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Training for Tomorrow Hydrogen Gas and the Future of Vocational Education and Training

Paul Wilson

Victorian Skills Authority Fellowship, 2024



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01

Acknowledgements

The Awarding Bodies

The Fellow sincerely thanks the Victorian Skills Authority (VSA) for providing funding support for the ISS Institute and for this Fellowship.

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The Victorian Skills Authority works in partnership with the International Specialised Skills Institute by funding the VET International Practitioner Fellowships. The Fellowship program focuses on developing opportunities within the VET sector to assist in building an Education State in Victoria that produces excellence and reduces the impact of disadvantage. In addition, the program is funded to support the priorities of Skills First, including developing capacity and capability, innovative training practices and increasing teacher quality within the VET sector as well as building industry capability and developing Victoria's current and future workforce.

Fellows Acknowledgements

I would like to thank the International Specialised Skills Institute (ISSI) and the investors who make opportunities like this possible for teachers like me. Without generous donations like this, this opportunity would not have been possible. The work that the staff put in and their absolute joy in helping with assistance was amazing. I am truly grateful for being able to have this journey and I am speaking to my colleagues to have a look at what they could do themselves for their fellowship journey.

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02

Biography

I am a licensed plumber who has been specializing in the heavy industrial and commercial sector of the gas industry working on large gas consumption appliances. During my time as a tradesman working my way from an apprentice up to project manager, I had the great opportunity to train and educate young apprentices who worked under my supervision. In my time while working “on the tools” I could pass on my skills and knowledge to the 11 young apprentices with the hope that I had a positive impact on their lives.

I have been in the plumbing industry for 18 years and started my teaching journey a little over 4 years ago in 2019 when I started as a session plumbing educator. From that introduction to teaching apprentices in the classroom setting, I found that I have a growing passion for educating young plumbers on the way I moved into a full-time educating role.

The potential impact to help guide young people to be both professional and skilled in the plumbing industry is a responsibility that has deeply resonated with me. My journey from being a tradesman to a plumbing teacher has been a testament to the transformative power of education and mentorship.

As a licensed plumber, my expertise lies in the heavy industrial and commercial sectors of the gas industry, where I have spent years working on intricate systems and large gas consumption appliances. The transition from apprentice to project manager was a significant milestone in my



career, allowing me to not only master the technical aspects of plumbing but also to assume leadership roles and guide teams in executing complex projects.

During this period of hands-on work “on the tools,” I recognized the invaluable opportunity to share my accumulated knowledge and skills with the next generation of plumbers. Over the years, 11 young apprentices had the privilege of learning under my supervision. My approach went beyond the technicalities of plumbing; it aimed to instil a sense of professionalism, attention to detail, and a commitment to excellence.

The decision to embark on a teaching journey was motivated by a desire to broaden my impact. In 2019, I took the first step as a session plumbing educator, venturing into the classroom setting to impart knowledge to apprentices eager to delve into the world of plumbing. Little did I know that this initial foray into education would spark a growing passion that would redefine the trajectory of my career.

The realization of the potential impact I could have on shaping young minds and guiding them to be both professional and skilled professionals was a turning point. The classroom became a canvas for me to paint a vivid picture of the intricacies of plumbing, combining theoretical knowledge with practical applications. Each lesson was an opportunity to not only transfer technical skills but also to nurture qualities such as problem-solving, critical thinking, and effective communication.

As I navigated the challenges and joys of teaching, it became evident that this role went beyond a job; it became a calling. The satisfaction derived from witnessing the intellectual and personal growth of my students fuelled my commitment to the teaching profession. This passion, coupled with my extensive experience in the plumbing industry, propelled me into a full-time education role.

In the realm of education, I found a profound sense of purpose. Guiding young apprentices through their formative years in the plumbing trade became more than a task; it became a mission to prepare them for the challenges and opportunities that lay ahead. My teaching philosophy centres on fostering not only technical expertise but also a holistic understanding of the plumbing profession.

Professionalism, a core value in the plumbing industry, became a focal point in my teachings. I emphasized the importance of approaching every task with dedication, integrity, and a commitment to excellence. Beyond the nuts and bolts of plumbing, I sought to cultivate a mindset of responsibility and accountability, traits that are essential for success in any professional endeavour.



The transition from industry professional to educator was not without its challenges. Adapting to the nuances of classroom dynamics, tailoring lessons to diverse learning styles, and developing effective teaching strategies required a shift in mindset. However, the intrinsic rewards of teaching—the joy of seeing a concept click, and the satisfaction of witnessing a skill mastered—far outweighed the initial challenges.

Creating a supportive and inclusive learning environment became a priority. Recognizing that each student possesses a unique set of strengths and learning preferences, I adopted a flexible approach to teaching. Incorporating practical, hands-on experiences became a cornerstone of my methodology, bridging the gap between theory and real-world application.

Moreover, I encouraged a culture of collaboration among students, fostering teamwork and peer learning. The plumbing profession, like many others, thrives on effective communication and collaboration. By integrating these aspects into the learning experience, I aimed to prepare my students not just for exams but for the collaborative nature of the industry they would soon enter.

As I honed my teaching skills, I also recognized the importance of staying abreast of industry developments. Plumbing, like any other field, undergoes continuous evolution with technological advancements and changing regulations. I instilled in my students the significance of embracing a mindset of lifelong learning, urging them to seek out new knowledge, adopt emerging technologies, and pursue additional certifications to remain at the forefront of the industry.

Mentorship emerged as a vital component of my role as an educator. Beyond the confines of the classroom, I became a guide and mentor to my students, offering advice on career paths, professional development, and personal growth. The mentor-student relationship became a conduit for not only sharing knowledge but also for imparting life lessons and instilling a sense of resilience and adaptability.

The past four years have been a journey of self-discovery and growth. From a seasoned plumber to a passionate educator, I have witnessed the transformative power of education in shaping the lives of individuals. My aspirations for the future extend beyond the classroom, encompassing collaborative endeavours with industry partners, and bridging the gap between academia and the professional sphere.

In conclusion, my biography as a plumbing teacher reflects a profound evolution—a journey fuelled by a commitment to excellence, a passion for teaching, and a dedication to shaping the future of the plumbing industry. As I look ahead, I am filled with excitement for the continued exploration of innovative teaching methodologies, the cultivation of skilled and professional plumbers, and the ongoing pursuit of excellence in the ever-evolving field of plumbing education.



03

Executive Summary of Fellowship

For Australia to align with the strides made by American and European nations in adopting hydrogen gas as a pivotal energy source, a comprehensive strategy is imperative. A key facet of this strategy involves identifying the requisite training programs for the construction industry and plumbers. Given hydrogen's increasing prominence in power plants and as a blend or substitute for natural gas in consumer piping, workers in these sectors must be well-equipped with the necessary skills. This entails not only understanding the unique properties and handling of hydrogen but also mastering the intricacies of its integration into existing infrastructures. Collaborative efforts between government bodies, educational institutions, and industry stakeholders should be fostered to develop targeted training initiatives. By investing in education and skill development, Australia can proactively position itself at the forefront of the hydrogen revolution, ensuring a seamless transition towards sustainable and innovative energy solutions.

Australia faces substantial gaps in training for the burgeoning field of hydrogen utilization, primarily due to the current viewing of natural gas. An examination of training.gov.au reveals 5 existing units of competency related to hydrogen, indicating a significant deficiency in comprehensive education on the subject. This inadequacy is further exacerbated when considering the intricate alignment between these competency units and the diverse array of jobs and sectors involved in hydrogen integration.

To bridge this gap, a concerted effort is required to develop and implement tailored training initiatives that cater to the specific needs of the construction and plumbing industries. The existing competency units must be expanded, and new ones created, addressing the nuanced demands posed by hydrogen applications in power plants and consumer piping. Collaboration between educational institutions, industry experts, and governmental bodies is vital for designing comprehensive curricula that cover not only the fundamentals of hydrogen properties but also the practical aspects of its integration into existing infrastructure.

By acknowledging and addressing these training deficiencies, Australia can proactively cultivate a skilled workforce capable of spearheading the nation's transition toward hydrogen-based energy solutions, aligning with global leaders in the field. This investment in education will not only empower workers to become proficient in their chosen industries but also position Australia as a competitive force in the evolving landscape of sustainable energy.

Ensuring the readiness of the Victorian education sector for the imminent integration of hydrogen gas is paramount for several reasons. First and foremost, hydrogen stands as a pivotal player in the global shift toward sustainable energy, offering a clean and versatile alternative for power generation and consumer applications. For Victoria to effectively embrace this transformative energy

source, the education sector must anticipate and address the impending demands.

The significance of addressing the gaps in Australian training is underscored by the current inadequacy of available programs, as evidenced by a mere 5 competency units listed on training.gov.au. This insufficiency poses a hindrance to the development of a skilled workforce prepared to navigate the intricacies of hydrogen integration. As the hydrogen sector continues to burgeon, understanding the specific jobs that will be created becomes imperative. These roles span the construction and plumbing industries, necessitating a comprehensive approach to training that encompasses the nuanced requirements of each sector.

To achieve this, a thorough examination of existing competency units must occur, assessing their alignment with industry needs. This process should not only involve expanding and refining existing units but also potentially creating new ones to address the unique challenges presented by hydrogen applications. Collaborative efforts between educational institutions, industry stakeholders, and government bodies are essential in shaping a robust curriculum that equips future workers with the expertise needed to excel in their chosen fields. By proactively addressing these training gaps, Victoria can position itself as a leader in the burgeoning hydrogen economy, fostering a skilled workforce capable of driving innovation and sustainability in the energy landscape.

My decision to embark on this fellowship and delve into the integration of hydrogen gas in the plumbing industry and renewable energies is rooted in a multifaceted commitment to continuous learning, industry leadership, and the well-being of communities. One primary motivation is my unwavering dedication to advancing my knowledge within the plumbing sector and renewable energies. As a professional in the field, I recognize the pivotal role education plays in staying abreast of technological advancements and evolving industry landscapes.

