ELECTRICAL TRADES UNION OF QUEENSLAND AND THE NORTHERN TERRITORY

SUBMISSION TO THE QUEENSLAND ELECTRICAL SAFETY REVIEW

June 2023

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Executive Summary

The Electrical Trades Union welcomes the opportunity to provide feedback on the Electrical Safety Office's Review of the *Electrical Safety Act 2002*.

All forms of energy, however they are produced, come with risks. The understanding, control, and management of those risks is what makes the use of that energy safe. The safety of our energy systems gives confidence to the community, users, and workers that we are both individually and collectively protected from the risks and harms associated with energy use.

This regulatory function is crucial in many areas of work, but especially in electrical work, where the difference between a job well done and one done poorly is also the difference between life and death. Where other work can lead to illness and injury when not effectively regulated, electrical work is arguably the most dangerous, where the margin of error is routinely fatal.

We believe that the best way to manage these risks is to ensure that the people best placed to judge the relevant risk are given the power to do so. In the case of electrical work, the most qualified people to assess risk are licensed electrical workers.

In our submission, we argue for the options which ensure that electrical work captures new and emerging technologies, and that this work is conducted by licensed electrical workers.

Position on Proposed Policy Options

Options	ETU position
Section 1	
Option 1: Status quo	**REJECTED**
Option 2: Expand the definitions of 'electrical equipment' and 'electrical installation' in the Act (legislative response)	**PREFERRED**
Option 3: Increase education and awareness (non-legislative response)	**REJECTED**
Section 2	
Option 1: Status quo	**REJECTED**
Option 2: Expand the definition of electrical work by reducing scope of existing exclusions (legislative response)	**PREFERRED**
Option 3: Increase supervision requirements for certain activities excluded from the electrical work definition (legislative response)	**REJECTED**
Option 4: Education and awareness (non-legislative response)	**REJECTED**
Section 3	
Option 1: Status quo	**REJECTED**
Option 2: Capture work on electric motors within the definitions of 'electrical equipment' and 'electrical work', for the purposes of a licensing requirement (legislative response)	**PREFERRED**
Option 3: Increase education and awareness (non-legislative response)	**REJECTED**

Introduction

Over the course of the twentieth century, Australia developed our understanding of electricity, generation, transmission, distribution, and consumption to a point where it is impossible to imagine a city or community of any scale operating without some form of electricity. In that time, we also came to much better understand the risks and potential harms that are associated with electricity and commensurate with that increase in knowledge came an increase in the required skills and qualifications to manage those risks.

For the majority of the twentieth century, and into the twenty first century our generation, transmission and distribution systems remained primarily a unidirectional system of generation at large centralise power stations that use high voltage transmission to distribution networks that deliver power to homes, business and industry at varying levels of voltage.

Our awareness of the risks and harms associated with electricity gives the community confidence that we are skilled in understanding and controlling these potential risks through the capability of a well-educated and skilled electrical workforce. This capability is a significant contributor to the high levels of safety and community confidence that our sector receives, particularly from the community that knows the systems we a have in place keep them safe from harm.

Towards the end of the twentieth century there was the emergence of two important technologies: the first was the ability to manufacture reliable solar panels and the second was innovations in battery technology that significantly increased their energy density with a commensurate reduction in weight.

There has been a steady reduction in cost of manufacturing of solar panels and associated equipment and installation since the start of the current century. This has driven a significant increase in distributed generation which now requires electricity distributers to be able to not only supply electricity but to also enable the increasing number of micro scale installations to feed back into the grid. We are entering the era of multidirectional power flow that extends beyond just the household to now include our electric machines.

Electrical generation and supply are a complex integrated energy delivery system in which it is vital to ensure that each of the component parts is capable of performing the function that is required of it, be that on the generation floor of a coal fired power station or a roof top installation feeding into a local transformer in the street.

Electricity is one of the defining features of the modern age. When it first entered the public arena in the 1800s it was one of the marvels of the age. In Australia, while the earliest uses were spectacular and novel (notably lighting up Sydney on the eve of a Royal Wedding in 1863 and illuminating the first night game of football played at the MCG in 1879), the first applications were to practical public matters, notable lighting streets and powering trolley cars down municipal high streets.[1]

[1] David Havyatt, 'History of Electricity Reform in Australia' in Guilliame Roger (ed), *On The Grid: Australian Electricity in Transition* (Monash University Publishing, 1st ed, 2022) 1, 5.

The wide-ranging and very public nature of electricity's practical application has led to a crucial interconnection between operation and regulation within the electrical network. In Queensland, this interconnection dates back to the original municipal authorities who owned and operated the supply through the late 19th and early 20th century.[2] Indeed, the first recorded practical usage in Queensland was the electrification of lighting in the Government Printing Office on George Street in Brisbane in 1883,[3] followed by the Roma Street rail yards, Parliament House, and the General Post Office within 5 years. By 1906, there were 46 electric light and power stations with an aggregate capacity of 23,000kW, nearly half of which were municipally owned and operated – most of which were in Queensland.[4]

This role of the state in electricity production and distribution is one that is carried through to the current era of energy transition. The state of Queensland still owns a significant number of coal-fired power generators, the proceeds of which are being used to fund a significant investment in state owned and operated hydrogen, solar panels, and battery storage facilities.[5]

However, while this role in the operation of the grid is critical, the state's role as both a regulator and creator of regulations is of even greater importance when considering electrical work. Effective regulation ensures that services are reliable, dependable and represent a significant value proposition to consumers – but most importantly they also keep the workforce safe.

This regulatory function is crucial in many areas of work, but especially in electrical work where the difference between a job well done and one done poorly is also the difference between life and death. Where other work can lead to illness and injury when not effectively regulated, electrical work is arguably the most dangerous, where the margin of error is routinely fatal.

Thankfully, the strengthening of regulation in recent history has seen a dramatic reduction in the number of fatalities associated with electrical services and products (see

[2] Malcolm Ian Thomis, *A History of the Electricity Supply Industry in Queensland Volume I 1888-1938* (Booralong Publication, 1st ed, 1987).

