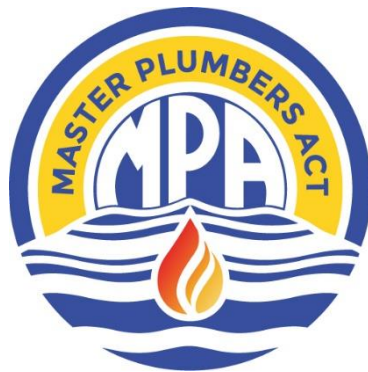


Master Plumbers Association - Canberra ACT

Submission

On the

Proposed Regulation to Prevent New Gas Connections in the ACT (ACT Pathway to Zero Carbon Emissions)



Master Plumbers Association – Canberra ACT (MPA) was established in 1976 and is the region’s peak organisation for the plumbing industry, aimed at supporting a strong and professional industry, a satisfied community, and a flourishing environment. We do this through our support of training excellence, industry leadership, an emphasis on environmental protection and sustainability, protection of public health and safety, and upholding highest ethical standards.

MPA’s work importantly brings all groups together to underpin best outcomes for the ACT community & ACT Government through our collaborative endeavours.

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1. Executive Summary

As the peak membership association for the plumbing sector, Master Plumbers Association - Canberra ACT welcomes the invitation from the ACT Government to present feedback on the Proposed Regulation to Prevent New Gas Connections in the ACT. We strongly counsel that our feedback will be fully considered, and especially that our Recommendations are implemented, prior to any decision being taken to ban new gas connections across our jurisdiction.

The ACT Government's announced decision to ban future gas connections is a decision which will have potentially devastating and irreversible impacts on ACT residents when renewable gas becomes the energy source of least cost and least environmental impact. The Community is unfortunately bearing the brunt of an escalating cost-of-living crisis, and gas is currently an economical and reliable energy source for the majority of our residents. Continued approval to connect gas will ensure we can:

- Maintain electricity reliability while new demands emerge;
- Transition to more sustainable gaseous fuels with minimal disruption to end-users;
- Maintain the reliability, affordability, and safety of gas supply whilst managing uncertainty during the transition; and
- Transition the ACT economy efficiently and equitably.

MPA is deeply concerned at the lack of comprehensive, reliable modelling and strategic planning in the ACT Government's push towards 100% electrification, and the failure to address transition challenges across all across all user types, building types, cohorts, demographics, and societal groups. As a single example, apartment dwellers are the fastest growing residential cohort across the ACT, and MPA calls on the ACT government to release detailed modelling and comprehensive planning documentation to support a fair and just transition for this and every building type over the next 5, 10, 15 and 20 years to 2045. This is a vital step prior to any premature decision to remove the option of gas connectivity.

MPA is acutely aware of misinformation being promulgated about natural gas, most recently the incorrect assertion in relation to negative impacts of gas use on health. This particular assertion has been thoroughly debunked, through independent, comprehensive, reputable research. It is particularly vital that the ACT Government relies on and shares reputable evidence with the broader Community to immediately and firmly correct false assertions.

MPA is pleased to present the following Recommendations to support the ACT Government in transitioning our Community to Zero Carbon Emissions. These recommendations will ensure the transition is as efficient as possible, whilst minimising negative cost-of-living impacts on our Community.

- ◆ **Recommendation 1:** That the ACT Government refrains from any decision to implement a ban on new gas connections.
- ◆ **Recommendation 2:** That the ACT Government undertakes and publishes detailed, peer-reviewed modelling for the proposed transition to 100% electrification - across all user types, building types, cohorts, demographics, and societal groups.
- ◆ **Recommendation 3:** That the ACT Government promotes reputable, evidence-based research around all energy options available to transition to Zero Emissions



2. About Master Plumbers Association – Canberra ACT

Master Plumbers Association – Canberra ACT (MPA) is the peak membership association for the plumbing sector, with a vision of a thriving, professional industry, a safe and healthy community, and a flourishing environment.

MPA members include experts across the breadth of the industry including policy makers, contracting businesses from those with 200+ employees to sole operators, training organisations, apprentices across the breadth of the 6 years of study to become fully licensed, product suppliers and allied organisations. The purpose of MPA is to support our members in their efforts to uphold highest possible ethical and professional standards through knowledge sharing, professional development, networking and advocacy.

Our objectives include the promotion of a professional and ethical plumbing industry as a critical objective across government, business and the community; the promotion and advocacy of policies and practices that support public health and safety and environmental protection; the improvement of relative plumbing sector outcomes for vulnerable demographics and groups within the community; leadership and promotion of a collaborative environment encompassing all those with responsibility for and working in the plumbing industry; and support and advocacy for highest standards of training and continuing professional development across the industry.