Moreover, the aspiration to emerge as a leader in the industry propels my pursuit of knowledge. I am driven by the desire to actively contribute to decision-making processes that shape the trajectory of the plumbing sector. A leadership role not only signifies personal growth but, more importantly, a responsibility to ensure the sustained success and employability of my fellow trade's colleagues. In my conviction, plumbers are integral to the health and well-being of our communities, and effective leadership in the industry is instrumental in fostering positive outcomes.

A key aspect of my motivation stems from the anticipation of what I can bring back to my role as an educator. The intention is to impart valuable insights and knowledge gained during this fellowship to both teaching staff and apprentices. By staying informed about the latest developments in European and American counterparts, I aim to contribute to the educational foundation of future plumbing professionals in Australia. This proactive approach ensures that our industry remains adaptive and innovative, preparing the next generation of workers for the challenges and opportunities that lie ahead.

The global trend toward hydrogen utilization for clean electricity generation and fuelling heavy industries and logistics underscores the urgency of this exploration. By understanding the initiatives and advancements abroad, I am positioning myself to lay the groundwork for the adoption of hydrogen technologies in Australia. This not only aligns with sustainable energy goals but also ensures that our nation remains competitive and forward-thinking in the ever-evolving landscape of renewable energies. In essence, my fellowship is driven by a commitment to lifelong learning, industry leadership, and the betterment of both the plumbing sector and the communities it serves.

My hydrogen journey commenced in Rotterdam, Netherlands, a strategic choice driven by the city's pivotal role as the host of the world's largest hydrogen conference, "The World Hydrogen Summit," held at the Rotterdam Ahoy convention centre. Rotterdam Ahoy stands as the epicentre

for cutting-edge discussions and innovations in the hydrogen sector, making it an ideal starting point for my exploration.

The decision to begin in Rotterdam was influenced by the unparalleled scale of the conference, attracting 8,000 visitors, 160 delegates, 50 major sponsors, and over 350 exhibitors from across the globe. This grand assembly serves as a comprehensive showcase of the diverse capabilities within the hydrogen industry, encompassing shipping, hydrogen transportation and fuelling, manufacturing of electrolyzers, hydrogen storage solutions, and advancements in hydrogen motors for the automotive and transport sectors. The sheer magnitude of participation underscores Rotterdam's significance as a hub for global hydrogen expertise and technological advancements.

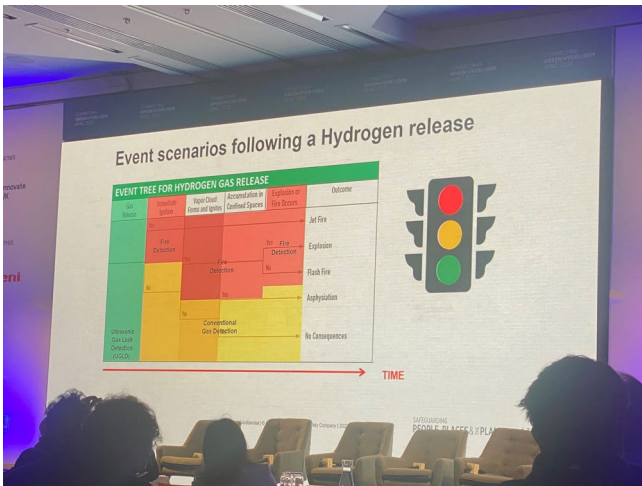
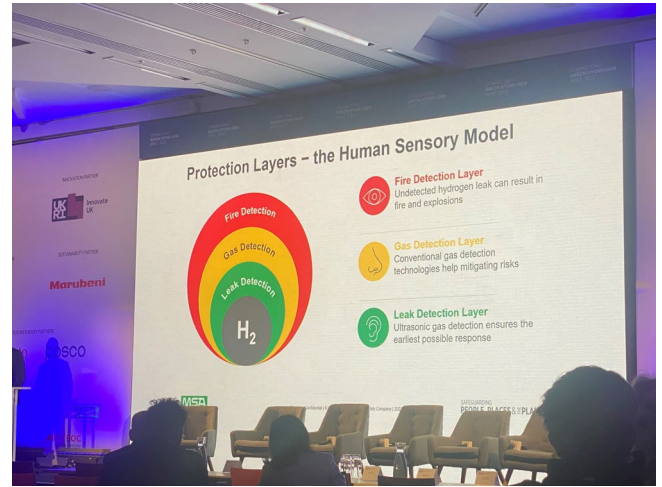
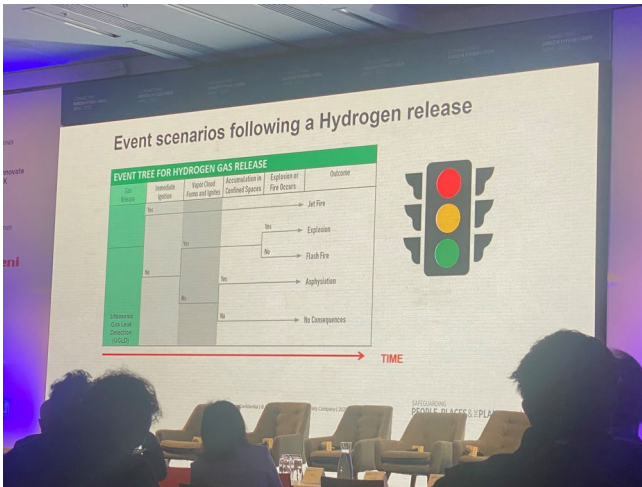


By immersing myself in this dynamic and extensive gathering, I aimed to gain insights into the latest developments and best practices. Rotterdam's prominence as a global meeting ground for hydrogen professionals allowed me to witness firsthand the multifaceted applications of hydrogen across industries. Moreover, engaging with experts, delegates, and exhibitors provided invaluable networking opportunities, fostering connections that would prove instrumental in understanding and implementing hydrogen-related advancements back in Australia.

In essence, my choice to begin my hydrogen journey in Rotterdam was driven by the unparalleled scale and influence of "The World Hydrogen Summit," positioning me at the epicentre of global hydrogen innovation and enabling me to bring back knowledge that could shape the future of hydrogen adoption in Australia.

The research conducted at "The World Hydrogen Summit" in Rotterdam yielded significant findings, illuminating key advancements and initiatives across various sectors of the hydrogen landscape. One of the most noteworthy discoveries was the substantial progress made by major companies in the research and design of heavy haulage trucks and light commercial vehicles powered by hydrogen. This signifies a crucial step toward greening the transportation industry, with companies like Renault and Peugeot leading the charge by entering the trial stages of a revolutionary hydrogen highway.

While in Rotterdam for the conference, I had meaningful conversations with many people who are developing their businesses around what they can do for the incoming hydrogen industries. While I was there, I had the opportunity to speak to the Stallholders from HRS about their plan in motion for the rollout of their hydrogen highway. Also speaking to MSA about the levels of protection that they have created for hydrogen storage was amazing. They have created leak detection systems that are at the forefront of safety. They have gas-detection & flame-detection systems that are so smart that they can sense when there is a leak or escape of gas that they can isolate the gas supply.



Engaging with the stallholders from HRS offered a comprehensive understanding of their ambitious plan for the rollout of the hydrogen highway. These discussions revealed that HRS had set in motion an intricate strategy involving the establishment of fuelling stations every 150 kilometers. The initial phase of the plan, which included trials in France, was already underway, and the subsequent expansion into Spain and Germany highlighted the scalability and cross-border collaboration inherent in the hydrogen highway project. The stallholders from HRS outlined the meticulous planning involved in creating a network of fuelling stations strategically positioned to ensure convenience and accessibility for hydrogen-powered vehicle owners/ users. This comprehensive infrastructure model aligned with the conventional gasoline station layout, emphasizing the importance of practicality and ease of use in promoting the widespread adoption of hydrogen fueling.

While in Rotterdam for the hydrogen conference, I found myself immersed in a world of innovation and forward-thinking solutions aimed at revolutionizing the way we fuel our vehicles. The focus of the conference was on hydrogen fueling for passenger vehicles and light vans, spearheaded by Hydrogen Refueling Solutions (HRS) and MSA, a safety solutions company. My meaningful conversations with stallholders from both companies provided valuable insights into their plans and products, shedding light on the promising developments within the hydrogen industry.

The concept of a hydrogen highway, strategically placing fuelling stations within 150 kilometres of each other, addresses a critical challenge in the adoption of hydrogen-powered vehicles— establishing a reliable refuelling infrastructure. This initiative instils confidence in companies and drivers, ensuring they can seamlessly refuel their hydrogen trucks, thus promoting the widespread adoption of clean transportation practices. Witnessing such ground-breaking projects underscores the tangible shift toward sustainable fuel sources in the transportation sector.