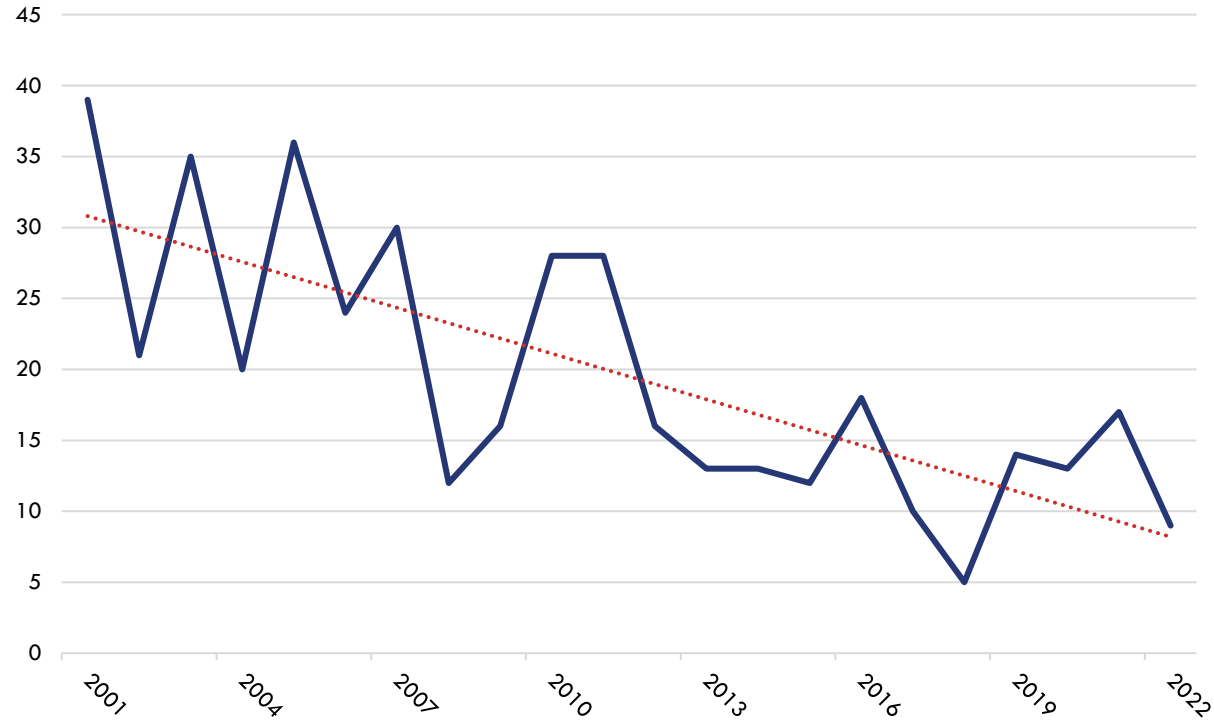
[3] Col Dunn, *The History of Electricity in Queensland : An Outline of the History of Electricity and Its Progress in Queensland 1882-1984* (1985) 21–27.

[4] Frank Brady, 'Contribution on Australia' in The International Conference on Large High Voltage Energy Systems (ed), *A Dictionary on Electricity* (1996) 20, 3 <http://www.ewh.ieee.org/r10/nsw/subpages/history/electricity_in_australia.pdf>.

[5] Mark Ludlow, 'Queensland's Coal Bonanza to Fund Green Power Shift', *The Australian Financial Review* (14 June 2023); Annastacia Palaszczuk, Cameron Dick and Mick De Brenni, 'Palaszczuk 2023-24 Budget Delivers Biggest Electricity Bill Support Package in the Nation', *Joint Ministerial Statement* (2023) <https://statements.qld.gov.au/statements/97922>.

Figure 1). In the early to mid 2000s, electrical fatalities fluctuated between 20 and 30 deaths per year. However, over the past 15 years, these figures have been halved, and have been trending down towards single digits.

Figure 1. Electrical Fatalities.



Source: ERAC.[6]

This reduction in fatalities is a textbook case of regulatory success. While technological changes have occurred over this period, electricity did not become less deadly. The regulation of electrical work, by successive state and federal governments, has driven this decline in death across electrical work in Australia.

However, it is worth noting who suffered fatally in electrical accidents. Crucially, despite their increased risk of occupational accident, licensed electrical workers were far less likely than non-electrical workers or the general public to suffer fatal electrocution (see The effect of having licensed workers who comply with safety regulation is highly valued by the workforce. An analysis conducted by the Electrical Safety Office (ESO) in 2011 showed the Queensland workers listed "reduced chance of injury to oneself", "reduced chance of injury to others", "being prepared for potential risks and accidents", and "saving money by reducing chance of downtime" as being the top 4 advantages to safe and effective regulation.

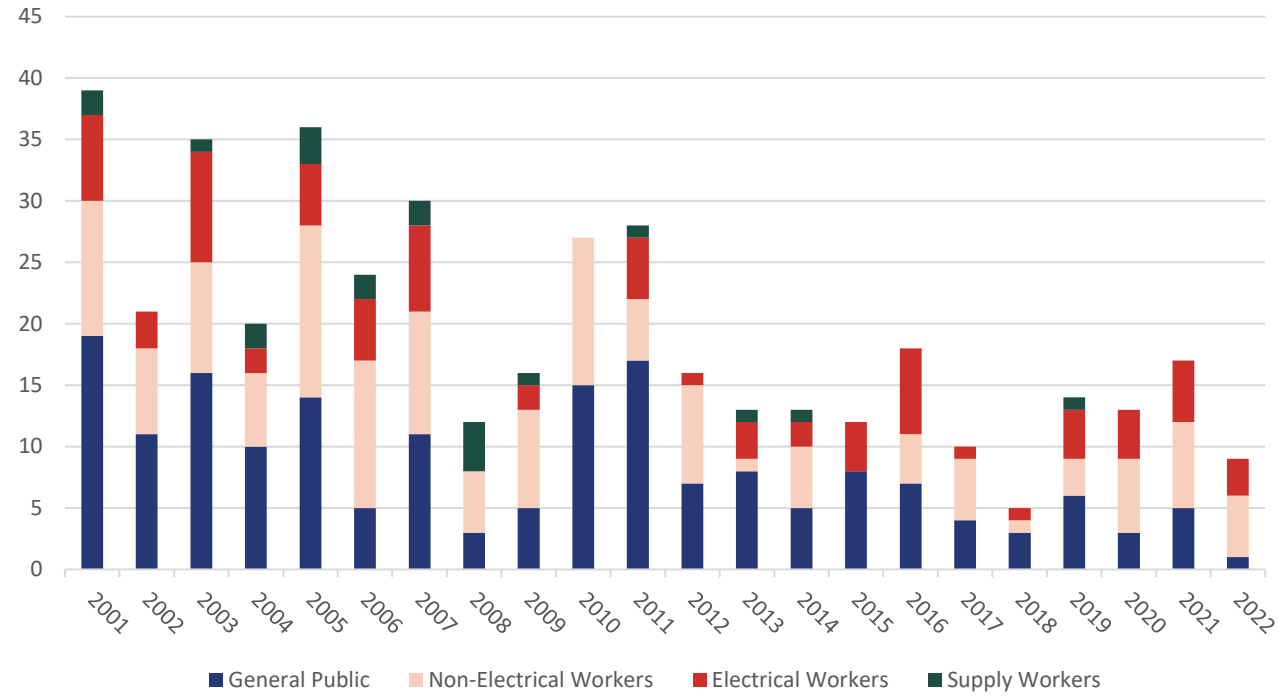
[6] Electrical Regulatory Authorities Council, *Electrical Fatal Incident Data* (2022) 4.