3. Concerns around ACT Government Modelling used to underpin the decision to transition to 100% Electrification

As comprehensively outlined in our communications across the sector, MPA continues to raise major concerns about deficiencies in the ACT Government’s modelling to support the transition to 100% electrification ([MPA ACT, 2022](#)). These deficiencies are summarised below:

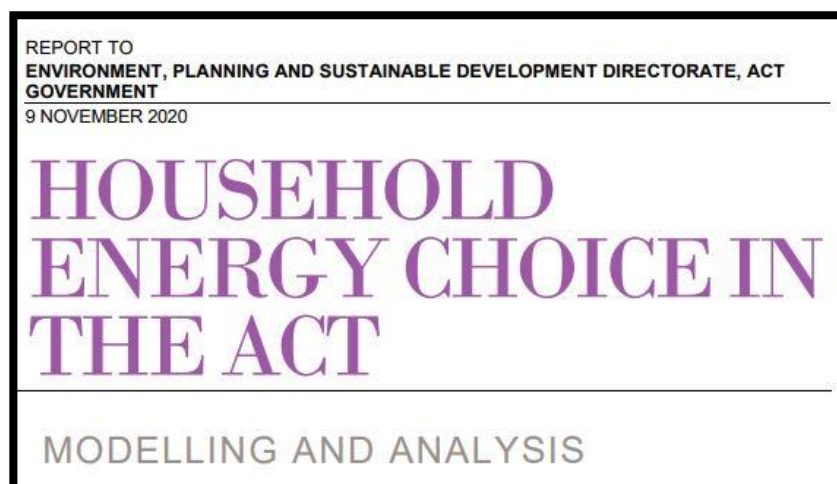
- The announcement to transition away from gas to 100% electrification was made with no industry consultation, nor consideration of the potential impact on our industry. The ramification of this has been to dis-incentivise Gasfitting as worthwhile to learn/maintain proficiency in, even though natural gas will be in use for the next 2 decades (based on government modelling). Consultation must have the ability to influence the outcome. MPA remains concerned that, given this history, that the outcome of these ‘consultations’ is predetermined, and our input will simply be irrelevant;
- The size and professional standing of our industry is significant – not simply in relation to Gasfitting, but across the much broader spectrum of Plumbing and Drainage. Our industry annually turns over around \$1b (our Large Project Award, to O'Neill and Brown Plumbing for the School of Physics and Engineering at the ANU, was worth \$200m alone ([MPA ACT, 2022](#))), trains 600 apprentices across Cert III and post-trade, involves hundreds of companies (from those with under 5 employees to those employing 200+) and thousands of individually licensed professionals.
- Our industry vital – across Gasfitting, Plumbing and Drainage. The high standard we uphold on behalf of our community is fundamental for best safety, public health, and environment outcomes.
- There is an innate difficulty in responding to the question around 'future Plumbing / Drainage / Gasfitting workforce needs' given that no transition planning has been released. Yet the Gasfitting sector of our industry has essentially been blindsided by the



government's announcement. In reviewing information released by the ACT Government, some important considerations are detailed below:

- No workforce modelling has been completed for the three presented scenarios, and the population/energy usage (21% projected increase in energy usage by 2045) projections seem problematic, with the detail for Hydrogen not appearing to be factually correct based on whichever consulting agency is relied upon (e.g. [\(PWC Global, 2023\)](#)). Indeed, the Energy Ministers Meeting (which includes all state and federal energy ministers, including ACT Minister Rattenbury) released a communique specifically supporting “the development of a competitive and efficient hydrogen and renewable gas industry, which will play a vital future role in delivering net zero emissions for Australia” ([Department of Climate Change, 2022](#)).
- The projected ACT population for 2056 of 700,000 ([Treasury 2019](#)), which is used as the basis for the electrification modelling (and decision to transition away from a choice of renewable gas), is concerning. 2021 census data shows prior modelling was under-estimated by 20,000 for the 2021 year alone. The expectation is that this recent under-estimate will be compounded over coming decades, and the projection of 700,000 residents by 2056 will also be a significant underestimate. How will this impact our industry? Across Gasfitting, Plumbing and Drainage?
- Shifting demographics and dwelling types appear to be missing from the modelling. Importantly, the current planning review has not been incorporated into the base case.
- Modelling such as the household energy choice modelling specifically excludes the fact that apartments or townhouses, or those who are renters, are unable to install solar ([Environment, Planning and Sustainable Development Directorate, ACT Government, 2020](#)). The fact that this vital aspect is excluded from modelling is compounded by the unrealistically low population/energy use projections, and lack of dwelling-type projections.

The modelling provides no insight into the planned explosion in numbers who will reside in apartments and townhouses over the coming decades, which makes the push to 100% electrification appear even more unsustainable.





