STATE DEVELOPMENT, INFRASTRUCTURE AND WORKS COMMITTEE

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PUBLIC BRIEFING—INQUIRY INTO E-MOBILITY SAFETY AND USE IN QUEENSLAND

TRANSCRIPT OF PROCEEDINGS

Tuesday, 22 July 2025

Brisbane

TUESDAY, 22 JULY 2025

The committee met at 12.20 pm.

CHAIR: Good afternoon. I declare open this public briefing for the inquiry into e-mobility safety and use in Queensland. I am Jim McDonald, the member for Lockyer and chair of the committee. With me here today are: Ms Jonty Bush, the member for Cooper and deputy chair; Mr Terry James, the member for Mulgrave; Mr David Kempton, the member for Cook; Mr Shane King, the member for Kurwongbah; and Mr Bart Mellish, the member for Aspley.

The purpose of today's briefing is to assist the committee with its examination of e-mobility safety and use in Queensland. This briefing is a proceeding of the Queensland parliament and is subject to the parliament's standing rules and orders. Only the committee and invited witnesses may participate in the proceedings. Witnesses are not required to give evidence under oath or affirmation, but intentionally misleading the committee is a serious offence. Members of the public may be excluded from the briefing at the discretion of the committee. I remind committee members that officers are here to provide factual or technical information. Questions seeking an opinion about policy should be directed to the minister or left to debate on the floor of the House.

The proceedings are being recorded and broadcast live on the parliament's website. Media may be present and are subject to the committee's media rules and the chair's direction at all times. You may be filmed or photographed during the proceedings and images may also appear on the parliament's website or social media pages. Please turn your mobiles phones off or to silent mode. Finally, I remind everyone to please press your microphones on before you start speaking and off when you are finished.

LOCKWOOD, Dr David, Director, Trauma Service and Acute Care and Renal Transplant Surgeon, Princess Alexandra Hospital; and Clinical Co-chair, Queensland Trauma Clinical Network, Clinical Excellence Queensland, Queensland Health

CHAIR: Dr Lockwood, I invite you to brief the committee, after which committee members will have some questions for you.

Dr Lockwood: Thank you for the opportunity to appear before this committee on the inquiry into e-mobility safety and use in Queensland. You have read through my qualifications with the emphasis being on the fact that I am a trauma surgeon and director of the trauma service at the Princess Alexandra Hospital and co-chair of the Queensland Trauma Clinical Network, which is, as you mentioned, who I represent today.

Our network is a multidisciplinary group within the Health Improvement Unit of Queensland Health. We provide strategic advice and oversight of trauma care in Queensland. Among other things, we do this through data informed quality improvement programs, design and delivery of trauma education to caregivers, especially regionally, and the development of clinical guidelines to ensure safe, consistent and high-quality trauma care for injured Queenslanders. Our membership is comprised mostly of frontline personnel who see the impact of these injuries in person almost daily. We took the opportunity to provide a written submission for this inquiry to inform the committee of perspectives from the healthcare system arising from e-mobility devices. I would like to acknowledge the Queensland emergency department and rehabilitation clinical networks for their input into the Queensland Health submission.

Further to the written briefing provided, I will give an overview of the current state and trends in traumatic injuries sustained from the use of e-mobility devices. The QTCN recognises that, although the measurable impact on health services is almost by definition a cost or net negative, there are significant environmental benefits to e-mobility devices and potentially some indirect health benefits. Indeed, many healthcare staff choose to use these devices as mechanisms of transport to work. We do not seek to give the impression that the trauma burden should be the sole determinant of the use and regulation of e-mobility devices; however, our experience to date has dramatically underlined the importance of being able to monitor, measure and minimise the health costs of this technology.