Figure 2). The number of licenced electrical workers who have suffered electrical fatalities has never hit double digits. The same cannot be said for unlicensed workers and the general public.

The effect of having licensed workers who comply with safety regulation is highly valued by the workforce. An analysis conducted by the Electrical Safety Office (ESO) in 2011 showed the Queensland workers listed "reduced chance of injury to oneself", "reduced chance of injury to others", "being prepared for potential risks and accidents", and "saving money by reducing chance of downtime" as being the top 4 advantages to safe and effective regulation.[7]

[7] The University of Queensland and Queensland University of Technology, *Assessing Electrical Safety Awareness in the Queensland Electrical Trades Community: Final Report* (2011) 159.

Figure 2. Electrical Fatalities by Victim.



Source: ERAC.[8]

On average, the general public are more than twice as likely to suffer electrical fatality than licensed electrical workers. Similarly, non-electrical workers suffer fatalities at a rate that exceeds that of their licensed counterparts. This is no quirk of data, but a direct result of the skilled risk assessments that licensed electrical workers are able to make as a result of their training and experience.

In Queensland, between 1990 and 2000, there were 116 deaths in the following categories: electrical workers in the electricity supply industry (5); electrical workers in general industry (13); other workers (28) and the general public (71).[9] Around two non-fatal electrical incidents were reported daily. During 1999-2000, electricity deaths were greatest for non-electrical workers (50%), followed by the public (30%). Interestingly, electrical workers represented 20% of all fatalities.

When considering the technological changes currently entering our electrical system, from photovoltaics (PVs) to electrical vehicles (EVs), the role of the state has not changed. The onus is to put the safety of electrical workers, and the general public who consume the output of their services, first and foremost. This is the position that will be advocated through this submission. Wherever possible, the default position on electrical work should be that it is performed by licensed electrical workers.

All forms of energy, however they are produced, come with risks. The understanding, control, and management of those risks is what makes the use of that energy safe. The safety of our energy systems gives confidence to the community, users and workers that we are both individually and collectively protected from the risks and harms associated with energy use.

It is for this reason that across the globe all countries have sought to regulate the creation, distribution, supply, and consumption of energy. From the end of the nineteenth century through to the early years of the twentieth we sought and gained the ability to store, generate, distribute, and use electricity.

At the same time as this nascent technology was developing, we also sought understand the inherent dangers as well as the benefits that would come with electrification of our homes, business, industries, and cities. It was for this reason that from the start we required skills and qualifications to be in place for workers to ensure not only their safety in undertaking the work but also to ensure the safety and the confidence of the community in using electricity.

[8] Electrical Regulatory Authorities Council (n 6) 8.

[9] *The Electrical Safety Bill 2002* 2002 2.

As the new technology develops, advances are made to equipment manufacturing and we gain practical understanding on the risks associated with different aspects of the rapidly changing energy sector, it may be appropriate in some circumstances to allow some tasks to be performed by non-licensed workers under the supervision of an electrician. However, that decision should not be taken lightly, and the onus of proof should be on those seeking to amend or alter the regulation, not a tacit assumption baked into the regulation as it stands. In these circumstances effective regulation will be critical to establishing the minimum 'guardrails' required to maintain public confidence and worker safety.

Throughout this submission, we will advocate for the modernisation of the definition of electrical work, ensuring a contemporary application of a long held public policy position is achieved in order to cover these new technologies and ensure that licensed electrical workers continue to be a fundamental safeguard to protect both workers and the community from the risks presented by electrical work. The evidence is clear that this is the only way to ensure that electrical work is done safely and that the figures described previously do not reverse their downward trend.

1. Electrical safety considerations of new and emerging technologies

As previously mentioned, the lag that exists between technology and regulation is not unique to electrical work. However, when the margins of error so readily incorporate property fires, severe injury and fatalities, the need for regulation to err on the side of caution is paramount. We argue in favour of Option 2, which modernises the definition of electrical equipment and electrical installation to encompass new technologies across the electrical system.

Response to feedback questions

How are you, your organisation or your stakeholders affected by the problems identified and to what extent?

The Electrical Trades Union (ETU) is the only representative body for workers in the electrical industry, and the ability of ETU members to be safe when working in and around electricity is fundamental to ensure the safe and effective operation of electrical systems, components, equipment and the electrical grid as a whole. ETU members are not only most qualified to perform electrical work, but they are also best placed to assess risk within the electrical system. They are both affected by and able to affect the system as a whole, and consequently their voices are paramount in this discussion.

Do you agree with the assessment of the problem identified, and are there any other elements to the issue that you think have not been captured? If yes, what are they and can you provide examples of these issues?

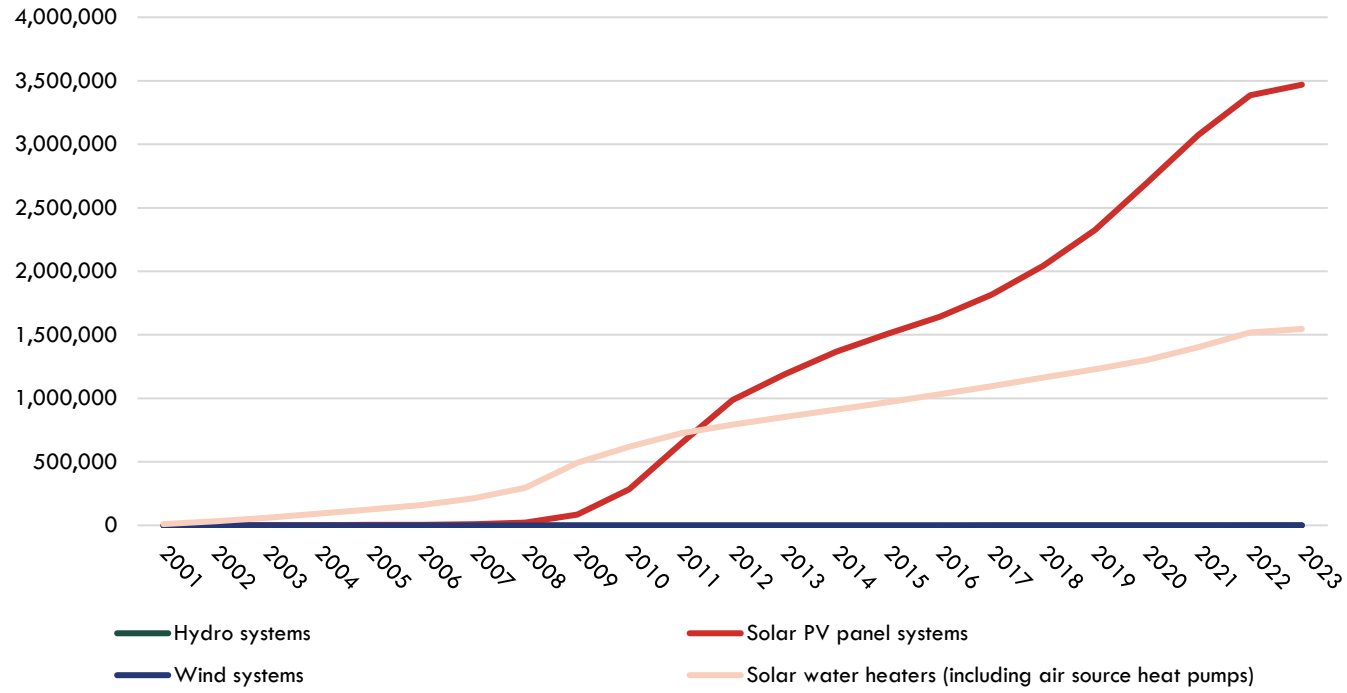
Yes, the assessment of the problems identified within the discussion paper are adequate and accurate. However, there are some areas that need to be discussed in clearer detail. For example, solar panels for roof tops installations are generally performed on Class 1 (typically standalone single dwellings of a domestic or residential nature) and Class 10a (non-habitable buildings including sheds, carports, and private garages) buildings under the National Construction Code (NCC),[10] and are usually under 30Kw capacity with most below 10Kw.