- At present, the Gasfitting industry is in a holding pattern awaiting detailed workforce modelling.
- Workforce issues in our sector are compounded by the nation-wide shortage of skilled and semi-skilled labour as well as migration lags, and the focus on post-COVID infrastructure-led recovery. This is further impacted by product supply chain issues, worsening inflation, lower relative household income, and poorer housing affordability.
- As requested in our Budget Submission ([MPA ACT, 2022](#)), MPA strongly urges financial support to enable us to best assist all sectors of our industry and the community ([MPA ACT, 2022](#)). We continue to strive for exceptional professional standards on behalf of our community, whilst ensuring a positive transition for our industry, and this needs to be recognised and supported by our government.

MPA remains concerned about the effect on the ACT community as a result of the government's decision, especially our customers where we are less sure about the solutions that we may be able to offer: What are the technical solutions for those without the financial capacity to make the most of government incentives, those living in the increasing number of Canberra's multi-level apartments, or townhouses or even renters, who have no option to offset their energy with solar & batteries, or are perhaps faced with the burden of major building alterations as gas hot water options are no longer available? These issues have not been modelled, nor have population projections for these ever-increasing dwelling-cohorts been released.

4. A Zero Emissions Transition Utilising Gas: A reliable, safe and low-cost energy source

Our comprehensive 2022-23 Budget Submission ([MPA ACT, 2022](#)) & our Submission to the Inquiry into Climate Change and Greenhouse Gas Reduction (Fossil Gas) Amendment Bill 2022 ([MPA ACT, 2022](#)) clearly outline our industry's support for a smooth transition to Zero Emissions by 2045. However, we strongly urge the government to refrain from making any further decision that could permanently derail a future of green gas.

We urge the ACT Government to avoid the potentially costly impacts for consumers of removing renewable gas as an option to replace fossil gas. This is especially important given the cost-of-living pressure that is being felt across our nation.

Continued approval to connect gas would ensure we can:

- Maintain electricity reliability while new demands emerge;
- Transition to more sustainable gaseous fuels with minimal disruption to end-users;
- Maintain the reliability, affordability, and safety of gas supply whilst managing uncertainty during the transition; and
- Transition the ACT economy efficiently and equitably.

The industry considers the transition of the ACT's natural gas network to zero emissions to be potentially one of the most significant decision points in the long and proud history of the gasfitting industry in the ACT. It is an industry which has provided reliable, safe and low-cost energy for generations of Canberran families, employed many thousands of workers, and fuelled manufacturing and industry. Due to our industry's vital role, we continue to seek to work with the ACT Government to ensure a carefully balanced transition keeps the health of our economy



front of mind, keeps the cost of at the forefront of every government decision for the benefit of every resident, and supports best outcomes health of our community and environment.

The size of the ACT plumbing industry, including gasfitting, is significant. Our industry around \$1B to the economy, and encompasses great diversity - from large companies with 200+ employees turning over up to \$50m each, through to sole operators ([Ibisworld Stats, 2022](#)). There are over 3,600 plumbing licenses in operation in the ACT, as well as many thousands of administrative staff and allied organisations and workers supporting the industry ([Joboutlook, 2022](#)).

ACT's gasfitting industry alone is comprised of 1,800 licenses across both liquid and vapour phases, and we are seeking to maintain a strong and viable industry, and to preserve our energy options by protecting the ACT's significant economic asset which is worth \$350m.

The plumbing industry is heavily reliant on a large fleet of light vehicles, excavators and heavy equipment, which spend 20-30% of time on ACT roads – every day. As Transport contributes more than 60% of the ACT's greenhouse gas emissions, we would like to work in partnership with the government to transition to zero emissions vehicles across the industry ([ACT Government, 2022](#)).

We reiterate our call for support to this Inquiry, and would appreciate strong consideration of our proposal by the whole of government in order to support our collective transition to zero emissions.

5. Renewable Gas advancements and the ramifications of removing the ability to retrofit

The ACT Government's announced decision to ban future gas connections is a decision which will have potentially devastating and irreversible impacts on ACT residents when renewable gas becomes the energy source of least cost and least environmental impact. For example, new subdivisions, houses, apartment buildings, commercial properties etc will not have the ability to retrofit for the best choice energy source of renewable gas.

MPA has previously made strong recommendations on the path forward regarding renewable energy innovation ([MPA ACT, 2021](#)). MPA also draws the ACT Government's attention to the relevant Plumbing Industry Climate Action Centre submission to the Victorian Government's Gas Substitution Roadmap' ([Engage Victoria | Victorian Government, 2022](#)).

There are important advancements being made in terms of increased availability and reduced costs of Biomethane and green Hydrogen. These innovations over the next decade could enable us to flick on a relatively simple switch to transition the fossil fuel gas in our existing infrastructure to environmentally friendly green gas.

We're seeing jurisdictions around Australia and globally who are forging ahead with green gas projects and funding, and we don't want the ACT community to bear the expensive brunt of mistakes our government may make at this early stage ([MPA ACT, 2022](#)).