Queenslanders are presenting to our emergency departments with injuries related to e-mobility devices every day. There is not one single mode of accident but a variety of mechanisms involved with widely varying injury patterns. These range from simple falls at low or moderate speed to collisions with stationary objects, falls down stairs or heights to collisions with pedestrians, cars or other vehicles. Locations include roads of most speed limits, road shoulders, parks and shared paths. Injuries related to fires involving e-mobility devices are a serious emerging problem, which I will leave to the QFES discussion that will follow shortly.

At the lower end of this spectrum, injuries may be uncomplicated fractures, which may not result in prolonged hospital admissions, but the individual impact can still be substantial with weeks of lost work and lingering disabilities. The main concern with this end of the group is the sheer volume of presentations to emergency departments. In one study interstate, children's hospital presentations quadrupled in the space of 12 months. We have yet to see where this may level out in Queensland. We recorded over 6,300 emergency department presentations in a year, which is almost certainly an underestimate of the scale of the problem, as another 25,000 presentations involving bikes, scooters and skateboards could not be confirmed to be electronic related but many of them may have been. A cost estimate of the confirmed so-called minor cases comes out at over $4.5 million for that 12 months. Potentially of greater concern is the impact on our notoriously overstretched emergency departments and emergency operating theatre workloads. This inevitably contributes to ambulance ramping and surgical cancellations including elective surgery.

At the upper end of the spectrum, the numbers are smaller but the individual consequences far greater. Mechanisms beyond a low-velocity fall onto an outstretched hand disproportionately result in facial, head and spinal trauma. These injuries present acute clinical management challenges all the way from the ambulance team to the emergency department, intensive care units, multiple operating surgical teams, complex and prolonged hospital ward care and for the more fortunate ones, rehabilitation. From a rehabilitation and recovery perspective, these patients often require prolonged admission with impacts to daily functioning and the ability to return home at all. Many will never return to work; some will require full-time care. This is a group with a long tale of chronic health problems and care requirements.

So who are the people predominantly affected? E-mobility trauma, as you might expect, disproportionately affects young adults. Amongst severely injured patients, the average age is just 29—near the peak of their social and economic contribution. The Queensland's Children's Hospital has also recorded an increase in children under 16 years old sustaining severe injuries from e-mobility scooters. The direct costs have been conservatively estimated at a total of $15 million for the year that we reviewed which was not including rehabilitation costs, outpatient costs and the cost of
001 residential care or the impact of being unpaid. The real cost to society can only be estimated.

Finally, and tragically, in the 12 months to May, seven people in Queensland lost their lives due to mobility device related accidents. The average age was 34, and one of those was a child. What part of this can we hope to have an impact on? Several risk factors appear to be linked with more severe injuries. In general, the Queensland experience mirrors the global experience. As for any road trauma, speed is a major determinant of the outcome. Devices that can be imported or modified to significantly exceed different current legislated speeds are a serious risk to riders, pedestrians and road users alike. These are also apparently greater risk of fire hazards and presentation. The absence of a helmet predictably increases the risk of serious head injuries. Riders under the influence of alcohol or other substances display a greater risk-taking behaviours including the failure to wear a helmet but also impaired judgment and higher speed. When stand-up devices are being used, full-face helmets have been shown to offer greater injury protection. For scooters particularly, the smaller wheel size means that minor surface irregularities can result in wheel catching and a higher risk of accidents. Where higher speeds are to be allowed or expected, the engineering
002 requirements for those surfaces should be correspondingly more stringent.

With this health focus background, the following recommendations are provided to assist with reducing the volume and severity of e-mobility device related injuries. By way of legislation, we need to seek ways to prevent or reduce the importation of noncompliant e-mobility devices and it is recognised that this is not going to be particularly within state boundaries. Some of these devices are specifically marketed for their maximum speed which greatly exceeds the speed that we know is legislated to be safe. Clear labelling and consumer warnings should feature on the packaging of these devices, particularly ones aimed at children. We need to enforce minimum safety standards with respect to helmets, with deterrent penalties for noncompliance. We need to consider a conservative minimum age for road use. There should be consideration of a licensing or a competency

requirement. We would advocate for the implementation of compulsory third party insurance for all devices used in public areas. We would potentially limit e-bikes to the use on roads only for licensed road users.