Australia leads the world in the roll out of this form of PV,[11] with nearly three and a half million homes being powered in part by rooftop solar (see Figure 3). This penetration rate of solar can impact the operation of the grid in areas, as it changes the mix of power going in and out of the grid. This fact needs to be considered as it can have an impact on supply authorities and adjacent homes if not proactively managed by the authority.

[10] Australian Building Codes Board, *Understanding the National Construction Codes Building Classifications* (2022) <https://www.abcb.gov.au/sites/default/files/resources/2022/UTNCC-Building-classifications.PDF>.

[11] The Department of Climate Change, Energy, the Environment and Water 'Australia Leads World in Rooftop Solar as Share of Renewables Jumps to 35%' (2022) <https://www.energy.gov.au/news-media/news/australia-leads-world-rooftop-solar-share-renewables-jumps-35>.

Figure 3. Small-scale installations by year.



Source: CER.[12]

Similarly, large scale solar farms are reporting risks and hazards that should be dealt with by licensed workers. A recent audit conducted by the ESO in 2020 found 25 reported incidents on solar farms including "electrical shock, electrical burns, fire or explosion, risk of injury from damage to solar PV modules from grass fires and severe storms", with many of being the result of unlicensed workers or contractors being ill-equipped to complete the tasks safely. [13] This follows a similar audit conducted by WokSafe Queensland and the ESO in 2019, where investigators issued 67 notices across 30 solar farms over a 12 month period, covering "unsafe isolation and securing and protection of cables, earthing, marking and labelling, and testing. They also found unlicensed people carrying out cable installation".[14]

Similarly, the small scale renewable energy sector is facing its own challenges with high and persistent rates of underperformance. The ETU's engagement with this sector has repeatedly shown that the lack of contemporary regulation of electrical work is resulting in suboptimal outcomes with providers regularly advertising for 'unlicenced' electrical workers and trades assistants to complete installations. The extracted Appendix below from the Clean Energy Regulator's inspection data shows the high rates of underperformance:

Appendix

Table A: Number of inspections completed, unsafe and substandard systems for states and territories up to 30 June 2022 (over the life of the program)

	Systems inspected	Unsafe systems	Substandard systems
ACT	423	14	52
NSW	8,754	260	1,612
NT	222	7	39
QLD	10,398	311	2,177
SA	4,199	61	762
TAS	453	20	72

[12] Clean Energy Regulator, 'Postcode Data for Small-Scale Installations' (2023) <https://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations>.

[13] The Commissioner for Electrical Safety Queensland, *Improving Electrical Safety in Queensland* (2020) 12.

[14] Worksafe Queensland, *Electrical Safety on Solar Farms* (2019) <https://www.worksafe.qld.gov.au/news-and-events/newsletters/esafe-newsletters/esafe-editions/esafe-electrical/2019-bulletins/electrical-safety-on-solar-farms>.

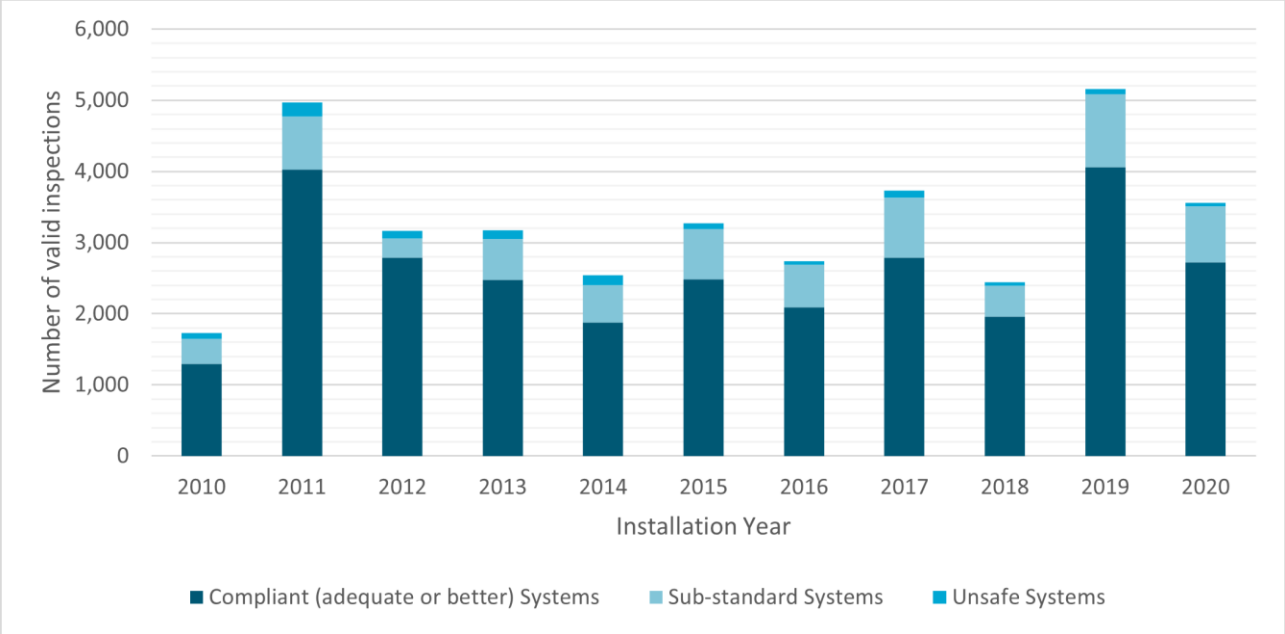
VIC	7,249	220	1,063
WA	5,258	151	1,070
Total	**36,956**	**1,044**	**6,847**

There were about 90k systems installed in Qld in that time and just 10k were inspected - https://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations

On average, 3% were unsafe and 21% were substandard, which is a continuation of a long term trend in performance at both the state level and nationwide for this part of the sector. Based on these trends, of the approximately 90,000 installed small scale solar systems, it is likely 2,700 were unsafe and 18,900 were substandard installations.