MPA understands that the ACT has seen consistent use of natural gas of around 8,000 Terajoules per year, with the number of gas connections increasing from 110,000 to 140,000. More

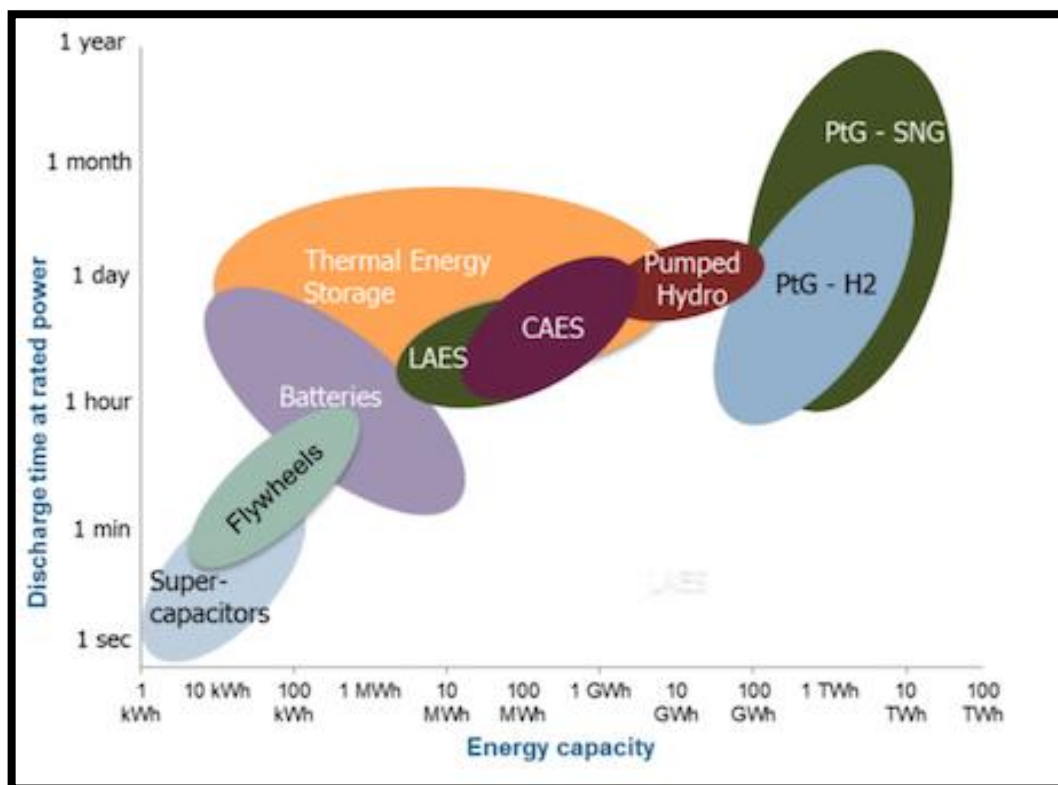


than 2,000 of these came online over the last year. If consumers continue to seek and rely on the gas network, we strongly believe the hydrogen and biomethane future option is worth looking at.

The natural gas energy sector in the ACT is supported by \$380m worth of infrastructure, which is 100% Biomethane and 95% Hydrogen ready. This currently provides storage to meet morning and evening peak heating demand. Our collective of experts strongly urges the ACT government to avoid writing off this option moving forward. Hydrogen may well play a critical role, for example, in allowing us to usefully store excess renewable generation. The figure below represents the storage capacity and discharge times of a variety of storage technologies. It is evident from this figure that Hydrogen and Biomethane exhibit the greatest advantages across storage capacity and discharge times.

Storage Capacity and Discharge times of different storage technologies

From: (Electrification Strategy EU, 2022)



There's a great deal of work underway across Australia and around the globe to modify existing appliances and tweak infrastructure, at low cost, to support the introduction of cheaper green Hydrogen coming down the line. And the momentum is increasing. A few examples of relevant publications are as follows:

- [CSIRO Hydrogen Map: current Hydrogen projects Australia-wide](#) (CSIRO, 2022)
- [Australian Government Website: "Growing Australia's Hydrogen Industry"](#) (Federal Department of Climate Change, Energy, the Environment and Water, 2022)
- [New sweeping analysis debunks reports blaming gas stoves for respiratory illness](#) (Fox News, 2023)



