc
- Planning legislation to facilitate energy efficiency (i.e., ESD 2.0) and construction code changes (i.e., NCC)
- Support for the uptake of more efficient appliances and plant equipment.
- Where applicable, require the installation of PV or other appropriate clean energy behind the meter energy generation on new buildings and the provision of future infrastructure.
- Restrictions on gas infrastructure to all specialised connections and future supply opportunity (i.e., hydrogen or biogas).

2. What is the role for gas-fired power generation and hydrogen in maintaining electricity reliability?

Other renewable options and storage and grid infrastructure should be considered prior to the use of gas for peak electricity generation. The pace of renewables is growing faster and will continue to.

Gas should be reserved for industrial processes where there is no alternative, not power generation, or as an emergency source of power to avoid black outs.

There should be disincentives for gas supply of peak power generation. Cheaper fossil-fuel-free sources should be prioritised before gas.

Key issue 2 - Transitioning to more sustainable gaseous fuels with minimal disruption to end-users

1. What are the key technical challenges in converting existing gas networks to accommodate more sustainable gaseous fuels?

Electrification of the energy grid and increased energy efficiency of the State's key assets and infrastructure should be the priority for the transition away from gas, followed by use of alternative gaseous fuels.

The increased availability, affordability and efficacy of renewable energy sources such as solar PV and wind power negate the need for combustion of gaseous fuels in most applications. The primary exceptions relate to specific industrial processes that are difficult to replicate using electricity, and end users in remote areas in which consistent power supply may be an issue. Investment in "off-the grid" electrical technologies such as storage and further investment in Victoria's electrical transmission network can assist in addressing this challenge.

Furthermore, the actual (and perceived) capability, reliability and safety of hydrogen and biogas present key technological challenges.

Ideally, the requirements for reticulated gas to be connected to new residential developments should be removed completely, and these developments completely electrified. Both residential and typical commercial developments are also readily electrified through the utilisation of air-to-air electric heat pumps for heating, air-conditioning and domestic hot water, combined with rooftop solar PV and solar pre-heating or storage tanks.

For the commercial sector, packaged scroll ACs with fresh air economy cycle for units larger than 15kW can also be utilised for heating and cooling.

Subsidised ammonia heat pumps for aquatic and leisure centres, along with further education and engagement, should be considered.

2. What are the potential costs and opportunities in switching to more sustainable gaseous fuels for consumers?

With the electrification of buildings and the generation of the majority of electricity required from roof top solar, most remaining energy requirements could be sourced from the grid via 100% renewable energy (such as wind power, large scale solar, and hydropower). This would eliminate the need for the majority of fossil fuel resources.

As it is a waste by-product, Biogas is considered to be less costly, more readily available and reliable. Once the transition is made, there will be more competitive costs in the long run with a less emissions intensive fuel available at a low cost.

Key issue 3 - Maintaining the reliability, affordability and safety of gas supply

1. What are the affordability, reliability and safety considerations related to gas supply and gas infrastructure, both in the short term and during a long-term transition to a decarbonised gas sector?

Gas resources are finite and depleting in Victoria. Further prospecting and exploration is not a viable long-term option for many reasons. Gas supply reliability should be aimed at preserving supply for industrial processes for which there is no alternative.

In the case of the City of Greater Dandenong, it is the industrial and manufacturing sectors that have many processing operations requiring gas that cannot necessarily be met with electric heat pumps, hydrogen or biofuel in the short to medium term. While there are multiple benefits of a long-term transition to electrification of these processes, the cost will prove prohibitive until further large scale investment is made in the electricity network. Please refer to the 2018 Beyond Zero Emissions Zero Carbon Industry Plan – Electrifying Industry for a comprehensive evaluation of electrification of industrial end uses which summarises the possibility of this transition.

Reliability should focus on improved energy performance and transitioning residential and typical commercial operators away from gas to electric alternatives. Coupled with energy efficient buildings, this is more cost effective and offers better emissions reduction outcomes. This also frees up existing supply to industries that have limited alternatives.

2. What policies are needed to ensure that the gas system continues to operate reliably and safely and remain affordable for end-users during this transition?