Enforcement is going to be key among these recommendations, and we need effective enforcement of the current road rules, including speed limits most importantly, but also blood, drug and alcohol limits, helmet use and significant penalties for modified devices, potentially including confiscation.

We would advocate for improved road engineering and maintenance, especially where speeds greater than 12 kilometres per hour are to be allowed. This implies also improvements in footpath designs, signage and maintenance for shared areas.

We would be able to comment on none of this without data. We would advocate for improved support for data collection for injury trends. As I said, this is an evolving area. The use of these vehicles and the injuries resulting from them is still changing by the month and by the year, and we need to monitor that trend over the coming years, including, wherever we can, product specific information, detailed location information to be able to inform policy review and infrastructure planning and so on.

We would advocate for improved education, including implementation of cross-agency campaigns, school education and community engagement to improve the awareness of the current legislation and the risks. We would also advocate for research, based on the data that we have already requested, to determine the safe operating speeds, further research into those risk factors, vehicle design and to inform future legislation.

In summary, we believe there is a place for e-mobility devices and with this review of current legislation, along with targeted enforcement, education data and research, they can become safer devices, and we can see fewer injuries and hospitalisations as a result.

Thank you to the committee for your time and the invitation to present today. The trauma network looks forward to supporting the committee throughout their inquiry. I now welcome any questions.

CHAIR: Thank you, Dr Lockwood. Thank you very much for providing your submission, too. It is very detailed and thorough and I really appreciate the work that has gone into that on a data informed basis, as you said in your opening.

Mr MELLISH: Thank you, Dr Lockwood, for the very detailed submission and the work that has obviously gone into that over time. As we have gone through the submissions to this inquiry, we have almost found two different sets of challenges in this industry: there is the rental hire scheme and then the private use ones where you can get issues with illegal vehicles—maximum speed being much higher than they should be, and that sort of thing. I note you had a good point about data collection there. Is there anything in the data collection you have at the moment, perhaps even at an anecdotal level, on the rental hire scheme issues you are seeing presenting versus the private use schemes? Is there any break-up in the difference of injuries or rate of injuries or any other comments around that?

Dr Lockwood: It will be restricted to anecdotal, I am afraid, and our data has not been enough. We have really only put detailed data into that last 12 months. That is really more of a snapshot. It is a very good question to ask. In anecdotal terms, I would say the commercial devices are quite effectively speed limited, and that certainly has a big impact on the injury presentations that we see. By way of sheer volume, there was a lot of use. It is on not particularly great footpaths a lot of the time, so accidents certainly were happening and occasionally they were still serious. Overall, though, anecdotally, I would say that the most severe injuries are not from the commercial devices, except by way of sheer volume. Per vehicle, it seems to be much worse for personal devices. This is what the explosion has been in the use of: personal devices which are frequently modified to be able to go a lot faster.

Mr KEMPTON: Doctor, in view of the benefits and the overwhelming arguments against it, there would be a pretty strong case to ban these things all together, but obviously that is not the case. The stats around the submissions are pretty startling. Is there an activity more dangerous than this in terms of young people that causes more admissions, more harm and more trauma, in your experience?

Dr Lockwood: I am not a paediatric surgeon. Again, it is going to be mostly dictated by volume, and historically kids have always ridden bikes and I am sure the vast majority of trauma experience would relate to bikes, including motorbikes and off-road bikes, so I think we are still fairly early in the

evolution of this. However, the early trends are concerning about how quickly the injuries related to these specific devices are emerging. I think this will quickly become the dominant form of injury in the paediatric population, yes.

Mr MELLISH: Thank you for putting into your submission a range of recommendations as well. That is really useful for the committee going forward. A lot of other submitters have talked in terms of the infrastructure and what changes can be made. By that, I mean small wheel size or potentially seating requirements or other technological changes or requirements that can be made. Do you have any further comments around how you can reduce the trauma by the design of these vehicles that is allowed?