This trend is reflected in the Clean Energy Regulators own data as reflected in Figure 1 below:

Figure 1: Yearly inspections numbers over the life of the program 2010 to 2020



What practical impact in the form of benefits would the options proposed in the Discussion Paper have on you, your organisation, the workforce or the community? Please provide examples where possible, including for new and emerging technologies and ELV equipment.

The first, and most important, benefit that is gained is ensuring the safety of workers and the general public from electrocution and equipment and property from fires and explosion risks. By ensuring that electrical work is clarified to include new technologies and ELV equipment, we ensure that it is handled by skilled, experienced, and licensed professionals throughout the installation, maintenance and repair of these emerging electrical products.

Second, the proposed changes would close a regulatory gap which has emerged over the last decade as the penetration rate for solar has increased at a rapid pace. The lag between PV rollout and regulatory catch up has created significant risks within the system as unlicensed workers have been allowed to perform potentially dangerous and deadly work, and as such, the closing of this gap will enhance safety for workers and the community. Additionally, this reform will help to maintain confidence in these technologies which are key to our transition to a carbon neutral energy system.

The 'bad press' that a fatality or series of fatalities could have on the uptake of future domestic renewable energy technologies is also considerable and could severely dampen the progress Australia is making towards its carbon targets. This potentiality is not imagined or unprecedented, and the risks were clearly demonstrated to the nation during the 'pink batts' scandal that saw housing insulation being installed by untrained, unlicensed workers, which 'unnecessarily exposed workers, particularly inexperienced ones, to an unacceptably high risk of injury or death'.[15] The deaths of four young men, 3 of them Queenslanders, was entirely avoidable, and we should learn from this unfortunate example and ensure that work done on PVs and EVs is completed by licensed professionals.

What practical impact in the form of costs, would the options proposed in the Discussion Paper have on you, your organisation, the workforce or the community? Please provide examples where possible, including for new and emerging technologies and ELV equipment.

Negligible. Mostly the expansion of the definition will provide benefit to ETU members as it will ensure confidence in installations that ETU members are required to work on, while also providing for opportunities for both upskilling and access to additional work opportunities. While there is some cost associated with compliance, this cost is already being paid, so alterations to the definition will not be significant.

What is your preferred option for the various ELV discussed and why will it be best for you, your organisation and your stakeholders?

Our position is that all equipment and/or devices designed to generate or store electricity be deemed as electrical equipment, including PVs, wind turbines, lithium (and other next generation) batteries and EVs. This provides certainty and future proofing as new products, and technologies emerge onto the market. We recommend the definition include allusions to "any and all" such products that generate or store electricity, and advocate for a mechanism based on a risk assessment that can exempt certain products or technologies from inclusion in the scheme.

However, crucially, the mechanism should see the onus of responsibility shifted to the entities and organisations who are seeking exemption for products or services to prove that said objects are safe to be operated or serviced by non-licensed workers. However, the scheme should take a precautionary approach until the risks of new products and technologies can be assessed. This will make for a safer environment for electrical workers and the community.

If you prefer Option 1 (status quo), how would the potential electrical safety risks of newer ELV technologies be minimised or eliminated?

N/A.

[15] Ian Hanger, *Report of the Royal Commission into Housing Insulation Program* (2014) 2.

Do you have suggestions for other options to address the problems identified? Please provide examples (including costs where appropriate) of your suggested options, including how it would ensure the workforce are electrically safe and conduct electrically safe work for community safety.

No, it is incumbent upon the Government to ensure that there is a regulatory system in place that will protect workers in the industry and the community from the inherent risks associated with the generation and use of electricity. The best way to ensure the safety of the system is to allow the best qualified people to make the risk assessment, and in the case of electrical work, the best qualified people are licensed electrical workers.

Are you aware of evidence of the dangers of particular forms/categories of ELV equipment? If so, what evidence is available?

Yes. There are now frequent reports of fire associated with the widespread use of Lithium-Ion batteries, particularly associated with charging when the batteries are used in harsh environments like personal transport devices eBikes and eScooters. In 2022-23 there were 450 fires that were linked to these new generation of batteries,[16] with 72 occurring in Queensland.

These incidents occur because lithium-ion batteries are highly energy-dense, they contain electrolytes that are highly flammable and mobile batteries like those used in scooters and bikes are subject to harsh treatment by users. Additionally, growing demand for these new technologies has created incentives for cost-cutting by producers,[17] who attempt to compete on cost against other higher quality technologies.

The ACCC has reported that the lack or inclusion of ELV in the existing regulatory system is a determent to Australian consumers and that work is needed to protect consumers.[18]

Should certain ELV equipment be included in the scope of the Act's regulatory reach that are not currently covered?

Yes – see other answers

What approach to including ELV equipment within the scope of the ES framework should be adopted in Queensland?

As a default position all ELV equipment designed for the purpose of generating, storing, or supplying electricity either in installation, in connection to an installation, or for supply to a network should be regulated as electrical equipment under the Act.

A system of Ministerial/Commissioner exemptions should also be created to allow for low-risk equipment or technologies to be excluded, but as argued previously the burden of proof should be placed on the applicant to prove conclusively that an exemption does not pose a safety risk to the workforce or general public.

Should a measure of energy density/capacity be adopted? If so, which measure and what amount (e.g., how many watts per hour)?

Yes. However, this determination will require further research so as to determine the appropriate energy density and the operating conditions.

Are you aware of evidence of the dangers of particular forms/categories of ELV equipment? If so, what evidence is available?

Yes. As described previously, there is significant danger in the current use of mobile lithium-ion batteries in small scale EVs, such as e-scooters and e-bikes. As such, the ACCC argues that

[16] Rhiannon Shine, 'Concerns over Growing Number of Fires Linked to Lithium-Ion Batteries in e-Scooters and e-Bikes', *ABC News* (2023) <https://www.abc.net.au/news/2023-01-18/e-scooter-lithium-battery-fire-risk-fears-/101863902>.