Gas should be prioritised for industrial consumers where there are no readily available short term electrification alternatives (such as high temperature process heat). However, where the technology doesn't currently exist for a transition, research and development consideration of other fuels such as hydrogen to enable a transition away from fossil fuels should be prioritised. Wherever possible, as the technology allows, gas appliances should be replaced with electric with a phase out plan for other appliances that requires further development of appropriate alternate technology. In time a 'ban' should be placed on mature proven technologies to ensure now new gas fired appliances enter into the system that then lock in emissions over the life of the appliance.

Building regulation in the NCC and Victorian Planning Provisions should ensure that new residential developments are gas free. Environmental protection legislation and the potential for an emissions tax or trading scheme will also prevent growth in demand for gas infrastructure.

Key issue 4 - Supporting Victoria's workforce, industry and the institutions that support them

1. What workforce skills and industry capabilities are required to transition to new and emerging energy sources?

Skill sets are needed for de-gasification and electrification of residential and typical commercial operators. Existing skilled workers should be prioritised for the transition to and expansion of Victoria's electricity grid and the predicted increase in employment opportunities in the renewable energy sector in particular.

Management of refrigerants should also be taken into account to avoid ozone depletion and global warming potentials.

More research capability at the tertiary and TAFE level is needed to support hydrogen and biofuel.

2. How can government, industry and unions best work together, including through the Victorian TAFE and Training system, to help to build these skills and capabilities, and support existing workers through the transition?

This area demands substantial investment to ensure appropriate skill sets are available to support the transition.

Councils with TAFE and training campuses in their municipality, such as City of Greater Dandenong and Frankston City Council, would welcome increased investment in these areas. For example, with TAFE and training campuses located in these municipalities, it is expected that opportunities to boost skills through these educational institutions (without the need for under/post-graduate courses) would be well received.

3. How do we maximise local job opportunities, including for industry training centres such as that operated by the Plumbing Industry Climate Action Centre, to prepare workers for the future?

Having training centres located closed to energy generation will help to maximise local job opportunities. This will support the generation of employment opportunities in regional hubs, particularly in former natural gas employments sites.

Key issue 5 - Managing uncertainty in the transition

1. What key uncertainties should the Roadmap take into account, and what is the government's role in reducing these uncertainties?

A strong and factual information package addressing supply, safety, and capability and inclusion of real-world examples to boost confidence in the transition when it occurs is needed.

This should include the current and increasing costs of maintaining the gas network, the estimated costs of the transition and its effect on different customers, and the future higher costs if the transition is not implemented or implemented slowly. These future costs should take the environmental and social costs (greenhouse gas emissions and jobs) into account.

Key issue 6 - Transitioning the Victorian economy efficiently and equitably

1. How can we ensure that the costs of transition to lower emissions energy sources are borne equitably?

Electrification of residential and commercial SMEs is viable now. The capital costs may be higher however the operational benefits, particularly when considering the rising cost of natural gas into the future, outweigh this.

It is also important to avoid any stranded assets use gas as the transition occurs, noting that the speed of the transition could accelerate rapidly in the same way that other emissions reduction technologies have rapidly accelerated.

As an example, Moreson larger boiler systems that were cheap at the time fell behind electrical systems a few years down the track (i.e., Cogeneration and Trigeneration plants – one of which was removed from central Dandenong as it wasn't viable). This is particularly prudent considering the ongoing maintenance cost of large-scale gas systems compared to newer electric technologies such as heat pumps.

2. How can we help low-income and vulnerable households manage any upfront costs in changing energy sources?

Grants and rebates for occupants, owners, builders and developers. Increased prioritisation of local manufacturing would bolster this. For example, rebates for switching cooking appliances from gas to electricity.

Accessing assistance and low interest finance or loans to upgrade to solar-electric or heat pump electric hot water systems at point of failure.

Introduce a policy of electrical replacement of appliances and hot water heating in Social Housing from 2021.

Using our clean, free and infinite renewable energy resources could see Australia becoming a manufacturing superpower with demand from ASEC-ASEAN trading partners.

3. What are the barriers for households in improving the efficiency of their use of gas for heating, cooking and hot water and/or switching to solar/pump hot water in existing homes?

Provision of information, education and engagement can assist. If the option isn't available to them, they will stay with what they have (e.g. apartment or unit with no gas connection, the resident will get used to cooking with induction). Ultimately programs that incentivise rental providers to improve energy efficiency or minimum starts should be developed (e.g., Victorian Residential Efficiency Scorecard).

4. What are the opportunities for the Victorian Energy Upgrades program to incentivise efficient gas use, thermal upgrades of buildings (e.g. insulation) and electrification?