Dr Lockwood: It is probably a little outside of my expertise. For several years, we have been conducting a lot of conferences based around this, and my anecdotal knowledge really comes from the RACQ who have done quite a lot of work on this and hopefully you would have the benefit of some of their research. The centre of gravity has an impact. There would be some benefit in having a seating arrangement. I do not feel I am in a position to say that that is a standard recommendation, but overall we would consider that to be a safer ergonomic way to practise it, but I am not sure we are saying that that would be the only way to do it. Wheel size certainly does seem to be very important.

Mr JAMES: Doctor, it is a very good report. I think you have just about written it for us. You referred to a figure of 25,000 injuries in your opening statement. Could you just elaborate on that and break it down a bit?

Dr Lockwood: That is a much broader search. These searches are based on key words within the database that we have, and that was referring to all devices that people ride, of any sort—skateboards, bikes or anything. Certainly not all of those were e-mobility, clearly, and in the early part of that probably the minority, but as time goes on, a greater and greater proportion are related to that, and certainly the severity of injuries that are related seem to be correspondingly going up. No, I would not pretend that the major proportion of that 25,000 would be e-mobility related. It is just to show that there is another big pool, some of which was probably not included in the figures we provided.

CHAIR: For clarification on that, that is another 25,000; it does not include the 6,300?

Dr Lockwood: Correct, yes.

Ms BUSH: Thank you so much for coming in and for your submission today. I think it is probably fair to say with committees we are always looking for really great recommendations that will make a material difference. A lot of your colleagues and yourself have touched on the issue of data capture and recording and reporting. I am really interested in that. Can you perhaps expand for the committee on what is currently happening? How are these injuries or incidents being recorded? What does that mean for you in terms of being able to extract data—talk about the costs; talk about public policy reform? Why would we consider a recommendation around data categorisation and capture?

Dr Lockwood: Thank you for that question. That is where my expertise lies to some degree. I am not an expert on vehicle design or any of that sort of thing. You have been very complimentary about the submission. That was not me; that was my network, particularly our Queensland trauma coordinator, with the support of a structure called the Queensland Trauma Data Collection. That has been crucial. It has only been in its current form for a few years, and it is still evolving. We are still relying very much on their input for this process. They are the figures that you have seen.

For the detail of what data they can collect, we are not on the spot. We rely on information collected through the various services, and that would include the Ambulance Service. It includes data collected by people doing research on this actively within emergency departments. There are people who are proactively trying to collect this data, particularly in the last few years. It is still a bit patchy. As we have touched on, people injured are sometimes substance affected. We do not always get a very accurate recollection or account of exactly what has happened, and obviously there is also some motivation potentially not to be entirely truthful about the circumstances leading up to an accident. We are not saying that this data is concrete in every case, but we would need to be able to collect the best data that we can. Certainly, the objective data, such as from the Ambulance Service, would be what we are relying on. There are a number of data structures within Queensland Health that we can tap into. Another one is through the Jamieson Trauma Institute who have done a lot of work under this, and you may even have seen some of that in the submission. They are trying to get a much more ambitious and interlinked trauma dataset. It is still probably a few years away from reaching its full potential.

I think what we would argue for in the shorter term is really just the potential to be able to mine the data that is already there in the medical records. We need a clearer data flag in emergency departments, and that probably does need some specific funding—particularly in the major trauma centres would be one logical place to be putting that—to encourage the capture of that information at the front desk. That would help improve the accuracy of the data we are able to present to you and inform that policy.

Ms BUSH: To clarify, the benefit to doing that, to getting that full analysis and that full picture across the state—because from what I am hearing there is probably a degree of underreporting—the utility of that is then feeding into future reforms or funding? Obviously, it makes your role clearer, but from a public value perspective what is the hook?