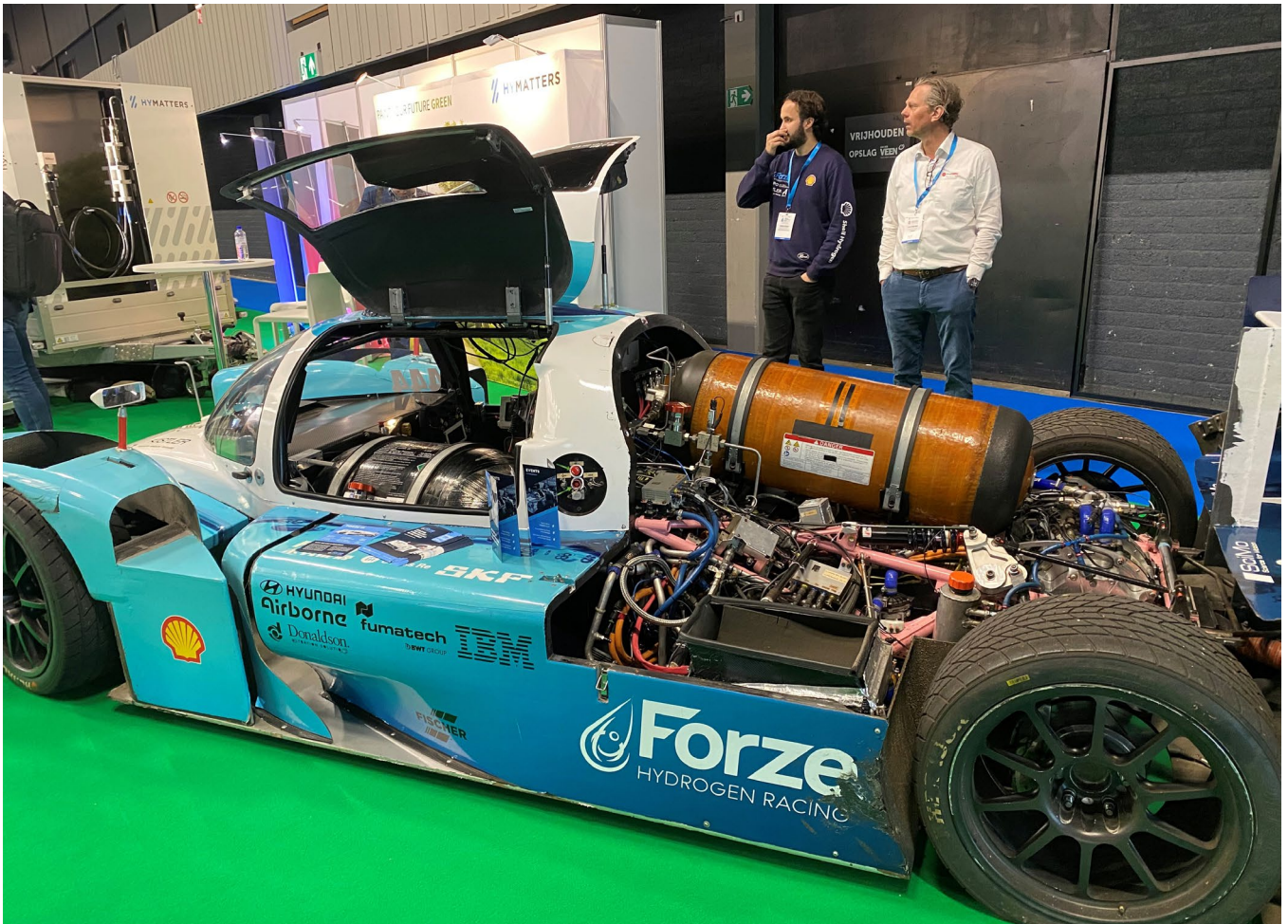
Conversations with the MSA stallholders delved into the critical aspect of safety within the hydrogen industry. MSA's flame detection systems and test lamps emerged as key components in ensuring the safety of hydrogen storage facilities. The discussions unveiled the intelligence embedded in MSA's safety solutions, capable of real-time sensing and reaction to potential dangers. MSA's leak detection systems, specifically designed for hydrogen storage facilities, were highlighted as instrumental in promptly identifying and addressing potential leaks. The advanced technologies incorporated in these systems not only enhance safety measures but also contribute significantly to building confidence in the reliability of hydrogen as a fuel source.



The conference conversations with both HRS and MSA stallholders underscored the collaborative efforts and innovation driving the hydrogen industry forward. HRS's commitment to creating a practical and accessible hydrogen highway aligns with the broader vision of establishing hydrogen as a viable and widespread fuel option. Simultaneously, MSA's focus on safety solutions showcased the industry's dedication to addressing potential challenges associated with hydrogen storage and distribution.

These interactions with stallholders provided a unique perspective on the tangible progress being made in the hydrogen sector. The amalgamation of strategic infrastructure planning by HRS and cutting-edge safety solutions by MSA sets a promising trajectory for the widespread adoption of hydrogen fueling for passenger vehicles and light vans. As the plans and products discussed during the conference unfold, it becomes increasingly evident that the hydrogen industry is not just conceptualizing a greener future but actively implementing the necessary frameworks to turn that vision into reality.





Another notable aspect of the conference focused on the maritime industry, where international shipping accounts for a significant portion of global carbon emissions. My Therese Blank from Maersk said that Maersk are making substantial investments in their fleet, with their newest vessels running on ammonia, albeit not as environmentally friendly as hydrogen. Despite this, it represents a commendable stride toward more sustainable practices in an industry notorious for its environmental impact. Maersk's commitment highlights a paradigm shift in the maritime sector, where major players are actively exploring alternative fuels to reduce their carbon footprint.

Intriguingly, multinational mining and resource companies were engaged in discussions with energy providers to explore the transition to using hydrogen for electrical production. The prospect of incorporating hydrogen into the energy sector has the potential to significantly reduce carbon

emissions, making it a notable step toward achieving greener energy practices. This avenue, alongside nuclear power production, emerges as a promising approach to electrifying the energy sector while minimizing environmental impact.

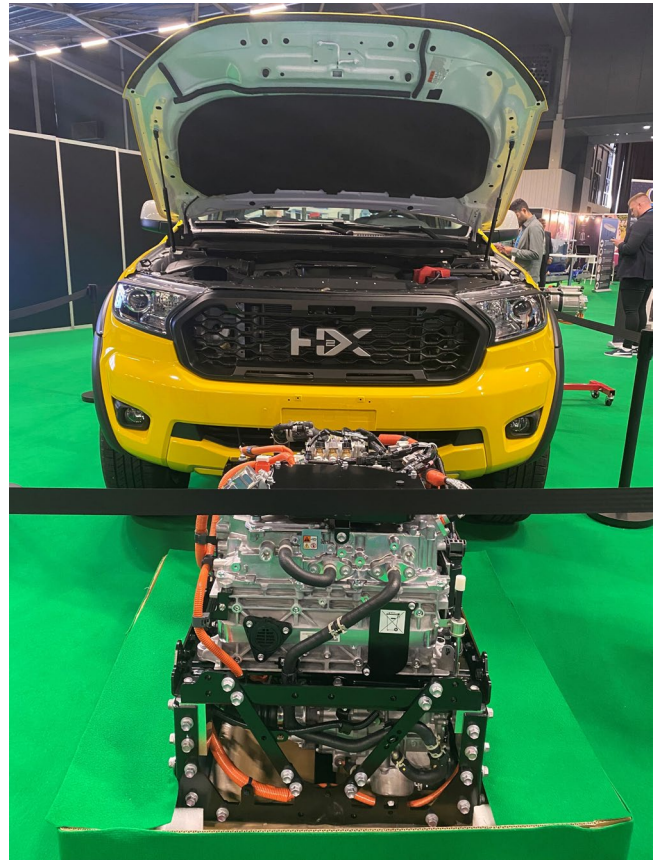
Of particular interest to me, as a plumbing tradesman and instructor, were the pioneering programs piloted by countries and companies testing blended gases of hydrogen and natural gas for consumer appliances such as ovens, wall heaters, and hot water heaters. These initiatives hold immense significance, as they indicate a concerted effort to integrate hydrogen into everyday domestic applications. As a result, my primary focus revolves around understanding these programs and contributing to securing the future of my fellow tradespeople. This involves actively participating in the evolution of training programs to ensure they align with the emerging renewable industry's demands.

In conclusion, the research conducted at the conference unveiled a multifaceted landscape of hydrogen advancements, spanning transportation, maritime, energy production, and domestic applications. The findings underscore the global momentum toward sustainable practices and highlight the pivotal role of hydrogen in shaping a greener future. As a plumbing tradesman and educator, my commitment lies in leveraging these insights to contribute to the ongoing evolution of training programs, ensuring that the plumbing industry remains at the forefront of the renewable energy revolution.

The research conducted at “The World Hydrogen Summit” in Rotterdam has not only illuminated significant strides in the global hydrogen landscape but has also opened doors to numerous opportunities for the development of innovative training programs. My fellowship journey began with a focus on the Netherlands, where Rotterdam emerged as the epicentre of hydrogen advancements, hosting the world’s largest hydrogen conference. This initial choice allowed me to witness firsthand the transformative potential of hydrogen in various sectors, ranging from transportation and maritime to energy production and domestic applications.

One major finding centred on the progress made by major companies in the research and design of heavy haulage trucks and light commercial vehicles powered by hydrogen. Companies like Renault and Peugeot are leading the charge by entering the trial stages of a revolutionary hydrogen highway, strategically placing fuelling stations within 150 kilometres of each other. This initiative addresses a critical challenge in the adoption of hydrogen-powered vehicles, establishing a reliable refuelling infrastructure. The concept of a hydrogen highway not only promotes the widespread adoption of clean transportation practices but also offers a model for sustainable fuelling infrastructure that can be applied globally.

The maritime industry, a significant contributor to global carbon emissions, showcased notable developments as well. Companies like Maersk,



investing heavily in their fleet and running their newest vessels on ammonia, underscored the industry’s commitment to exploring alternative fuels. This shift towards more sustainable practices in the maritime sector represents a significant step forward, showcasing the industry’s responsiveness to environmental concerns and the potential for hydrogen adoption.

Multinational mining and resource companies exploring hydrogen for electrical production highlighted the potential for cleaner energy practices. This move aligns with the broader goal of reducing carbon emissions and underscores the versatility of hydrogen as a clean energy source across diverse industries.

I have a keen interest in the exploration of blended gases of hydrogen and natural gas for consumer appliances, such as ovens, wall heaters, and hot water heaters. These pioneering programs, piloted by countries and companies, represent a significant step in integrating hydrogen into everyday domestic applications. As a plumbing tradesman and

instructor, this aspect resonated deeply with me, emphasizing the importance of adapting training programs to align with emerging renewable industry demands.

The question of whether there is an opportunity to develop programs based on the research findings is met with a resounding affirmative. The potential lies in reshaping and enhancing the plumbing training package CPC32420 to incorporate essential elements of hydrogen technology. This involves a meticulous examination of existing hydrogen units of competency and determining their relevance in the evolving landscape. My current focus is on actively participating in the redesign of the plumbing training package, ensuring that it reflects the latest developments in hydrogen technology.