The VEU should be expanded to include incentivising thermal efficiency and electrification. Where there are alternative electrification technologies, VEU support for gas should be removed.

The Victorian Energy Upgrades program would provide one means of low interest finance or loans to upgrade to electric appliances. However, consumers will need assistance to know about the scheme at point of sale, i.e., installers will need to understand and submit the paperwork on behalf of consumers in a similar way to the Solar Homes rebate.

5. What issues and elements do you see as most important to improve the energy and emissions performance of new homes?

SECCCA's key technology recommendations for mandatory changes to the building envelope for all new homes are as follows

1. Source 100% renewable energy at all times (solar PV).
2. External shading for east and west windows.
3. Minimum insulation levels of R2.5 walls and R5 in the roof.
4. Minimum glazing performance of R0.3 and U value of 3.3 for windows & doors.
5. Achieve a building envelop airtightness value of less than 5ACH at 50pa of pressure (as per the standard currently used in the NCC).
6. Achieve a mechanical air ventilation rate of 1 ACH every 2 hours, including the recovery of 90% of heat in the exchanged air and filtering of air to a level of M5 / G4.
7. Three additional building inspections - Pre insulation, Pre plaster & Post occupancy to ensure on-site as built verification and certification.

The estimated costs to achieve the above recommendations was approximately $20,000 per house with attractive paybacks of 8 years (assuming $2,500 annual energy bills, 30squ home). If (as observed in some households) these costs are included in the construction budget rather than additional costs, then paybacks are negligible, and homeowners enjoy the benefits of lower living expenses every year.

IMPROVING ENERGY EFFICIENCY - HOUSING ENERGY EFFICIENCY UPGRADES, APPLIANCE UPGRADES

1. What are the key benefits, risks, and potential impacts on various end-users, on energy affordability, safety, security, reliability and equity?

Improving household energy efficiency, in both the built form and of appliance, has tremendous benefits for householders and the community at large. Reducing the amount of energy used is the easiest and cheapest technical solution to implement.

SECCCA has developed and implemented several projects across the south east Melbourne region that have delivered energy efficient, zero carbon, climate resilient, comfortable and affordable homes.

For low-income households, SECCCA implemented the Energy Saver Study (ESS), a $4 million program to provide energy efficient upgrades. (The ESS provided the blueprint for the Sustainability Victoria's Healthy Homes program.) SECCCA also piloted the Residential Energy Efficiency Scorecard, which is an Australian-first 'whole-of-house' energy rating program.

For new homes, SECCCA undertook the New Home Energy Advisory Service (NHEAS). This project provided bespoke and detailed design advice to numerous households regarding how to achieve net zero carbon. Twelve of these households received an as-built verification of their homes, an air tightness test and a report quantifying costs, energy savings and experiences. (A comprehensive report on the finds of this program has been submitted to DELWP and is available upon request.)

Through the research undertaken as a core part of these projects, SECCCA has developed specific, evidence-based learnings that explain how zero carbon residential development is currently available and importantly, is affordable. The learnings are consistent with those from Curtin University and the CSIRO Mainstreaming Net Zero Energy Housing: Cost Analysis Report in which SECCCA participated through the build of SJD Net Zero Home. We have also communicated these findings to the Australian Building Construction Commission for consideration in its review of the National Construction Code.

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these costs are included in the construction budget rather than additional costs, then paybacks are negligible, and homeowners enjoy the benefits of lower living expenses every year.

These homes are also fully electric with zero reliance on gas, maximising solar system paybacks. Our experience is that electric induction cooktops are far superior to any gas equivalent cooktops or ovens. The homes still draw power from the grid, such as at night-time, however over the course of the year they generate more power than the use, making them net zero or carbon positive.

In summary, net zero carbon housing can be achieved at very affordable costs, using technology, and building approaches that are currently available - delivering comfortable, modern, and contemporary homes.

Convincing householders of the benefits from increasing the uptake of energy efficiency technologies in the built form remains the most difficult challenge. For many the technology can be confusing, especially when faced with the multitude of decisions required when building or renovating home.

2. What is the scale of the opportunities and potential to accelerate uptake?

Increasing the uptake of energy efficiency in households presents a huge opportunity to accelerate action across the new homes market.

From 2022 to 2025 the new net annual housing supply in Victoria is forecast to be 222,600 houses [1]. Changing building regulations and requiring additional building inspections to certify compliance in these new homes will make a significant improvement.