- [The Effects of Cooking on Residential Indoor Air Quality: A Critical Review of the Literature with an Emphasis on the Use of Natural Gas Appliances](#) (Catalyst Environmental Solutions, 2023)
- [Gas backed for Victorian energy transition](#) (The Australian, 2023)
- [Clean energy tech company EntX to explore Polda Basin salt deposits for hydrogen storage potential](#) (ABC News, 2023)
- [Australia's National Hydrogen Strategy](#) (Federal Department of Industry, Science and Resources, 2022)
- [Malabar Biomethane Project](#) (Jemena, 2022)
- [Hydrogen Park South Australia](#) (Government of South Australia, 2022)
- [The ACT will be gas-free in 2045: Your 'burning' questions & concerns so far](#) (RiotACT, 2022)
- [ACT missing out on renewable gas](#) (Australian Pipeliner, 2022)
- [Cost of switching from gas to electric appliances in the home](#) (Frontier Economics, 2022)
- [No new gas connections for Canberra homes and businesses from next year](#) (MPA ACT, 2022)
- [No new gas connections for ACT homes and businesses from 2023 under plan to phase out fossil fuels](#) (ABC News, 2022)
- [Gas or electric cooking - Where do you stand?](#) (ABC News, 2022)
- [Global infrastructure solutions leader joins leading Australian industry as country advances \\$1.4 billion plan to build a hydrogen industry](#) (Black & Veatch, 2022)

The Australian government has seen the massive potential for green Hydrogen, evidenced by an investment of \$1.4 billion to build an Australian Hydrogen industry, and the Australian National Hydrogen Strategy is our comprehensive plan to grow this industry and position Australia as a major player by 2030.

<https://www.industry.gov.au> > policies-and-initiatives > growing-australias-hydrogen-industry
Growing Australia's hydrogen industry | Department of Industry, Scien...
Our vision is to **build** a clean, innovative, safe and competitive **hydrogen industry** that benefits all Australians. Prioritising **hydrogen**. The Australian Government is investing **\$1.4 billion** in building a **hydrogen industry**. Australia's National **Hydrogen** Strategy is a plan to grow this **industry** and position Australia as a major player by 2030.

In the ACT we're seeing an unfortunate push to take infrastructure options off the table that are needed in a planned transition to fully renewable fuels. It would be foolish to put all our eggs in one basket when energy technology and delivery costs are changing so rapidly.



6. The risks of shifting electrification network costs and ownership from government to individuals, and the resultant shockwave driving societal inequality

MPA is concerned at the increasingly apparent trajectory of the ACT government's plan to transfer significant costs of the energy network/storage ownership via batteries to individuals, rather than being the collective responsibility of the Australian community via State and Federal Governments.

The ACT government appears to be making a strong push for financially-capable house-owners to install individual-owned and community-owned batteries, which come at high environmental cost to mine the necessary metals and minerals, have significant issues with recycling at end-of-life, and have a relatively limited-lifespan.

This trajectory significantly disadvantages those who have the least ability to fund 'private electrification', and there is currently no planned support to ensure a fair and just transition for the less financially advantaged members of the community, for example those living in apartments.

The number of people anticipated to live in apartments across the ACT is projected to increase rapidly over the next decade, yet the government has not provided any detail on how this rapidly growing cohort of apartment owners and residents is supported to transition. This includes, as one example, detailed planning to support apartment owners to take advantage of electric vehicles. Retrofitting for electric vehicles incurs significantly higher costs to accommodate power upgrades, and doesn't allow for privately-owned renewable energy feed-ins. This is simply the result of apartment residents not having the ability to install individual solar panels or batteries, nor the option of retrofitting vehicle charging to individual apartments without incurring exorbitantly higher costs than their ACT house-owner counterparts.

It is a glaring oversight that this specific transition has not been comprehensively incorporated into the government's modelling, nor has there been detail provided on the impact this will have on full electrification costs or network capacity.