Moreover, I am advocating for involvement in designing and creating an industry training centre specifically tailored for hydrogen. This envisioned training facility will serve as a hub for imparting fundamental knowledge about hydrogen gas and the specific requirements of appliances powered by this innovative fuel. The goal is to equip workers with the skills and expertise needed to navigate the nuances of hydrogen applications in the plumbing industry.

The wealth of information gathered from the fellowship journey offers a unique opportunity to pioneer change in the plumbing industry. By actively participating in the redesign of training packages and advocating for the creation of specialized training centres, we can ensure that plumbing professionals are well-prepared to embrace the transformative potential of hydrogen. This approach not only secures the future of the plumbing industry but also contributes to a sustainable and environmentally conscious future.

04

Acronyms

Blue Hydrogen: Blue hydrogen is produced mainly from natural gas

Green Hydrogen: Hydrogen produced with carbon neutral renewable energy

H₂: Hydrogen Gas

ISS: International Skills Institute

LPG: Liquefied Petroleum Gas

PSCIA: Plumbing, Sheetmetal, Coppersmithing Instructors Association

U.O.C: Unit of Competency

VET: Vocational education and training

HRS: Hydrogen Refueling Solutions

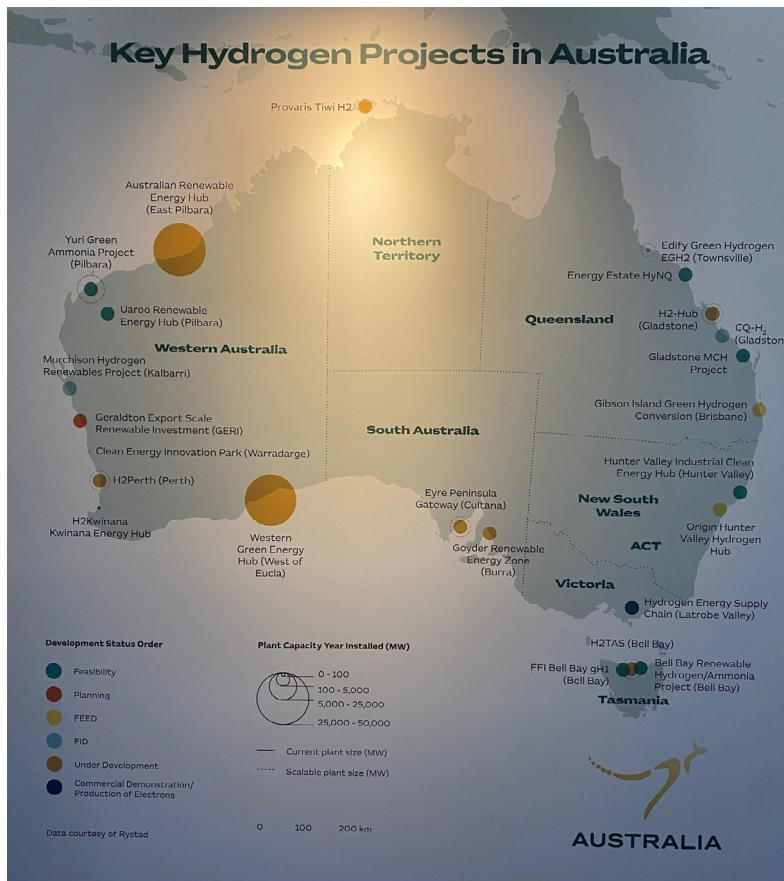
DAF: Dutch Truck Manufacture

MSA: MSA Safety Incorporated, manufacture & supply of safety products

05 Findings

Despite over 100 hydrogen projects in Australia, a significant hurdle lies in the prolonged development planning and permitting stage, with approximately 70% of projects currently in this phase. This bottleneck poses a challenge, as by the time projects receive approvals, technology, and pricing landscapes may have evolved, leading to project delays or cancellations. To position Australia as a hydrogen industry leader, the federal government must recognize the economic potential and

implement measures to expedite the permitting stage. Not only this there is an issue of the price for hydrogen which needs to be set, as well as a government subsidy to get the projects started. This will help the companies that Australia wants to invest in us so we can work together with mutual benefit. With the information I had access to on my journey, I can see where we can become a world player in the hydrogen market.



Hydrogen Highway and transportation.

- The success of the Hydrogen Highway concept, as demonstrated by Peugeot and DAF, showcases the practicality and efficiency of hydrogen-powered transportation.
- Australia can leverage this model to accelerate the adoption of hydrogen vehicles, addressing environmental concerns and reducing dependency on traditional fuels. In Sydney, they are trialling hydrogen-fuelled buses with the look to expand this to the whole network.

Hydrogen blending with Natural gas.

- Learning from Great Britain's pilot programs, Australia can implement similar initiatives to introduce hydrogen blends in small communities, fostering public acceptance and familiarity.
- There are 3 hydrogen blending projects underway so far in Albury/ Wodonga, Gladstone, and South Australia and these projects are critical in bringing hydrogen to our domestic consumer market.
- Plumbing professionals play a crucial role in this phase, requiring targeted training programs to adapt to the integration of hydrogen blends in consumer appliances. We need to adapt new training for plumbers for hydrogen fundamental training and need to be aware of requirements for the piping materials and handling practices of the new gas.

Hydrogen power plants

- The exploration of hydrogen electrolyzers for power generation presents a ground-breaking opportunity to transition away from coal-based power.
- These power plants will create more jobs and secure the future of workers who will have to move or find new employment once the coal-based plants shut down. We as Australian and educators need to ensure that there is gap training available to these workers so we can

have a smooth transition from one fuel to the next.

- Collaborative efforts between the government and private sector are essential to streamline regulations, ensuring a conducive environment for investments in hydrogen-powered power plants.

Permit Bottlenecks.

- The bottleneck in the development planning and permitting stage is a critical impediment to the growth of the hydrogen industry in Australia.
- Fast-tracking the permitting process is paramount to prevent technology and cost fluctuations that often lead to project delays or cancellations.

Recommendations

Hydrogen Transportation Promotion

- Government incentives and policies to promote the purchase and use of hydrogen vehicles.
- Investment in research and development for hydrogen-powered public transport fleets.

Community Awareness Programs

- Collaborate with industry stakeholders to launch community awareness programs on hydrogen blending.
- Include plumbing professionals in awareness campaigns to ensure a seamless transition to hydrogen blends in consumer appliances.

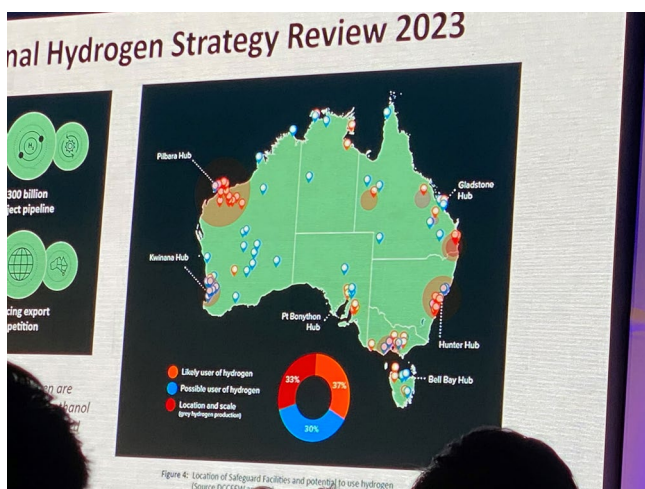
Hydrogen Powered power plants.

- Establish a regulatory framework that facilitates the expedited approval of hydrogen-powered power plant projects.
- Encourage partnerships between energy companies and technology developers to drive innovation in hydrogen power generation.

Streamlining Permitting Processes.

- Create a dedicated task force to streamline the permitting processes for hydrogen projects.
- Provide financial incentives for projects that align with national hydrogen goals.

Australia has the potential to emerge as a hydrogen leader, capitalizing on global best practices and tailoring strategies to address specific challenges. The integration of hydrogen in transportation, community awareness programs, transitioning power plants to hydrogen, and expediting permitting processes are pivotal steps in unlocking the full economic and environmental benefits of the hydrogen industry. By implementing these recommendations, Australia can position itself as a frontrunner in the global hydrogen landscape.



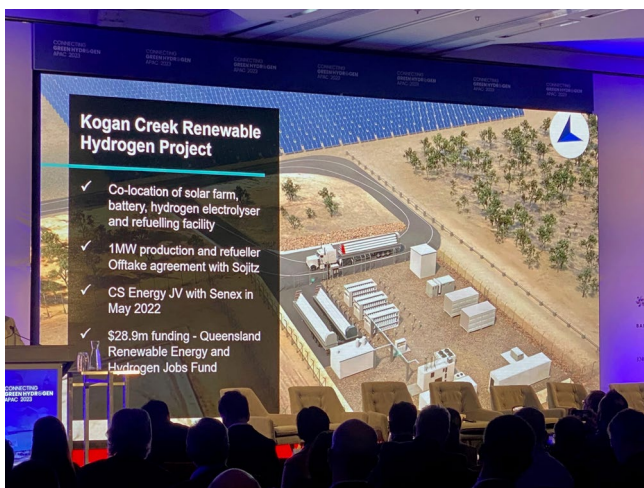
When I walked into the entrance of the conference, I had no expectation or baseline of what lay behind the doors, and when I walked through the doors and saw a sea of multinational companies and country stands/stalls and the sheer number of people in the conference I was astounded. I was amazed and excited by the scale of this Hydrogen conference and as a bonus there was a hydrogen battery storage conference running at the same time. As I started my way around the conference I was taken by complete surprise when I saw that they had hydrogen-fuelled trucks and vans inside the conference. I was able to speak to both the car/ truck manufacturer Peugeot / DAF and they

were telling me about the “Hydrogen Highway” that they are setting up. They are working on setting up these highways with fuelling stations every 100-150 kilometres of each other and then expanding them into existing fuelling stations to grow the network of fuelling stations to over 100. With the initial testing, they were having great results that were showing mileage and refuelling times that were exceeding their expectations.