Dr Lockwood: When it comes to policy development, I would defer to the policymakers, but you cannot make these decisions without data, and that data needs to include granular detail on where these accidents are happening and what contributing factors seem to be in individual cases, so obviously you need, potentially, some police input into that as well. I think the Ambulance Service has the most potential to contribute to this. You would need a structure that is able to collate that information and analyse that. I am not sure I am really answering your question. I do not know. I guess it is through networks like mine that we are able to analyse that data and come up with some recommendations for public policy, but more for policymakers.

Ms BUSH: To put a fine point on it, too—I do not want to put words into your mouth—to then target interventions to the right places at the right time has a benefit to the public service; would you agree?

Dr Lockwood: I would absolutely agree with that and, as I outlined, the costs that we can measure are really the tip of the iceberg and the social costs in terms of lost productivity are much, much bigger.

CHAIR: Doctor, with regard to your network and you mentioned before about conferences you have been to, can you share with the committee some examples or what you have learned about where people are doing this well, where there are fewer presentations than we are seeing here in Queensland?

Dr Lockwood: Within Australia, not really. As you would have seen in the headlines, some bans which have been in place have not been in place long enough to see what the impact is going to be. One of the interesting places will be Melbourne where one of the more detailed studies came out from; that is not a complete ban, is my understanding. Certainly, the impact of that should be felt very quickly. The trauma community is not a large community. We speak to each other very frequently, and we will be keeping tabs on what is happening in other states.

Within Australia, I am not aware of anyone who is really doing it much better than us. Everyone is faced with the same challenges; no-one wants to make it illegal, no-one wants to stop people from having fun, everybody wants to go faster and what is available from overseas is really the same for everybody. The studies that I am aware of from overseas are all a little old. As I say, this has evolved so quickly within the last few years that they are not really even comparable. Even information that is 12 months old is not really comparable. The literature I am reading from the US has much lower mortality rates, but I think that is just because it is older. No, I do not really have a good example of where it is being done better, but it is a very good question. Another major jurisdiction, I think, is Paris which has banned this, and again we would certainly be looking with interest at what the impact is
003 there.

CHAIR: I am encouraged by the dataset. Obviously a lot of people have been injured and there is a very sad story behind each one of those cases. Following on from the member for Aspley's question, I wonder if we can get a breakdown of that dataset across the HHSs to see if we can align that with other work around hire programs across the state.

Dr Lockwood: That is one thing we are able to provide. I cannot provide it right now, but we can provide it on notice. The QTDC, which I mentioned before, has been specifically set up to address those sorts of questions. Very early in its inception it did give us some data we were not aware of about the impacts of trauma generally in the regions and how much is being cared for in the regions. That was a surprise to us and a great revelation.

CHAIR: As stated in the data, the Sunshine Coast hospital reviewed 176 paediatric e-scooter presentations. For the committee's benefit, is paediatric under 18s or under 16s?

Dr Lockwood: Those definitions vary. The admission criteria is usually under 18-year-olds at a given hospital. Other hospitals routinely look after 16-year-olds—occasionally it is 14-year-olds—and up. Each study would specify its own age range.

Mr KING: It is almost as if we wish we could push the rewind button and bring the public with us. It is interesting that you mention full face helmets. I grew up riding dirt bikes and there was no other option. That was what you did. I remember when helmets for pushbikes were introduced there was a reluctance but that generational change has occurred. I applaud you for the idea of full face helmets. I do not know how the rental companies would feel. I think there should be too; it is a safety thing. That is more a statement than a question. Is there any jurisdiction you are aware of where they have introduced full face helmets and protective gear and maybe an education process that goes with the purchase of these to try and help?

Dr Lockwood: No, I am sorry, I cannot enlighten you on that. Clearly, BMX bikes go a bit faster, but some of these devices are approaching these speeds. It is not so much the tiny wheeled scooters, although some of them do. Some of them can go over 100 kilometres an hour. You have probably seen that yourself on the streets. Those sorts of speeds combined with the small wheels are a recipe for disaster. Inevitably, their speed capability is only heading upwards, so they are comparable to the sort of bikes you are talking about.