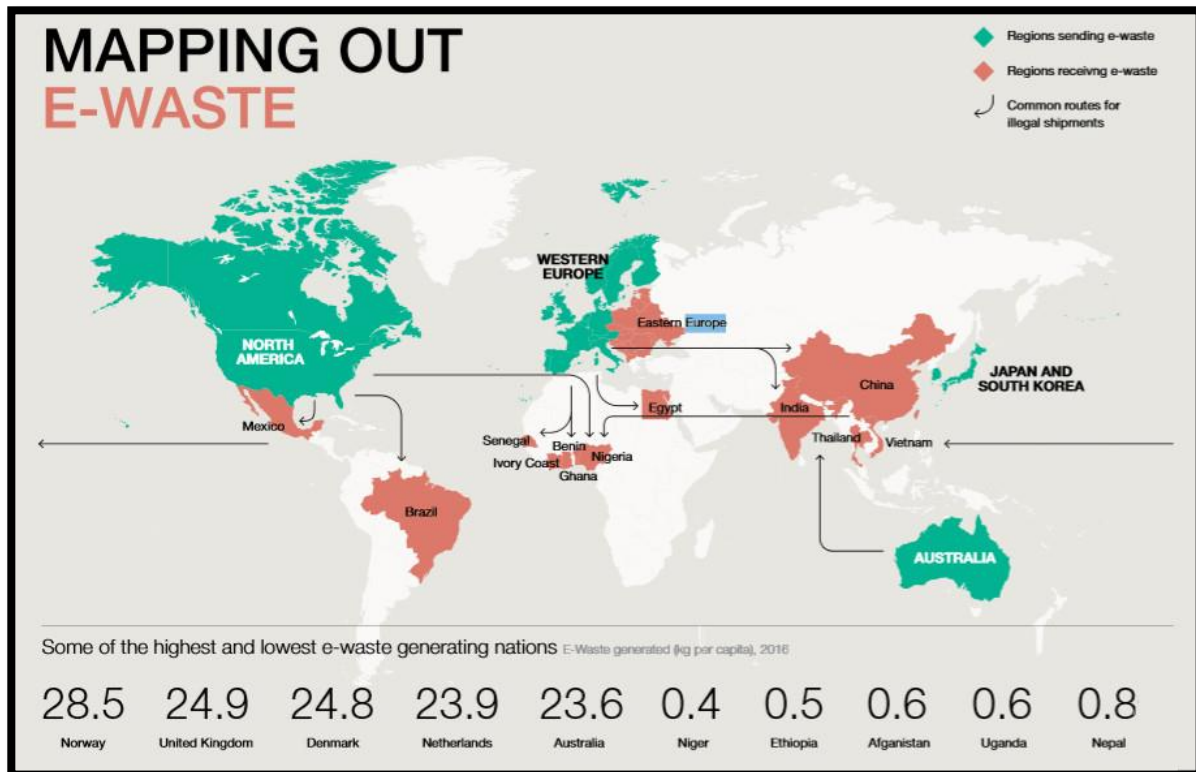
7. The environmental costs of 100% electrification: Problem-shifting

MPA remains highly critical of the push for electrification to be seen as 'clean and green', rather than acknowledging the immense 2-fold environmental impact of lithium-ion battery production, and end-stage disposal. This is in addition to the enormous environmental impacts from the production and end-of-life disposal of solar panels and wind turbines.

E-waste, electronic waste, e-scrap and end-of-life electronics (as shown in the mapping Figure below) are terms often used to describe used electronics that are nearing the end of their useful life, and are discarded, donated or given to a recycler. The UN defines e-waste as any discarded products with a battery or plug, and features toxic and hazardous substances such as mercury, that can pose severe risk to human and environmental health ([Geneva Environment Network, 2022](#)).



Mapping out e-waste from the report “A New Circular Vision for Electronics – Time for a Global Reboot”



Source: (Geneva Environment Network, 2022)

It is important to note from the Figure above that Australia is already one of the highest e-waste generating nations, and we are ‘exporting’ this ‘problem’ to neighbouring LMIC regions. Is this shocking reality really the legacy we want to leave for future Australian generations?

There is a plethora of information detailing the massive Carbon footprint that is left from producing lithium-ion batteries. Where lithium, cobalt and other critical metals are needed to produce these technologies, mining, processing, and disposing of these metals can seriously contaminate drinking water, land and environment (Institute for Energy Research, 2020).



8. Conclusion and Recommendations

The plumbing industry needs strong ACT Government support to navigate both the changing economic environment as well as the transition to Zero Emissions by 2045, with the ACT Government, our community, and our environment being direct beneficiaries of this support.

MPA makes this comprehensive submission to support best outcomes for all parties across the next several decades, and urges the government to acknowledge the serious issues with modelling used to support the 100% electrification decision, rapidly evolving renewable gas advancements, the risks of shifting electrification network costs and ownership from government to individuals, and the environmental costs of 100% electrification (problem-shifting), as discussed in detail in our submission. We strongly urge the government to implement the 2 recommendations proposed by MPA as follows:

Recommendations

- ◆ **Recommendation 1:** That the ACT Government refrains from any decision to implement a ban on new gas connections

The ACT Government's announced decision to ban future gas connections is a decision which will have potentially devastating and irreversible impacts on ACT residents when renewable gas becomes the energy source of least cost and least environmental impact. The Community is also bearing the brunt of a cost-of-living crisis, and gas is currently an economical and reliable energy sources for the majority of our residents. Continued approval to connect gas would ensure we can:

- Maintain electricity reliability while new demands emerge;
 - Transition to more sustainable gaseous fuels with minimal disruption to end-users;
 - Maintain the reliability, affordability, and safety of gas supply whilst managing uncertainty during the transition; and
 - Transition the ACT economy efficiently and equitably.
- ◆ **Recommendation 2:** That the ACT Government undertakes and publishes detailed, peer-reviewed modelling for the proposed transition to 100% electrification - across all user types, building types, cohorts, demographics, and societal groups.