After this, I started looking into what the other countries were doing with their hydrogen and what they planned to do with it. Great Britain is looking at introducing a blend as we are in Australia. They have nominated some small towns that they are doing some pilot programs on to get consumers to know the gas and become familiar with it. This is where my interest was mainly directed when I started this journey as a plumber and this is where I was focused. I was investigating to see if this was going to be a security to the future generations of plumbers also aiming to be at the pointy end of this new resource that is coming to our shores. After having more discussions with more people, I realized the opportunity to stop using coal for power generation and then look at having our power plant powered by hydrogen electrolyzers. Currently, in Australia, there are over 100 hydrogen

projects but about 70% of these are stuck in the development planning and permit stage. This is where Australia falls, the planning and permitting stage by the time the projects are planned and then get their permits approved the technology has moved, and the pricing from the builders tends to balloon and then the projects get shelved. What needs to be done by the federal government is the recognition that this is going to secure billions of dollars for our economy so let's see what can be done to fast-track the permitting stage for these companies looking at investing in Australia and our expertise. In China they are building 100 GW electrolyzers for their power grid also worth noting is that they are also building coal power stations as well, so it's not all green over there either.



While I was in the Netherlands, I was able to meet with other trainers who were at the conference and discuss what they were doing in the way of hydrogen education, and we discovered that we were not that different. I have also had discussions with Kay Jonas at the SHK Plumbing guild in Berlin about hydrogen and their training program. What was comforting and concerning was that we all seemed to be in the same spot; no one knows which way to jump.

This just shows how new and fast this is coming for us, and that action must be taken right now, we must engage with our big business partners and government education providers and see what we need to make this transition work. We need to have an analysis of the skills gaps within

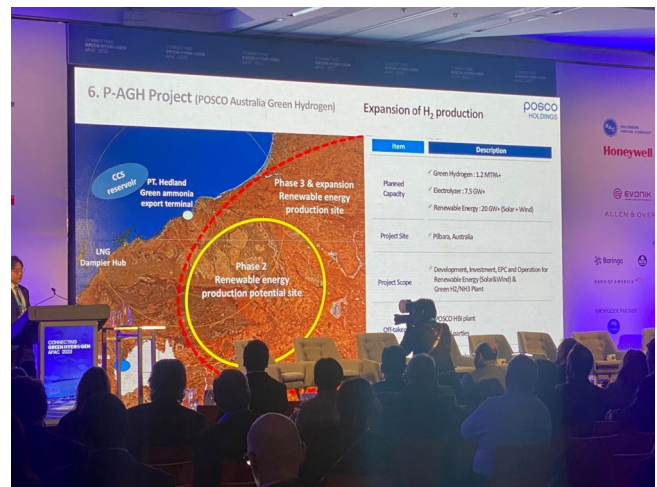
each industry and then come up with a system of identifying which is going to be the most urgent for the VET sector. This could be a diesel mechanic who will have to upskill for the maintenance of the hydrogen-powered buses and heavy logistics.

We need to dissect the available units of competency and see what can be used for our learners. We also need to discuss what the potential jobs will be. We will have new jobs with new skills that may have never been needed before. This will even be from the site managing side of things as they will need to be aware of requirements and handling procedures to ensure that their team is operating as required by new incoming safety guidelines that we don't even have yet. We are going to need training subjects such as hydrogen fundamentals, hydrogen safety, emergency response, understanding regulations of electrolysis and compressors, fuel cells, appliance installation, hydrogen batteries & installation transporting bottles, and hydrogen vehicle drivers. This helps to highlight the scope of the incoming education system that we are going to need. This is a golden opportunity that we have here, and this won't be around forever if we take too long, we may miss the opportunity to lock in long-term contracts with global partners and be left behind.



create new units of competency for each stream (i.e., electrical, plumbing, automotive etc.). These units of competency would also be used for gap training for the skilled workforce that is already registered/ licensed within their respective trades. However, there will have to be discussions with both industry and the governing bodies such as Energy Safe Victoria to see if we do require specialist licensing. In Victoria, there are many stages already of licensing for gas works. We have plumbers who can be licensed in gas installation works, licensed in gas type A servicing works, and then type B servicing works. The difference between the type A & B licenses is the capacity and the styles of the gas appliances; type A generally domestic settings and type B are large industrial boilers furnaces and appliances. Now with this licensing already set up within Victoria, I would recommend that we look at creating a type “H” license. This would ensure that the tradespeople operating and handling this gas are specialist-trained operators who understand the behaviours of the gas. This would also give the plumbing industry a new green focus on energy efficiency that we can show to the country that we are an integral part of the solution to achieving net zero by 2050.

One of the great strengths and opportunities that Australia has is the chance to be an industry leader for our region and we could have international trade partners in Korea and Japan if we can get our exporting stations ready with hydrogen storage. We could have exports set up around Australia from the northern end of WA to Tasmania and the east coast of Queensland all these ports allow getting the Hydrogen and Ammonia to customers. The issue that will be slowing industry down on this is the Australian permitting system. Big resourcing companies such as BHP, Rio Tinto, and Fortescue Metals have all made mention of the frustration of the building permitting systems. It has been said that the states all have different requirements which vary greatly however the time from lodging the permit to getting the permit approved can take 2 years in Victoria.



As these new technologies emerge, we the instructors and education providers need to turn to the industry to see what skills they need their workers to be equipped with. As it currently stands there are no real trade-focused courses available for the trades to enroll in to upskill. This is a major gap within the market. I am in talks with other training providers around Australia to see what they are currently planning also noting the emerging trades that will be incoming when hydrogen as a fuel source hits our shores and building sites. This could be a fuel for the power plants to get them off coal. Worth mentioning is that hydrogen could be a replacement for diesel-fuelled trucking and transport.



My trade plumbing can be the specialist provider of this new green gas to our industry and domestic consumers, even though this may be hampered hopefully only temporarily by the Victorian government. Hydrogen blending stations are being trialled in South Australia, Queensland and Albury/Wodonga and are being set up to run a 10% blend into Natural gas for 4,000 homes. Projects like this give us hope that this will catch on and be a positive step in securing a green future for Victoria.

The biggest threat of my finding is the Victorian government's mandate to ban natural gas in new homes and buildings. To me this has been a knee-jerk reaction pushed by the "Greens" strong-arming the government; this decision to electrify the state comes at the cost of increasing the "load" on the already struggling power grid. In my view, this is not a wise choice. With this choice, it may kill the opportunity to get Victoria carbon neutral by 2050.

With the findings from my fellowship, there are many opportunities that I see for my country, my place of employment, and my trade. For Australia, we have a small window of opportunity where we can become an industry leader in the Asia Pacific and partner up with the likes of Korea and Japan. We can offer them both Blue and Green Hydrogen and lock in long-term trade deals for 10+ years. When the deals are locked in, we can then look at setting up hydrogen with the country for ourselves.

Chisholm has a great opportunity to set up a hydrogen training centre, with the knowledge that we share within our organization we can look at training for electricians, plumbers, engineers, and builders. We can offer them training on setting up electrolyzers and training on fundamentals of the gas and requirements on what is needed for installation and storage of this gas; this would allow us to get out in front of our competitors.

06

Considerations and Next Steps

Some of the challenges that I have faced within the research part of this fellowship was when speaking to members of government there were astonishing gaps in communications and emails and this I do understand as they are extremely busy doing what they do, however, that doesn't make them reply any faster. Also, when trying to speak to big business partners they can be a little hesitant to show their cards so to speak. They want to ensure that no other competitors get an edge over them, again totally reasonable. I have made some amazing contacts that had been sharing some of their plans in converting existing exporting stations into hydrogen exporting ports. These projects are expected to be completed in 12-18 months; this means that they have already started the conversations with our Asia Pacific neighbours about long-term contracts.

With the implementation of my findings, I have found that there is a lot of excitement and talk about hydrogen and there are like-minded people who are having conversations with manufacturers to see what training they have their own staff complete and what they need the staff of the future to have. When listening to talks at the World H@ conference and APAC H2 conference there were representatives from companies such as Osaka Gas talking about their renewable plan and if hydrogen will be a part of it. They have said that hydrogen is part of their plan, but this is going to be confirmed once they have completed feasibility studies on their existing pipework. They have over 61,000 kilometres of pipework that are currently

used for natural gas and they are currently doing studies on the pipework to see if it is possible to have the pipe run 100% hydrogen gas and at what pressure. Once the study is completed and the results are in then they will be able to make an informed decision on whether they use hydrogen or possibly another gas such as "e-methane". Similar studies have also been carried out within Australia, for example Caroline Beattie from APA Group said they are looking at converting a section of the pipeline 43 kilometres long from natural gas into hydrogen. They have said technically it will work and it's feasible without issue, they are just doing testing on the operating pressure of the materials to ensure safety. They have been working closely with Standards Australia to record the data and make it available to the public with their findings. They believe this report will be available before the first quarter of 2024.





With all these studies taking place it shows that there are stakeholders that are heavily investing in the hydrogen future, and it also shows that if hydrogen does make it back to the consumers within their gas pipelines it might be some time away. There are so many other opportunities for the use of hydrogen in the future of Australia. And looking at the direction of the state governments on the east coast it shows us that we need to work and work fast at getting hydrogen-fuelled transport for buses, trucks, and logistics. This will be for the maintenance and repair of the vehicles and for installing hydrogen fuelling stations like the one that is currently been set up on the “Hume Hydrogen Highway”. This shows us there is a need for training on hydrogen handling and bringing awareness to the public about hydrogen, its safety, and the long list of benefits.