Incorporating energy efficiency into retrofits must be governed by regulation (for new builds) and incentives (for retrofits). Once buildings are energy efficient, their ability to transition away from gas becomes even more economical.

3. What are the key technical, regulatory and economic barriers?

The building envelope regulations are not sufficient to facilitate the uptake of energy efficiency technology that is currently available and affordable.

SECCCAs evidence-based findings demonstrate that there are no technical or economic barriers that should impeded the building of a zero carbon home.

These changes are already being implemented in some volume built homes and with changes to the regulations, the changes can be rolled out across the new homes market.

4. What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

The key role to be played by State and Federal Government is to mandate the appropriate technology recommendations. All governments can also support education and engagement, through for example the

[1] https://www.nhfic.gov.au/media/1581/nhfic-state-of-the-nations-housing-report-2020.pdf pg 72

sharing of case studies, to build awareness of the technologies and also the improved financial and wellbeing outcomes from their implementation.

There are a number of building practitioners that are already aware of and implementing the recommended approaches. The building industry at large must acknowledge the opportunities, accept that change must occur and support their stakeholders to embrace these new approaches.

5. What are the likely timings of technical maturity and economic viability?

These technology recommendations are easy and economic to implement now.

6. What are the best ways to maintain social acceptability and consumer confidence?

It is important to demonstrate that a zero carbon home is more comfortable, cheaper to run and that the technologies are readily available. Specifically highlighting cost savings is key.

It is also important to provide assistance/information to people to help them understand what is available and how to navigate what is involved in building an energy efficient home.

Through the implementation of the SECCCA projects discussed above, we found that engagement and commitment was actually the most difficult challenge (as opposed to technology and financial barriers).

7. What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

There are no trade offs with other pathways.

8. What are the key uncertainties and potential for unintended consequences?

It is important to ensure that compliance with improved household building standards is undertaken. The availability of resources and practice to undertake is not well developed and needs to be addressed.

9. What action is local government undertaking to facilitate transition away from gas?

Bayside City Council promotes how to reduce energy bills on its website.

City of Greater Dandenong is implementing the ESD local planning policy (Clause 22.06) which allows Council to encourage private development to transition away from gas. Participating in the Elevating ESD targets projects led by CASBE that will improve energy efficiency requirements and mandate no gas connection as base build. In the commercial space, all capital projects are designed to exceed NCC standards for energy efficiency to facilitate renewables.

Electrification - Substituting gas appliances for electric appliances and equipment

1. What are the key benefits, risks, and potential impacts on various end-users, on energy affordability, safety, security, reliability and equity?

With such a large proportion of residences connected to gas there is significant benefit and opportunity for the residential sector to substitute gas for electrical appliances and significant financial and emission reduction benefits due to the efficiency of electrical appliances compared to gas for residential. This transition also will facilitate job creation.

In the SECCCA region, gas is an important resource for the industrial and manufacturing sectors in particular. These sectors are a significant hub for economic activity, employment and GDP while also being a leading contribution to the region's overall emissions. Strong support will be required from the State government to ensure a just transition of these sectors is made as natural gas is phased out.

Substituting gas for electrical appliances in the Industrial sector will be more challenging, in particular industries that require gas as part of manufacturing and processing. However there is significant benefit to SMEs of an industrial nature that could transition away from gas to heat pumps.

2. What is the scale of the opportunities and potential to accelerate uptake?

The scale of opportunity and potential to accelerate uptake of electric appliances is immense, albeit challenging, when the number of appliances across Victoria is considered. Every home on gas network can replace appliances.

Provided supply issues can be addressed, the transition has the ability to be adopted quickly. In particular across industry and commercial operations once they understand the benefits. Many appliances can be easily replaced at the moment.

3. What are the key technical, regulatory and economic barriers?

Consumers that have been familiar with gas need to have an understanding of and trust in new appliances, e.g. heat pump hot water.

It is also unlikely, without specific policy drivers, that consumers will replace gas appliances until it is near or at its end of life. Consumers and installers need to have market awareness to enable them to readily replace a gas appliance with an electric one. This requires substantial information campaigns and point of sale advice on how to 'go electric.'

Economic barriers will exist for large industrial consumers that rely on large quantities of gas. If there is no substitute that is economically feasible then there will be no interest. Businesses operating on small margins will be hesitant.