[17] Ibid.

[18] Australian Competition and Consumer Commission, 'Lithium-Ion Batteries Issues Paper' (December).

> *"Taking a reactive approach to regulating ELV equipment does not strengthen consumer confidence and risks creating uncertainty for suppliers seeking clarity about their obligations. Further, solely relying on an enforcement mechanism to manage risk is resource intensive and narrows the regulatory approach to addressing safety issues after they may have already caused harm to consumers."* [19]

The risks associated with ELVs are still emerging, and as such the best qualified workers to make risk assessments are licensed electrical workers.

[19] Australian Competition and Consumer Commission, *ACCC Submission in Response to the Discussion Paper on the Statutory Review of the Gas and Electricity (Consumer Safety) Act 2017* (2017) 3.

2. Changing landscape of electricity and the workforce

As with the previous section, we note the high risks and early stage of development of the current generation of electrical technologies and argue in favour of Option 2 in all scenarios, and advocate that a licensed electrical worker be required to conduct any and all electrical work.

The current regulatory system has not kept up with the emergent technologies or the speed of their adoption, however when approached from the perspective of harm minimisation the principle that electrical energy is safest when its risks are understood and properly managed, the case for closing the regulatory gap is clear. If an installation uses rigid solar panels to generate or stores electricity, it and its component parts should be regulated unless a case for exemption from the principle can be made clearly demonstrating that it can be safely managed by another means.

The panels once connected are designed to supply electricity and they can only do that if they form part of an electrical installation. As described earlier our systems for over one hundred years have treated from the point of generation to the point of consumption as one regulated system inclusive of all of its component parts, that the large central generator is being supplemented by micro, small and lager scale generators in the form of solar panels does not change the fundamental elements of the regulatory system, nor the fundamental public policy principles that we manage the inherent risks associated with electricity for both workers and the community from the point of generation to the point of consumption as one integrated electrical system.

Rigid solar panels are installed on supporting frames to remain fixed in place for the purpose of generating electricity. There are three primary categories in which rigid solar panel are commonly installed, on the roofs of single dwelling house and associated non-habitable buildings (under the National Construction Code (NCC) buildings of Class 1 and 10), on the roofs of commercial and multiunit residential buildings and in solar farms primarily on ground-based frames. The frames that support rigid solar panels in each of these cases are connected and form an integrated system designed to create a safe electrical system but also a system which is safe in its interaction with the environment that it is in.

For example, a solar array installed on a building imposes not only a weight load on the roof that is supporting it but can in some instances also impose an additional wind load on the roof. The potential wind load is a variable factor depending on geography as the design of roofs under the NCC clearly sets out. Anything which imposes additional loads on a roof should be understood in connection with the requirements of the NCC. This is the same as the requirements under the NCC that apply to electricians in determining how to meet the energy efficiency requirements in all new buildings.

For and installation to be constructed and to remain safe for its life it needs to be constructed to the standard required of an electrical installation, in the same way within a building the wires, cable conduits and cable trays supports all form part of the electrical installation there is no difference of principle in the work required to construct and install the supports for rigid solar panel be that on a roof of a building or on a solar farm. The licensed electrical worker is responsible for more than just making the connections between each of the solar panels they are taking responsibility for the installation as a whole and ensuring that all the electrical safety requirements of the installation have been met, including ensuring the earthing system as well as the structure that supports the rigid solar panels is fit for purpose and electrically safe.

Response to feedback questions

How are you, your organisation, the workforce and the community affected by the issues posed by the changing landscape of electrical work? To what extent?

As previously mentioned, the ETU is the representative body for workers in the electrical industry, the ability of ETU members to be safe when working in and around electricity is fundamental to safe and effective operation of the electrical grid as a whole. ETU members are not only most qualified to perform electrical work, but they are also best placed to assess risk within the electrical system. They are both affected by and able to affect the system as a whole, and consequently their voices are paramount in this discussion.

How many workers have been impacted by the identified hazards or are exposed to such hazards and might be exposed in the future? Which workers/ businesses/ households are impacted by the problem?

The growth of decentralised energy generation and storage, coupled with the growth in the informal labour market (including gig work, labour hire and other forms of insecure contracting) make estimation difficult and available data is insufficient to quantify the number of workers impacted by the identified hazards. While this makes the question of quantity difficult to answer, another question must be answered to clarify the formers' purpose. How many workers exposed to unnecessary hazard should be acceptable? How many deaths are permissible? In our view, any and all hazards should be minimized as much as possible, and all deaths should be avoided. While mistakes will no doubt be made, it is the role of government to minimize these risks, and as such, we argue that the best way to assess the risks and hazards associated with electrical work is to leave it in the hands of licensed workers.

Which are the key industries in which these tasks take place and how large are they?

The need to decarbonise our homes and industry makes this quantification difficult. While industries such as the power industry, construction and manufacturing industry are obvious, other industries will be impacted by the roll out of renewable energy generation, storage, and distribution. Risks will be seen in hospitals, schools and office buildings across the country. Agricultural businesses too are rapidly decarbonising. The nature of the challenge that climate change has laid at our feet is significant and requires swift and wide-ranging uptake of new electrical technology. As such, the risks associated with this technology will be similarly broad in their applications.

Do you agree with the assessment of the issues identified with the changing nature of electrical work, are there any other elements to the issue that you think have not been captured? If possible, please share examples of your experience with these issues.

Yes, we agree with the scope and scale of issues identified within the paper. However, we want clarification on the nature of the equipment described in this section. All solar panels are by their nature electrical equipment and should be assessed, certified, and regulated for that purpose. To be clear, a solar panel has only one purpose that is to generate electricity and for that electricity once generated to be used in a device or appliance that either consumes or stores that electricity.

The output of a solar panel is electricity and as such has a risk associated with it that needs to be managed while voltage is the most common differentiator in what determines the risks associated with electricity it is not the only or the sole risk associated with the ability to generate electricity. The amount of electrical power that can be generated is of importance as well.

While it is the case that the energy output of a single rigid solar panel is low it is also the case that the panels are not designed to be used individually or in isolation from other panels, they are in fact designed as individual component parts of a larger system of connections and supports for the purpose of generating electricity with much greater energy output than any one panel can produce.

Whether the energy created by the solar panels is fed directly into the grid or stored in fixed battery energy systems or battery electric vehicles, the product, which is produced, is electrical energy and it is intrinsically integrated into installations that are regulated and require skilled and licensed workers to instal them.

What practical impacts – including costs and benefits – would each option have on you, your organisation, the workforce and the community? Please share examples of impacts and experiences of impacts, where possible.

As with the previous section, licensed electrical workers like ETU members stand to benefit significantly from Option 2, which we advocate for. Other options create not only costs to the electrical workforce but encourage significant risks to workers and the wider community. Therefore, electrical work should stay in the hands of licensed electrical workers.