The next steps from my fellowship journey nearly have come to three key things. I have almost completed a hydrogen research unit that we can offer students for additional study knowledge, I have been in high-level conversations with teams from the Victorian Skills Authority and the Construction Industry Advisory Group offering my feedback and advice on what could be done and lastly, I am working with other keen people to be a part of what can be produced as a hydrogen training hub. This is my biggest focus, and I would love to have a part in bringing this new training to our trade and country.

My work with the research unit offers basic hydrogen fundamental training, this information lays the foundation of knowledge for the users to build on. The idea of this unit is to grab the cohort's attention and interest to get them wanting to know more about hydrogen and what they could do with hydrogen and incorporate it into their career. I have also had conversations with my management group discussing what could be done with the existing units of competency and how they could be incorporated into the plumbing training package or even have the units bundled into a hydrogen training package. The aim of this is to see if we can expedite any of the organization of the training development to get some options out there for the learners to apply for. This could be a great step toward becoming the first hydrogen training provider.

I have been having conversations within my employer's Solutions department on what can be done and shared our thoughts also on what we can aim for thinking big, such as a specialist training centre. It seems that I am well placed at an organisation that also wants to be the leading edge of education and show the country what we can offer in the way of renewable education programs. We have been putting our heads together to develop ideas that can be pitched to the CEOs of the company and having our “solutions team” look to see what government funding may be available for us to apply for. We have been discussing with members from all the potentially affected trades to see what the need for training is and what they

want in a new training facility. Together with all the trainers from the industries we have a fantastic chance of creating a brilliant hydrogen-focused training facility showcasing training for a new hydrogen economy.

For my future research, I have connected with like-minded people within the plumbing training areas of the Victorian Skills Authority, and the Construction Industry Advisory Group. Within these meetings, I have had the opportunity to share what I have learned and to see what they are currently working on. When speaking to Brendan Gould from Master Plumbers Victoria he has shared some of the steps that have been taken by their Queensland branch. They have set up a hydrogen training room with hydrogen storage cylinders and gas detection equipment and appliances that can run on hydrogen gas. This is what needs to be completed in Victoria, we need to have a “Hydrogen Training Centre of Excellence” We need more than a room with some appliances, we need a building that can be used for multi-trades (builders, electrical, plumbing, and automotive.) This building can have training areas for the pipe materials and testing, areas for electrolyzers and wiring safety, gas detection equipment, and classrooms where the theory components of the training can be delivered and this can be set up as a one-stop building for all the hydrogen needs. A building/ training centre like this will need to have government funding to help pay for such a footprint however that is certainly available for a training provider that wants to take the first step.

In these meetings, there is a mutual understanding from all parties that we need to sit down with the industry and government and see what we can offer in the way of training our trainers to get them ready for some new delivery.

I want to be a part of a company that pushes hydrogen into the next phase, currently, it’s a hot topic with issues such as oil prices, wars, and electrification but action needs to be taken before it just dissipates away. I hope that my employer wants to be that company that is pushing the education industry to keep pace and lead the

way in education and training. I have been lucky enough to be involved in some high levels of discussions across a variety of providers that are in the investigation stage of what they can offer and who they are targeting for their training. If I was to look at this, I would look at targeting jobs that will be created by this industry such as managerial role, engineering, consultants and advisors’ roles, director & CEO roles, electrical designers, researchers, transport-related jobs, and gas-related workers. My training sector of plumbing and construction needs to start by creating hydrogen fundamental courses to give our cohort a basic understanding and bring knowledge to consumers and the common person on the street, so they understand the benefits of hydrogen. I want to avoid what has happened in the nuclear sector with lobby campaigns and scare tactics that have all but crushed the hopes of developing nuclear power for the community.

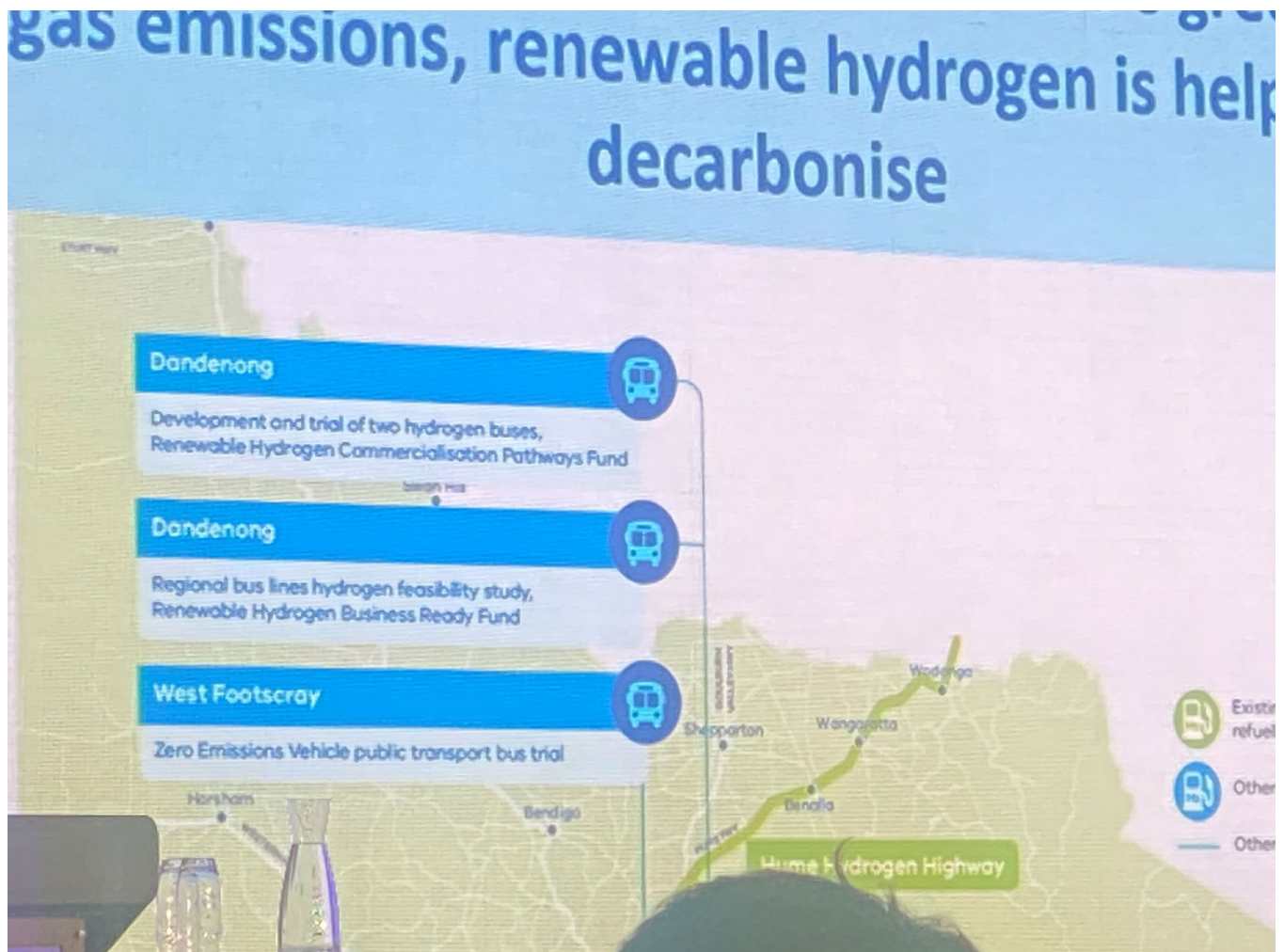
The Department of Education and Training needs to liaise with industry and see what jobs can be created so that we can then develop training packages to suit these careers. These jobs created by this industry will range from managerial roles, engineering, consultants, and advisors’ roles, director & CEO roles, electrical designers, researchers, transport-related jobs, and gas-related workers. There has already been a very extensive report completed by Swinburne University and the report analysed hydrogen-related jobs advertised online from October 2021 to April 2022 and found that, despite the serious lack of hydrogen skills and training available, most roles required extensive experience and knowledge.

Mechanics and drivers, gas and electrical workers, plumbers and technicians are just some of the people VH2’s Hydrogen Skills Roadmap says are likely to be impacted, making skilling new workers and upskilling existing workers a pressing issue facing the nation. Heavy vehicle transport was identified as an area for urgent attention, as the hydrogen transition requires diesel mechanics to update their skills in the near term. A thing to remember is that there will also need to be changes to documents such as Standards

Australia and the National Construction Code (NCC). With the new incoming gas, we will need to address things such as materials that can be used with hydrogen, testing procedures, ventilation requirements, gas sizing tables. For the NCC they will have to address requirements with storage of the cylinders and what requirements there will be for the air monitoring and leak and flame detection.

Limitations, there are many, and frankly, this is mainly because we don't know what we don't know. We have a potentially massive industry that has been said could produce an income for Australia of \$50 billion a year by 2030. We need to learn to walk before we can run; this would point our major companies in the direction of setting themselves up for mass export. They would be speaking with their partners in the Asia Pacific and see what the neighbours need and what we can provide them with whether it is Blue hydrogen or

the more favourable Australia Green hydrogen. Once the big miners have locked in long-term contracts with our neighbours they can then invest back into Australia and see what can be done. A great starting spot for Australia would be transport and changing our logistical transport and public transport over to hydrogen fuel. This will need investment into automotive technologies and automotive training and training facilities. David Oglesby leads the Victorian Government's Energy Industry Engagement and Development branch mentioned at the Melbourne H2 conference that the Victorian government is planning on having all public transport buses running on hydrogen by 2025, this shows just how quickly we need training providers set up for the hydrogen economy that is fast approaching.



Next would be using hydrogen to fuel our power plants, this work would need major research into converting these aged plants into state-of-the-art carbon-neutral plants. For this to work we will need to have engineers and electrical designers work with the government to see what can be designed where new plants can be built and when existing plants can be retrofitted with hydrogen as their fuel source. For the plumbing sector, we can develop training for the gas fitters so they can see what is needed for new appliances within the home and what is needed in industrial settings, this could be alterations to the ventilation requirements and additional drainage of flues. The plumbing training will need to address skill gaps for the tradespeople already in the field also noting that this training will need to be accredited by Energy Safe Victoria the state gas authority. This training will also need to be sent out to all plumbing practitioners and have a period of 12 months for them to get the opportunity to apply and complete the training and then apply for any licensing/ accreditation.