Smaller systems are faced with a knowledge barrier as they may not understand the benefits of electric systems compared to gas. It's essential they are informed when making decisions about replacing assets at their end of life (either planned or reactive).

Note the Beyond Zero Emissions 'Electrifying Industry' report which summarises the key transition pathways for industrial applications:

Product	Electrical heating technology
Prepared food	Heat pumps and infrared
Beer	Heat pumps
Milk powder	Heat pumps
Paper	Infrared
Aluminium casting	Induction
Brick	Microwaves
Glass	Electrical resistance
Plastic	Electrical resistance
Steel	Renewable hydrogen and electric arc furnace
Ammonia	Renewable hydrogen

Table: Key technology substitutions for industrial degasification. Source.

4. What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

Through collaboration between government industry, it can be demonstrated that electrical appliances (e.g., heat pump hot water, stoves, space heaters) are more economical and safer than gas appliances, and will grow cheaper with time. This must be underpinned by reliable information and real-life examples across all sectors.

Industrial applications have larger potential than most residential for on-site renewable generation (PV on large roofs) ensuring reliable, emission free and cost-effective energy is provided to their operation.

Governments can provide incentive programs that financially reward replacement of gas with electric, modelled on energy efficiency upgrade programs.

5. What are the likely timings of technical maturity and economic viability?

For the residential sector and for the SME, the technology is mature and economically viable. For large industrial technical maternity and economic viability is likely to be medium to long term, although this is affected by investment of time and resources by all levels of Government.

6. What are the best ways to maintain social acceptability and consumer confidence?

Demonstrating that electrical appliances (e.g. heat pump hot water, stoves, space heaters) are more economical and safer than gas appliances, and will grow cheaper with time. They often are simply better technologies that are safter to operate and quiet. These co benefits are considerations for many people beyond simply cost and carbon reduction.

It is important to explain the economic, reliability and practical benefits of electrified systems to industrial and commercial customers. These benefits include reduced price impacts from volatile utility prices and, provide electrification is sourced from renewable power, a reduction in the carbon intensity of the company's outputs.

For the commercial sector, councils report that new building with no infrastructure for gas are readily accepted by the community.

7. What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

As domestic gas infrastructure will become redundant in the long term, a key transition issue to consider is what to do with the existing gas network.

8. What are the key uncertainties and potential for unintended consequences?

Electricity will become a key component of a business cost inputs thus ensuring competitively priced and reliable electricity will be necessary.

9. What action is local government undertaking to facilitate transition away from gas

Bayside City Council is substituting gas appliances in Council buildings for (renewable) electric appliances by 2030, and not connecting gas in all new buildings - e.g., only (renewable) electric appliances and heat pumps in new sporting pavilions.

City of Greater Dandenong's sustainable building policy aims to phase out all gas appliances as part of their Climate Emergency. Their sustainable buildings policy also requires all new buildings are all-electric and no gas (under any circumstances).

Substituting natural gas with hydrogen - Or renewable methane produced from hydrogen

1. What are the key benefits, risks, and potential impacts on various end-users, on energy affordability, safety, security, reliability and equity?

We see this as the game changer to virtually all sectors, especially the industrial and high-temp commercial applications sector. Green hydrogen could be the biggest driver of emission reduction over and above what conventional renewables are achieving right now. We understand it is still undergoing research and experimentation and therefore poses cost and safety risks.

2. What is the scale of the opportunities and potential to accelerate uptake?

Uptake needs to be focused on Industrial sector. In particular operations where process heat is needed above 500deg.

3. What are the key technical, regulatory and economic barriers?

The technical issues relating to safety of transporting hydrogen in network to homes and costs associated with upgrading of the network to accommodate hydrogen are key barriers.

4. What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

The development of green hydrogen requires government funding on a state and federal level for research and ultimately subsidies when commercially viable.

5. What are the likely timings of technical maturity and economic viability?

Medium to long term.

6. What are the best ways to maintain social acceptability and consumer confidence?

Green hydrogen is still seen as experimental, and awareness of the technology is limited. There remains hesitancy and scepticism about its efficiency and effectiveness at present.

Providing information and engaging with the industrial sector and other industry, community and local government stakeholders about the technology and safety issues is critical.

7. What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

The technology is seen as expensive and very risky although the potential to use the existing transmission network is a key benefit.