In relation to the following three risks considered, which of the four options do you think is best and why? a. Fixing, mounting and locating of renewable energy generation and storage technology (such as solar PV panels) b. Mechanical cable protection work, c. Laying, cutting or sealing underground cables that are part of the works of an electricity entity before the initial connection of the cables to an electricity source.

In all instances, we argue for the work to be conducted by licensed electrical workers as described in Option 2. These are all examples of equipment designed to capture, store, generate or transmit power, and as such should fall within the expanded definition of electrical work, and as such, should be left in the hands of licensed electrical workers.

Do you have suggestions for other options to address the issues identified? Please provide examples (including costs) on the impacts of your suggested options, including how it would ensure the workforce is electrically safe and conduct electrically safe work.

N/A.

The Review identified risks with the locating mounting and fixing of energy generation and storage electrical equipment. Do you agree that the risks identified are limited to this equipment? If not, what do you consider the scope of these risks to be?

As we argued in a previous response, we believe the best way to futureproof against risk is to set the default option that all electrical work be conducted by electrical workers, and that electrical work be expanded to include any and all work that supports power generation, storage and/or transmission. This is a well-established public policy position which has served both electrical workers and the broader Queensland community well. If power will be connected to a product or service, then it should fall within the remit of a licensed electrical worker.

The Review identified risks from the laying, cutting or sealing of underground cables that are part of the works of an electricity entity before the initial connection of the cables to an electricity source (section 18(2)(j) of the Act). Other exclusions for electricity entities also exist in section 18(2) of the Act. Has the decentralisation of energy generation had a similar impact on the risk profile of these exclusions? Please provide examples where possible.

As described previously, the decentralisation of energy generation coupled with the rise of the informal labour market poses significant risks to the workforce and general public.

3. Electrical safety and electric vehicles

As with previous sections, we argue in favour of an expanded definition of electrical work and the requirement that electrical work be conducted by licensed electricians. As such, we argue in favour of Option 2, where electrical motors are included as electrical equipment.

The widespread adoption of electric vehicles in Australia is an inevitability. As a community we should expect that regulation is adaptive to emerging challenges, and that regulators can recognise when traditional approaches to regulation need to reflect changes in technologies. The electrical industry is fortunately highly adaptive and has responded consistently over the last century to introduce new safety measures to reduce risks and harm.

The recent approval of the first bi-directional charger for use in the Australian market will inevitably be followed by more suppliers. Crucially, the uptake of bi-directional charging has been hailed as a way to enhance grid stability, as the EVs act as additional storage capacity to be fed back into the grid in times of need. However, this will only increase stability if they are safely built and maintained.

Similarly, as the adoption of electric vehicles increase, alongside the continuing growth of roof top solar, the benefits of integration at the consumer level will continue to grow. However, we need to recognise the scale difference between the generations of electricity technology.

Residential battery storage energy systems (BESS) typically are around the 10 to 15kWh range, but even small electric vehicles battery packs are double this familiar energy source. EVs start with batteries in the 30kWh range, and small cars at the lower end of the price scale have recently been announced with 51kWh batteries. These battery packs pose significant risks to car owners who are used to doing minor electrical works on their own vehicles, changing batteries, spark plugs and even cabling. However, the difference between working on ICE batteries and EV batteries is akin to the difference between being able to swim 50m in a regulation pool and being able to swim the English Channel. Being able to do the former does not give one the ability to do the latter.

From a regulatory perspective, the complexity of our energy systems and the risks associated with it will only increase from here. Similarly, the growth patten for roof top solar and electric vehicles is showing no signs that it will abate. This growth, and in particular, the interactions of these technologies present unique opportunities and challenges. It is already possible to have an electric vehicle plugged into a residential home with roof top solar bi-directional charging for the electric vehicle and a connected BESS. All of the component parts need to work together electrically in a manner which makes then safe for the users, workers and the community.

There needs to be a recognition that the successful integrating of all of the component parts needs to be addressed holistically under one regulatory scheme, there can be no gaps in regulation or approval of the components as the interdependencies create risk at each connection. When an electric vehicle with bi-directional charging is plugged in it is not only a consuming device like fridge it can also be a power supply with as much capacity as a BESS or a solar panel array and needs to be regulated in the same manner for that purpose whether it was intended for that purpose or not.

The work of installing, servicing and maintaining these complex component parts should and must be done by licensed electrical workers.

Response to feedback questions

How are you, your organisation, the workforce or community affected by the problems identified and to what extent?

As previously mentioned, the ETU is the representative body for workers in the electrical industry, and as such, we believe that it is vital that the risks and potential harms associated with the use of electrical energy wherever it is used is appropriately managed. An appropriate regulatory system is vital to ensure the safety of workers, owners and operators of electric vehicles, and for the community to be confident in the standards of electrical safety and protection.

Do you agree with the assessment of the problem identified, and are there additional risks presented by electric vehicles that have not been identified? If yes, what are they and can you provide examples of these issues?

The risk presented by modern electric vehicles are twofold, first is the that the operating voltages required for the propulsion systems are well in excess of the threshold for low voltage found in fixed wiring systems (houses, buildings and the like) and would be covered by existing regulations. Second, the electrical installation within the vehicle is mobile, and as such is subjected to movement. This physical force impacts the electrical system in ways that are not encountered in fixed or rigid wiring systems. These factors necessitate minimum electrical safety standards which are met and maintained for the life of the vehicle.

Additionally, it is inevitable that there will be a second-hand market for electric vehicles, including sales made for post purchase modifications. The risks associated with second hand and aftermarket modifications for the mechanical components of registrable vehicles is well known and understood, and as a result, it is well regulated via vehicle registration systems in each jurisdiction. It is, in our view, essential that there be a complementary system of regulation to ensure that the work undertaken on the electrical systems for the batteries, the propulsion wiring and the motors of modified electric vehicles remains safe and sustainable.

The regulations need to be in place to certify that the electrical safety of both second hand, and modified, vehicles to ensure the protect consumers and the community. The same regulations should also be applicable for the repair of electrical vehicles that have been involved in accidents.

In addition, there is already a thriving cottage industry in converting ICE vehicle to electric vehicles. In this environment it is essential that there is a properly licensed electrical worker to undertake the wiring work to ensure that not only are the battery and propulsion systems properly installed, but also that the wiring system is appropriately sized and protected given the harsh operating environment.

What practical impact, including the costs and benefits, would the options proposed in the Discussion paper have on you, your organisation, the workforce or the community? Please provide examples where possible.

The transition to a carbon neutral energy system in Australia needs the transition to electric vehicles to be as smooth as possible. In order to achieve this outcome however, the community needs to be confident that electric vehicles, whether they be new or second hand, are safe for use.