07

Impacts of the Fellowship

When I undertook this fellowship, I was unsure if this was going to change the way that I conduct my life, but it has, it has lighted a fire within me around protecting my trade and the people within it. I am now driven into not just being another plumber and trainer, I want to be the leader of the industry or the person that people turn to when they have questions about hydrogen and training. I have taken it upon myself to be the leader of my organisation and to bring the information to my fellow peers and all of the apprentices so that they can then also take pride in what we do and understand that by implementing hydrogen into the gas lines of Australia we are protecting the environment from global warming and shouting from the rooftop that we are leading the way in helping Australia meet net 0 carbon emission by 2050. We are also securing our trade for the future, the move that the Victorian government made by taking away the choice from consumers to have natural gas in their new homes was a bitterly disappointing move. It seems like it has been a decision made because of many things but none of them good. I do agree that there are moves in the refrigeration industry that are making good progress however when it comes to recovery time with hot water appliances and the location and climate of the heat pumps (heat pumps over 3 hours to heat the cylinder) the numbers certainly do not add up in the consumer's favour. I am a massive advocate of renewable that works in the correct installation. I believe that Australia needs hydrogen from consumers, especially in the states of Victoria and Tasmania we are the states that are

the coldest and tend to rely on gas for our heating applications.

There has been a shift in the way I now deliver my gas subjects to the classes that I take, there has been a reignition of passion and I find that I am bringing it to the classroom in many ways. I find that the students sit forward and take an interest when I start talking about what the future of plumbing may look like in the coming years. I have recently been getting questions each class about the natural gas ban and when I counter that this could be a great way for hydrogen to make its way into the market. This could be a way for the experts to prove that we need gas, not natural gas but Green Hydrogen.

I feel a passion to show the students what is been trialled overseas and we can see that we are running behind some of our European friends in the rollout of the hydrogen highway trials, we are making progress just slower currently. I am showing them the trials that we are doing in South Australia about the gas blending and in Echuca about the 4000 homes to be trialled on hydrogen gas. These examples are getting interest from the learners, and they are asking questions about who can do the work and what training is available.

I have been able to have meetings with my organisation's "Solutions Team" This is the team that works to keep us at the top of training providers in the country. This team oversees new training programs and what Chisholm can offer

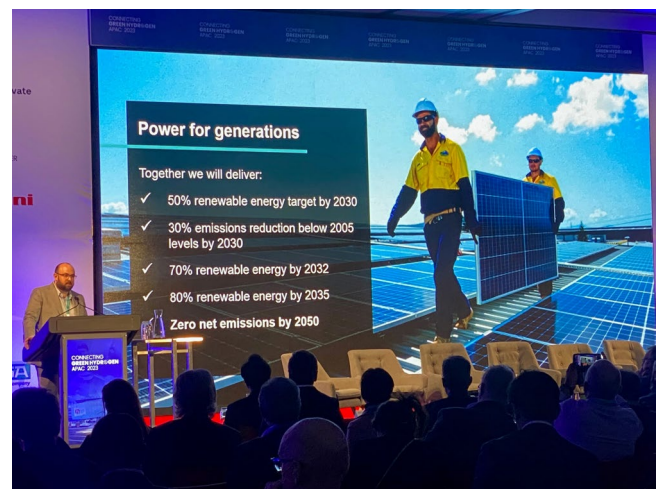
for what skills will be in demand as the hydrogen supply chain scales up. The solutions team is looking at trying to identify current hydrogen training across industry and education sectors nationally and internationally to see what is available for us and where we can go from here. We have been looking at providers like ATCO which are training pipe/gas fitters in hydrogen supply pipework in Western Australia and looking at current hydrogen skills and future skills requirements across hydrogen-related industries. They have also been speaking to industry down at Hastings to see what they want their staff to be trained in at all levels of the company so we can capture insights for a hydrogen skills trajectory in the workforce.

As a part of my fellowship journey, I have had meetings with my management team, and we have spoken about what we can offer the students in the way of hydrogen education with the plumbing training package. We have looked at what could be possibly inserted from the existing “current” units of competency on www.training.gov.au there are some units that would work very well about “basic hydrogen safety” and “safety practices, procedures and compliance” These units can be used once they have been pre-validated for the course.

I have also been granted time next year to go and visit the facility in Echuca where a 10GW Electrolyser and associated equipment is being built and they are planning to start with a blend of 10% hydrogen with natural gas. I have big hopes for this trip, they should be in the commissioning stage of the project, and I will be able to meet with the engineers of the project and talk about the procedures and what they know will be needed by the tradespeople of the future.

I am extremely happy that my managers agree that hydrogen is a future for our plumbing industry and want to be in the service/ education sector leading the way in our hydrogen future. We have put some time aside in early January so we can plan what we can offer students in the coming future.

There have been many connections made within the education sectors from secondary schools to universities, trades to big business. It is well known that Australia lacks the hydrogen skills and training capabilities it needs to achieve its newly legislated carbon reduction targets, according to new research by Swinburne University of Technology’s hydrogen Hub.



Just a few of the trades that we need to establish training for are mechanics and drivers, gas and electrical workers, and plumbers are just some of the people Hydrogen Skills Roadmap says will be impacted, making skilling new workers, and upskilling existing workers a pressing issue facing the nation. Heavy vehicle transport was identified as an area for urgent attention, as the hydrogen transition requires diesel mechanics to update their skills in the near term, this area is under pressure already as states such as N.S.W, Victoria, and South Australia have committed to their buses on the public transport sector to be hydrogen gas fuelled by the end of 2025.

The impacts of my fellowship on the plumbing and education sector have been greater than I had thought. When it comes to the meetings that I have been able to participate in, for example, I was a guest speaker in a meeting with a member of all the TAFEs within Victoria and was able to give a presentation of my fellowship journey to them. The most fun part of the presentation was when I opened the discussion to questions, the

participants all had questions about what we should do next and where do we go from here. This was so great to see that all the TAFEs are starting their hydrogen training journey and they all seem to be working on setting up delivery for new learners as soon as they can. I have made connections with these members and still converse with them about plans and projects that we are working on within our organizations.

The impacts of my fellowship across the sectors and state show that there is a severe lack of available training for the emerging industry, and this is also true for the soon-to-be trainers of the industry as they will need to undertake some “train-the-trainer programs to ensure that they are well equipped to take on the training of the new cohorts coming through.

Our state has committed to be carbon neutral from 2050 and this has put pressure on both the education areas and the industrial sectors as we are both working hard to get some things available for us and see what we can provide. There is going to be a need for gap training for tradespeople and professionals who are already qualified, this training needs to be developed as a matter of urgency. Then there is the case of developing new units of competency to suit a range of training cohorts such as managerial roles, engineering, consultants, and advisors’ roles, director & CEO roles, electrical designers, researchers, transport-related jobs, and gas-related workers.

Within the sector there have not been any changes made yet, however, discussions are happening currently that are targeted to change soon. The sector is working toward looking at what each sector will need within their training packages, some people are working on what can be piloted in the sectors for gap training for the hydrogen training. As the commitment has been made to be net 0 in 2050 there are many plans to get the hydrogen training sector ready to go however, when it comes to the hydrogen units of competency there still are only 5 available and each training program is going to need multiple units and from what available only Uegnsg901 - Apply Safety

Practices, Procedures, And Compliance Standards For Handling Hydrogen Gas, is the U.O.C that could be used across multiple sectors.

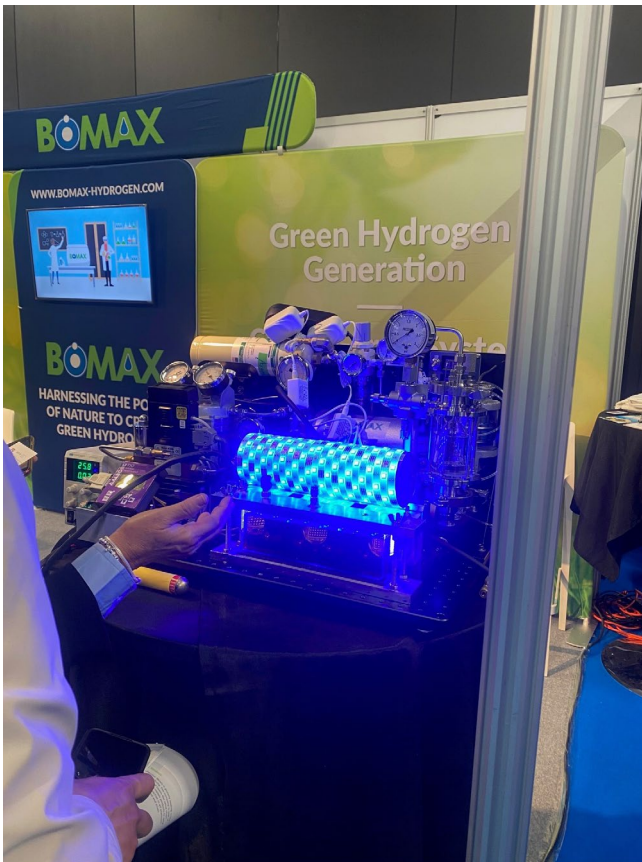
When it comes to the plumbing side of things. I have been working on what I can do for the apprentices that I teach, and I am looking at developing training on,

- Basic hydrogen fundamentals.
- Hydrogen safety practices, procedures, and compliance standards.
- Hydrogen fault finding and repair to storage equipment.

This training is planned to be able to be delivered to the plumbing cohort but some of the training will be able to use across multiple sectors and they can build on it to suit their sector’s needs.