8. What are the key uncertainties and potential for unintended consequences?

Safety of the technology in industrial, commercial and residential applications as well as the costs associated with technology development and transmission infrastructure retrofitting.

Substituting natural gas with biogas - From the anaerobic digestion of organic material

1. What are the key benefits, risks, and potential impacts on various end-users, on energy affordability, safety, security, reliability and equity?

Bio gas is effective for in-situ agricultural applications. It presents benefits to rural and regional settings where these are dominated by agriculture or bio-related manufacturing. Biogas also supports innovation and employment by applying technology to operations and cost efficiencies to businesses.

2. What is the scale of the opportunities and potential to accelerate uptake?

Biogas is already operating on site in waste treatment sites. It is currently being utilised in rural and some metro settings (including the ETP in Bangholme). This allows for replication.

3. What are the key technical, regulatory and economic barriers?

There are only limited sites (landfills, agricultural plants and sewage treatment plants) available for biogas generation. Generation sites need to be located near a biofuel source).

There are also technical constraints where specialised equipment may be needed to refine or impacts on equipment from contamination.

4. What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

Governments need to provide more support for trialling and implementation of the project is needed. This support should be focussed on regional areas to stimulate employment and innovation. This can then be transitioned to metropolitan precincts and ultimately all settings.

5. What are the likely timings of technical maturity and economic viability?

Large scale roll out of bio gas is likely to be a medium to long term opportunity.

6. What are the best ways to maintain social acceptability and consumer confidence?

Demonstrating biogas burns as efficiently as natural gas, with no smell, will help to improve consumer confidence and acceptability.

Biogas is virtually the same as natural gas in its combustible purpose. There are also environmental benefits as it supports a closing of the energy loop compared to BaU. Waste is often considered economical compared to virgin (if practical).

7. What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

Biogas offers complementary benefits as it can be used in places where there is no gas network or in areas that are within close proximity to the feedstock production e.g. Colac treatment plant and meat works.

8. What are the key uncertainties and potential for unintended consequences?

The safety of the technology and impact on operational equipment through contamination is a concern. Amenity impacts are also possible as methane is often associated with landfill, waste and animal refuse.

Ensuring sufficient volumes of biogas to replace natural gas us a key uncertainty.

Emerging technologies - Concentrated solar thermal, carbon capture and storage, geothermal.

9. What is the scale of the opportunities and potential to accelerate uptake?

Solar Thermal, Thermal Waste to Energy and geothermal are big opportunities for regions of Victoria. Solar Thermal concentrators will be limited to northern Vic due to the sunshine resources.

Bayside City Council has a consortium of South East Melbourne councils ready to develop a thermal waste-to-energy plant to avoid landfill waste.

There is also a waste to energy plant being proposed for Dandenong South. There is community resistance to this, however if the social and environmental benefits outweigh the impacts then it can be replicated. Melbourne urgently needs alternatives to what is the finite availability of land fill space.

CCS is unproven on a large scale and will take a very substantial time to develop. To address the climate emergency, Victoria needs to support emerging technologies that are proven to be effective, are practical to implement and will have the largest benefit in terms of clean, economic energy generation and emissions reduction.

10. What are the key technical, regulatory and economic barriers?

Building plant is very expensive and requires a large number of partners, private sector finance and government funding support.

Solar thermal and geothermal are perceived as expensive and impractical. Waste to energy perceived as dirty and a dedicated waste stream.

11. What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

Government should provide finding support to help kick start the project and help to reduce investment risk.

12. What are the likely timings of technical maturity and economic viability?

While these technologies are mature, economic viability is considered a medium-term prospect.

13. What are the best ways to maintain social acceptability and consumer confidence?

Promoting the fact that these technologies are mature and being implemented elsewhere can help build social acceptability and consumer confidence.

Solar Thermal is mature technology in Spain and the USA. Geothermal is used in SW Vic and now Gippsland for water heating. Waste to energy is mature technology in Japan.

Exploring what the barriers (regulatory, demand and cost) are to the roll out of these technologies would be useful.

City of Greater Dandenong is considering geothermal systems as a heat source for Aquatic Centres however none have yet been pursued.

14. What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

Planning for and implementing logistics and infrastructure required to supply feedstock and transmit energy needs to be to supply energy source is necessary.

15. What are the key uncertainties and potential for unintended consequences?

As they are location depending, the distance of thermal generation from network and users can present logistical, infrastructure and economic uncertainties.