MPA is deeply concerned at the lack of comprehensive, reliable modelling and strategic planning in the ACT Government's push towards 100% electrification, and the failure to address transition challenges across all across all user types, building types, cohorts, demographics, and societal groups. As a single example, apartment dwellers are the fastest growing residential cohort across the ACT, and MPA calls on the ACT government to release detailed modelling and comprehensive planning documentation to support a fair and just transition for this and every building type over the next 5, 10, 15 and 20 years to 2045. This is a vital step prior to any premature decision to remove the option of gas connectivity.



- ◆ **Recommendation 3:** That the ACT Government promotes reputable, evidence-based research around all energy options available to transition to Zero Emissions

MPA is acutely aware of misinformation being promulgated about natural gas, most recently the incorrect assertion in relation to negative impacts of gas use on health. This particular assertion has been thoroughly debunked, through independent, comprehensive, reputable research ([Catalyst Environmental Solutions, 2023](#)). It is particularly vital that the ACT Government relies on and shares reputable evidence with the broader Community to immediately and firmly correct false assertions.

Our Submission draws attention to MPA's recent communications across the sector and strongly cautions the ACT Government against a premature decision to permanently shut down the ACT's extensive gas network. This rash decision would remove any chance of a potentially more cost-effective and environmentally-friendly green gas future.

MPA appreciates the opportunity to make this submission and contribute to best cost-of living outcomes for our community, best possible public health and safety outcomes, and to ensure ongoing protection of our precious environment through an exceptional pathway to Zero Carbon Emissions.

Please do not hesitate to contact us should you require additional information or have any queries in relation to this submission.

Claire Howe
CEO
MPA – Canberra ACT

Jason Tait
President
MPA - Canberra ACT



9. References

1. ABC News. (2022, August 2). *Gas or Electric Cooking - Where do you stand*. Retrieved from <https://www.facebook.com/abccanberra/photos/a.81880677124/10160724986967125/>
2. ABC News. (2022, August 7). *Master Plumbers Association says 1,800 Canberrans are facing an uncertain future of gasfitting*. Retrieved from <https://www.facebook.com/abccanberra/photos/a.81880677124/10160732676492125/>
3. ABC News. (2022, August 4). *No new gas connections for ACT homes and businesses from 2023 under plan to phase out fossil fuels*. Retrieved from <https://www.abc.net.au/news/2022-08-04/act-no-new-gas-connections-from-2023-new-homes/101299552>
4. ABC News. (2023, April 11). *Clean energy tech company EntX to explore Polda Basin salt deposits for hydrogen storage potential*. Retrieved from <https://www.abc.net.au/news/2023-04-11/entx-to-explore-polda-basin-salt-deposits-hydrogen-storage/102209468?>
5. ACT Government. (2022, 05 04). Retrieved from <https://www.environment.act.gov.au/cc/zero-emissions-vehicles>
6. Australian Pipeliner. (2022, August 28). *ACT missing out on renewable gas*. Retrieved from <https://www.pipeliner.com.au/2022/08/09/act-missing-out-on-renewable-gas/>
7. Black & Veatch. (2022, July 31). *Global infrastructure solutions leader joins leading Australian industry as country advances \$1.4 billion plan to build a hydrogen industry*. Retrieved from <https://idadesal.org/global-infrastructure-solutions-leader-joins-leading-australian-industry-as-country-advances-1-4-billion-plan-to-build-a-hydrogen-industry/>
8. Catalyst Environmental Solutions. (2023). *The Effects of Cooking on Residential Indoor Air Quality: A Critical Review of the Literature with an Emphasis on the Use of Natural Gas Appliances*. Retrieved from https://masterplumbersact.asn.au/wp-content/uploads/analysis_effects_of_cooking_on_indoor_air_quality_3.2.2023.pdf
9. CSIRO. (2022, August 8). *Australian Hydrogen Projects*. Retrieved from <https://www.csiro.au/en/maps/Hydrogen-projects>
10. Department of Climate Change, E. t. (2022, August 12). *Energy and Climate Change Ministerial Council: Meetings and communiques*. Retrieved from <https://www.energy.gov.au/government-priorities/energy-and-climate-change-ministerial-council/meetings-and-communiques>
11. Electrification Strategy EU. (2022, August 28). *Hydrogen is the better technology for energy storage*. Retrieved from <https://electrificationstrategy.eu/faq/costs-benefits-and-distributional-impacts/hydrogen-is-the-better-technology-for-energy-storage>
12. Engage Victoria | Victorian Government. (2022, May 11). Retrieved from <https://engage.vic.gov.au/help-us-build-victorias-gas-substitution-roadmap>
13. Environment, Planning and Sustainable Development Directorate, ACT Government. (2020, 11 9). *Household Energy Choice in the ACT: Modelling and Analysis*. Retrieved from https://www.climatechoices.act.gov.au/_data/assets/pdf_file/0011/1784315/Household-energy-choices-in-the-ACT-Modelling-and-analysis.pdf
14. Federal Department of Climate Change, Energy, the Environment and Water. (2022, August 28). *Growing Australia's Hydrogen Industry*. Retrieved from <https://www.dccew.gov.au/energy/hydrogen>