I have been having meetings with the Chisholm Solutions Team to identify current hydrogen training across industry and education sectors nationally and we have looked internationally to see what is available for us to see where we can go from here. We have been looking at providers like ATCO which are training pipe/gas fitters in hydrogen supply pipework in Western Australia and looking at current hydrogen skills and future skills requirements across hydrogen-related industries.

I am planning on working towards a business case on what we can develop as a Hydrogen Training Hub, the hub is planned to offer training for targeting jobs for all hydrogen-related jobs such as managerial roles, engineering, consultants, and advisors’ roles, director & CEO roles, electrical designers, researchers, transport-related jobs, and gas-related workers. I also have the goal of having a small-scale electrolyzer on site so the learners will have the ability to look at a working example that we can train them on.



customers. I am looking at having demonstration bays set up for the apprentices to look at working examples of the water heaters, heat pumps, and ducted air-conditioning systems, this will allow them to look at the installations step by step and they will be able to follow the systems sequence of operation and break down of the componentry.

For my future, I have made the ambitious goal of overseeing a hydrogen training facility. My aim has always been at the front of the pack to lead the industry into every evolving space when it comes to renewable energies and green space. When I was a child, my parents would always say to me when we visited the beach or the park that we “always leave it cleaner than when we got there”. This is a mantra that I now say to my girls, and I now am working towards doing the same in my teaching and industry. As parents, our innate desire is to provide our children with a better upbringing than we experienced in our childhoods.

I am currently working closely with my management team to ensure that we have the most updated appliances and the most efficient in our industry. We are working closely with manufacturers to ensure that the appliances that we have our over 1000 apprentices trained on are the most efficient appliances on the market. By doing this it gives the apprentices knowledge and experience on these appliances which can get them and their employers the opportunity to offer these appliances to their

08

Sector Engagement (Dissemination)

June 2024

Plumbing, Sheetmetal, Coppersmithing Instructors Association (PSCIA)

Plumbing trainers from around Australia attended this event last year we had over 150 trainers in attendance. They have plans to get this number to 200 with over 30 presenters over the 3 days.

Annual Albury Conference Supporting Plumbing trainers and training.

Presentation, with PowerPoint that can be distributed to the attendees, and they can use in their presentations to the learners.

I have created within the PowerPoint some fundamental data points that the learning cohort can look at and compare with other gases that they already use. I also explain the different colour codes of hydrogen gas and how they are created and refer to Natural gas, LPG to see the characteristics of the gas.

This gives the learners an understanding of the gases and the advantages of hydrogen gas the hope is that the learners also understand the importance of bringing hydrogen into our plumbing program and the big picture would be that they become excited and have “buy-in” into hydrogen and push forward and make their steps in being hydrogen gas advocates.

I have been lucky enough to be involved in some high levels of discussions across a variety of providers that are in the investigation stage of what they can offer and who they are targeting for their training. We are looking at targeting jobs for all hydrogen-related jobs such as managerial roles, engineering, consultants, and advisors' roles, director & CEO roles, electrical designers, researchers, transport-related jobs, and gas-related workers.

My keenest interest is in the construction department and automotive training sectors, I want to see what we can start to develop straight away so that when we get the approval from the powers to be we can then have the course material on hand ready for delivery. I am working on creating hydrogen fundamental courses to give our cohort their basic understanding and this can be built on with the other units of competency within the chosen course.

My recommendations that I want to give the Victoria Skills Authority boil down to two recommendations and they do differ greatly, and this all depends on the way our gas authority and our industry want to have hydrogen gas from my plumbing point of view.

This could go the way of all plumbers and gas fitters who will be suitable and qualified to carry out any work with hydrogen If they have the following.

- Are registered and working under a licensed plumber.

- Licensed /registered Plumbers with Type a Gas servicing Accreditation.
- Licenced/registered Plumbers Type B gas fitters.

We could plan to have this hydrogen work to be treated as another gas for the plumbers to use and they need another accreditation on the plumber's registration/Licence. Then they will be ready to undertake the hydrogen work and then they submit the certificates of compliance as normal gas works. This would need new units of competency to ensure that the cohort has the required knowledge to work with hydrogen gas as they do with LPG and Natural gas.

The other option is that the hydrogen gas work is to be treated as specialist gas works that could come under a "type H Licence". If we are to only have hydrogen gas used in industrial settings for power plants and large commercial settings this is what I would recommend. If this was to be a specialized licence, then we would have to build a training program that would be a par with the type B gas licence. Generally, this work would be carried out by larger companies on large government scale projects such as mining and power plants.

09

Conclusion

In navigating the landscape of the hydrogen adoption some recommendations have emerged for the blueprint for Australia to climb into a leadership position in the hydrogen industry. These recommendations span from incentivizing hydrogen transportation and raising community awareness to fostering innovation in power generation and expediting permitting processes. Each recommendation shows the vital facet of harnessing hydrogen's transformative potential while addressing specific challenges, offering a comprehensive pathway to realize a sustainable and thriving hydrogen sector.

Hydrogen Transportation Promotion

To expedite the transition to hydrogen-fuelled transportation, the Australian government must implement targeted incentives and policies that encourage the purchase and use of hydrogen vehicles. By providing financial incentives, tax breaks, or subsidies, the government can stimulate consumer interest and alleviate initial costs associated with adopting hydrogen-fuelled vehicles. Simultaneously, investing in research and development for hydrogen-powered public transport fleets is crucial. This initiative not only fosters innovation but also serves as a practical demonstration of the feasibility and reliability of hydrogen technology in the transport sector.



Hydrogen Fuelled Power Plants

Establishing a regulatory framework that expedites the approval of hydrogen-powered power plant projects is imperative for realising a cleaner and more sustainable energy future. By streamlining regulations, the government can eliminate bureaucratic hurdles and facilitate the timely implementation of hydrogen projects. Encouraging partnerships between energy companies and technology developers is equally essential. This collaboration not only drives innovation but also harnesses the collaborative expertise of diverse stakeholders, ensuring the development of efficient and reliable hydrogen power generation technologies.

Streamlining Permitting Process

The bottleneck in the permitting process for hydrogen projects demands urgent attention. Creating a dedicated task force with a specific focus on streamlining these processes is a proactive step. This task force should comprise experts in hydrogen technology, regulatory affairs, and project management, working in tandem to identify and eliminate bottlenecks. This task force should be positioned at a federal level and eliminate having different processes from state to state. Additionally, providing financial incentives for projects aligned with national hydrogen goals can expedite the development of crucial projects. Financial support not only attracts investment but also mitigates risks associated with lengthy permitting processes, ensuring the timely execution of projects.

Community Awareness Programs

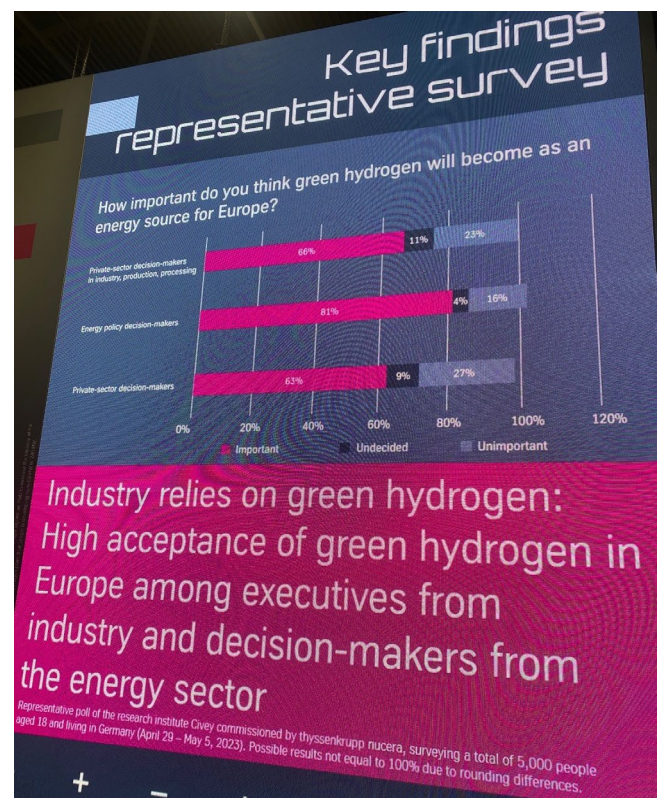
Fostering public awareness and acceptance of hydrogen blending is pivotal to its successful integration into daily life. Collaborative efforts with industry stakeholders can amplify the impact of community awareness programs. These initiatives should not only target the public but also include campaigns involving plumbing professionals. Given their role in consumer appliance installation, involving plumbers ensures a seamless transition to hydrogen blends. Tailored awareness campaigns can equip plumbers with the knowledge and skills needed to adapt to the evolving landscape, fostering acceptance and confidence in hydrogen-blended appliances.

Conclusion

In weaving together these recommendations, Australia stands at the precipice of a hydrogen revolution. By promoting hydrogen transportation, fostering community awareness, investing in hydrogen-powered power plants, and streamlining the permitting process, the nation can pave the way for a sustainable and prosperous hydrogen sector. The symbiotic relationship between

government initiatives, industry collaboration, and public awareness is pivotal in realising a seamless transition to hydrogen technology.

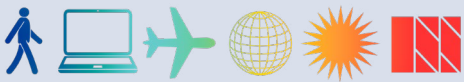
Australia's journey toward hydrogen leadership necessitates a holistic and synergistic approach, where government policies, industry practices, and public perception align harmoniously. The envisioned future involves hydrogen-fuelled vehicles seamlessly cruising the highways, hydrogen-blended appliances heating our homes, and innovative power plants generating clean energy. As the nation strides towards this vision, each recommendation serves as a cornerstone, fortifying the foundation for a hydrogen-powered future, where Australia stands not only as a participant but as a vanguard in the global hydrogen renaissance. The time is now to propel Australia into a leadership role, charting a course toward sustainable energy and economic prosperity.



10

References

Swinburne. Hydrogen Skills Roadmap.



est. 1991