The technology for electric vehicles is evolving quickly, and the rate at which electric motors, battery packs and electronic management systems are changing is unprecedented. As such, we need to ensure that the people best equipped to judge the risks associated with electrical work are given the power to do so.

The benefit to the Queensland community of the proposal to regulate in this area will be that they have a well-regulated system that puts in place the same level of electrical safety that they have come to expect and rely upon in their home and workplaces. To offer a lower level of electrical safety than that which already exists for Queenslanders on the basis that the electrical installation is mobile and not fixed is disingenuous and dangerous.

What is your preferred option and why would it be best for you, your organisation and your stakeholders?

Option 2. As outlined previously, by placing an expanded definition of electrical work solely in the hands of licensed electrical workers, the government is protecting workers and the general public, and ensuring that safety is at the heart of the regulations. This will minimize the risks associated with the work and maximize the benefits to workers and community.

If a licensing framework was introduced:

a. Should any specific type of vehicle be excluded for the requirement (e.g., motorcycles, cars, buses, trucks)? If so, what are they and why?

Non-registrable vehicles, (eScooters, eBikes with motors less than 250watts) due to their low risk should be excluded from the regulations. However, it is of note that in Australia and globally electrical fires have been reported in facilities that charge eScooters and eBikes which is indicative of a risk which at this time is not well understood and may require further investigation by electrical regulators and the Australian Building Codes Board. Maintaining some flexibility in any regulatory reform to allow new classes to be included based on risk would be a prudent course of action.

b. Is a restricted licence (specified training) or full licence (full apprenticeship) suitable? If so, why?

Both. For workers who are already licensed in the industry, there should be an appropriate unit of competence developed to ensure that they are aware of the specific electrical safety risks associated with the working on EVs. This may be done in the form of an endorsement to an existing license on successful completion of the unit, or the issuance of a certificate of competency recognised by the ESO.

For new entrants into the industry, the current qualification should be redesigned to include a unit of competency relating to the installation, service, modification and maintenance of EVs.

c. Should the licence type be determined based on the type of vehicle? If so, what would you suggest and why?

For all registrable vehicles where the equipment for the propulsion of the vehicle operates within the low voltage range the work should be undertaken by an appropriately skilled and licensed person. The risk inherent in electrical work are potentially fatal, and the risk of fatality does change substantially due to the size of the vehicle.

By analogy the electrical system in a residential house and in a twenty-story residential building made differ due to the complexity of the wiring work required, but the electrical risk is the same in both installations, which is why licensed electricians only have one license for electrical work in both cases.

Whether it is a car, a truck, or a bus, the risk associated with electrical work remains constant.

d. What types of work or occupations should be excluded from a licensing requirement? Or alternatively, what types of work or occupations should have specific licensing requirements (e.g., on-road works, general maintenance and check-ups, and/or removal and disposal)?

The maintenance and repair components of the motor vehicle industry should have at a minimum competency in electrical safety, and the knowledge to safely disconnect the electrical component for the purposes of making the vehicle safe.

The removal of battery packs for assessment for disposal or repurposing for other uses should be regulated. The useful life of battery packs in vehicles is substantially less than their full life operating capacity, which will create a secondary market for the use of the battery packs as stationary batteries for a variety of purpose. A regulatory system needs to be in place to ensure that the battery packs remain suitable and safe for the rest of their usable life.

e. Are there any elements under the Act which should not apply? Which sections and why?

N/A.

f. Are there situations in which a disconnect and connect restricted licence for performing work on non-propulsion components of a vehicle would be appropriate?

Yes. There should be such a license for the routine maintenance of the ELV components of the non propulsion electric systems within the vehicle. It should be noted that EV technology is evolving rapidly, so regulations should allow for an expanded role for licensed electrical workers should new risks emerge in the ELV components of the electric vehicle.

6. Do you have suggestions for other options to address the problems identified? Please provide examples (including costs where appropriate) of your suggested options, including how it would ensure the workforce are electrically safe and conduct electrically safe work for community safety.

No.

Conclusion

Electrical work is dangerous, potentially deadly work. The risks that are known are substantial, and the unknowns are still too numerous to allow for this type of work to fall outside the purview of properly licensed, effectively trained and considerably experienced electrical workers.

The purpose of regulation is to ensure the safety of the workforce and the general public, and the best way to ensure that safety is to place responsibility for electrical work solely in the hands of licensed electrical workers.

We commend the Palaszczuk government for its commendable review of the *Electrical Safety Act* and support the passing of reforms which see to modernise legislation whilst retaining a long held and proven public policy position through an expanded definition of electrical work to include new and emerging electrical technologies, and which keeps that electrical work in the hands of licensed electrical workers.

Bibliography

Australian Building Codes Board, *Understanding the National Construction Codes Building Classifications* (2022) <https://www.abcb.gov.au/sites/default/files/resources/2022/UTNCC-Building-classifications.PDF>

Australian Competition and Consumer Commission, 'Lithium-Ion Batteries Issues Paper' (December)

Brady, Frank, 'Contribution on Australia' in The International Conference on Large High Voltage Energy Systems (ed), *A Dictionary on Electricity* (1996) 20 <http://www.ewh.ieee.org/r10/nsw/subpages/history/electricity_in_australia.pdf>

Dunn, Col, *The History of Electricity in Queensland : An Outline of the History of Electricity and Its Progress in Queensland 1882-1984* (1985)

Electrical Regulatory Authorities Council, *Electrical Fatal Incident Data* (2022)

Hanger, Ian, *Report of the Royal Commission into Housing Insulation Program* (2014)

Havyatt, David, 'History of Electricity Reform in Australia' in Guilliame Roger (ed), *On The Grid: Australian Electricity in Transition* (Monash University Publishing, 1st ed, 2022) 1

Ludlow, Mark, 'Queensland's Coal Bonanza to Fund Green Power Shift', *The Australian Financial Review* (14 June 2023)

Thomis, Malcolm Ian, *A History of the Electricity Supply Industry in Queensland Volume I 1888-1938* (Booralong Publication, 1st ed, 1987)

Clean Energy Regulator, 'Postcode Data for Small-Scale Installations' (2023) <https://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations>

Shine, Rhiannon, 'Concerns over Growing Number of Fires Linked to Lithium-Ion Batteries in e-Scooters and e-Bikes', *ABC News* (2023) <https://www.abc.net.au/news/2023-01-18/e-scooter-lithium-battery-fire-risk-fears-/101863902>

The Department of Climate Change, 'Australia Leads World in Rooftop Solar as Share of Renewables Jumps to 35%' (2022) <https://www.energy.gov.au/news-media/news/australia-leads-world-rooftop-solar-share-renewables-jumps-35>