15. Federal Department of Industry, Science and Resources. (2022, August 28). *Australia's National Hydrogen Strategy*. Retrieved from <https://www.industry.gov.au/data-and-publications/australias-national-hydrogen-strategy>
16. Fox News. (2023, March 2). *New sweeping analysis debunks reports blaming gas stoves for respiratory illness*. Retrieved from <https://www.foxnews.com/politics/new-sweeping-analysis-debunks-reports-blaming-gas-stoves-respiratory-illness>
17. Frontier Economics. (2022, June 24). *Cost of switching from gas to electric appliances*. Retrieved from <https://www.gasenergyaus.au/get/1945/frontier-economics-report-gamaa-july-2022.pdf>
18. Geneva Environment Network. (2022, August 28). *The Growing Environmental Risks of E-Waste*. Retrieved from <https://www.genevaenvironmentnetwork.org/resources/updates/the-growing-environmental-risks-of-e-waste/>
19. Government of South Australia. (2022, August 28). *Unpacked: Green hydrogen and how it can help power SA's clean energy future*. Retrieved from <https://www.environment.sa.gov.au/goodliving/posts/2022/06/green-hydrogen-south-australia>
20. Ibisworld Stats. (2022, April 29). Retrieved from <https://www.ibisworld.com/au/industry/plumbing-services/324/>
21. Institute for Energy Research. (2020, November 12). *The Environmental Impact of Lithium Batteries*. Retrieved from <https://www.instituteforenergyresearch.org/renewable/the-environmental-impact-of-lithium-batteries/>
22. Jemena. (2022, August 28). *Malabar Biomethane Project*. Retrieved from <https://jemena.com.au/about/innovation/malabar-biomethane-project>
23. Joboutlook. (2022, April 29). Retrieved from joboutlook.gov.au
24. MPA ACT. (2021, April). Retrieved from <https://masterplumbersact.asn.au/wp-content/uploads/2021/05/MPA-ACT-Submission-to-the-ACT-2021-Inquiry-into-Renewable-Energy-Innovation-FINAL.pdf>
25. MPA ACT. (2022, November 10). Retrieved from <https://mailchi.mp/masterplumbersact/alert-no-55?e=3aa56d7e1a>
26. MPA ACT. (2022, August 4). *Disappointing announcement considering Monday's Media Release*. Retrieved from <https://www.facebook.com/MasterPlumbersACT/posts/pfbid05GuHrs65HnzjupjW5XQAV4WwHnCU36LiWXXK2FKAJYnr5biYvAP4C6Bnbj8c6zjGvl>
27. MPA ACT. (2022, July). *Master Plumbers ACT Submission to the ACT 2022-23 Budget Consultation*. Retrieved from <https://masterplumbersact.asn.au/wp-content/uploads/2022/05/Submission-to-the-ACT-2022-23-ACT-Budget-Consultation.pdf>
28. MPA ACT. (2022, October 31). *Media Release: 2022 Plumbing Industry Excellence Awards - Winners Announced*. Retrieved from <https://mailchi.mp/masterplumbersact/media-release-2021-awards-winners-announced-5248384?e=3aa56d7e1a>
29. MPA ACT. (2022, August 1). *MPA Media Release: Don't cost our community by switching off an ACT future of Green Gas*. Retrieved from <https://mailchi.mp/masterplumbersact/alert-no52-media-release-green-gas?e=3aa56d7e1a>



30. MPA ACT. (2022, September). *Submission to the Inquiry into Climate Change and Greenhouse Gas Reduction (Fossil Gas) Amendment Bill 2022*. Retrieved from <https://masterplumbersact.asn.au/wp-content/uploads/Submission-to-the-Inquiry-into-Climate-Change-and-Greenhouse-Gas-Reduction-Fossil-Gas-Amendment-Bill-2022.pdf>
31. PWC Global. (2023, April 18). *The green hydrogen economy: Predicting the decarbonisation agenda of tomorrow*. Retrieved from <https://www.pwc.com/gx/en/industries/energy-utilities-resources/future-energy/green-hydrogen-cost.html>
32. RiotACT. (2022, August 28). *The ACT will be (fossil) gas-free in 2045: your 'burning' questions, concerns so far*. Retrieved from <https://the-riotact.com/the-act-will-be-gas-free-in-2045-your-burning-questions-concerns-so-far/582605>
33. The Australian. (2023, April 5). *Gas backed for Victorian energy transition*. Retrieved from <https://www.theaustralian.com.au/nation/politics/gas-backed-for-victorian-energy-transition/news-story/30ee45d8031892dff4a213ea772e6c8>