Mr KING: Yesterday morning they were talking on the radio about these new bikes that are an actual bike that equates to a dirt bike, and kids are riding them around. There has to be something to make them wear a helmet. Maybe when they pull it out, a helmet comes with it or something.

Dr Lockwood: I fully agree. We are seeing those things being ridden on footpaths and so on. They are honestly almost indistinguishable from motorbikes.

CHAIR: I have just been informed that our live stream is dropping in and out, so for the people who are out there watching, please be patient with us. The technicians are working on it.

Mr KEMPTON: Doctor, there is obviously a public safety component to this inquiry. It is not just about those people who are riding e-mobility scooters; it is pedestrians as well. There is work to be done around education. Is it safe to say there is a greater risk to pedestrians from this type of transport than motorbikes and other licensed devices? Are you seeing a trend in that direction?

Dr Lockwood: With the number of pedestrians injured, I would not say there is enough to see a trend. There are certainly occurrences of it. They are allowed on footpaths. They are allowed to be in shared areas. Despite the legislated maximum speed of 12 kilometres per hour, it is very difficult to physically enforce that so there is an inevitable risk. It obviously does not apply to things that are confined to the road, so there is a unique risk from this group of devices that are allowed to use shared spaces.

Ms BUSH: I was interested in how you described some of the characteristics of the patients who are admitted and I wanted to give you the chance to expand on that. You did elaborate that it was young adults, some under 16s and alcohol that are factors. Are there any other characteristics of either the patients or the environment that the committee should be aware of in terms of where we could target our recommendations?

Dr Lockwood: There are a couple of other things that are already included in the legislation. As you would be aware, there is a ban on doubling and the use of mobile phones, and that is well targeted. They are real risks. The only thing I would comment on is that some of the people who find these devices the most useful live in suburbs that are on the outer edges of the metropolitan area. They are often a solution for people who maybe cannot afford a car, so it is certainly a more affordable mode of gaining some autonomy. I think it is fair to say that we are seeing a socioeconomic profile that is not cast in stone. People from all walks of life use these. Some of the more serious injuries, particularly as a result of heavily modified devices, we are seeing not so much from inner-city use but on suburban streets. I would underline again the importance of engineering the spaces these devices are designed to be used on. If we can improve surfaces where we know there are going to be commonly used spaces, potentially sharing with bikes, that is certainly going to have an impact.

Mr JAMES: Doctor, you mentioned that it contributed to ambulance ramping. This is probably more of a statement than anything, but I rode along with an ambulance a couple of weeks ago just for the experience and had the opportunity to spend two hours standing in a hospital corridor watching what goes on. That would be an ideal time for the paramedics to have an iPad and just ask some of these questions and collect that data, because they spend a lot of time in the corridors.

Ms BUSH: You mentioned a $15 million cost. From memory, you mentioned that was the direct cost associated with this. Over what period was that? Would it be fair to say there is no way to really estimate the long-term direct costs associated with this? I am just interested in the funding and the quantum.

Dr Lockwood: That was a 12-month estimate from May 2024 to April this year. That is when we started putting the data together for this. Yes, you are absolutely right; that includes no rehabilitation, no long-term consequences and of course no loss of earnings and productivity, so the real costs are much greater. They are the best costs we can come up with. They are not plucked out of thin air, but they really are the minimum directly attributable costs we can determine. Some of them were based on the large number of emergency department presentations. They are the sort of people you would have seen in the corridors, probably just a fraction often not getting admitted to hospital. I think the average cost of those was $713 per presentation. As I say, probably the bigger knock-on impact is the number of people who then have to wait in the ramped area, and that affects everybody in that whole department. Those numbers are concrete to a degree but, as I say, it would only be the tip of the iceberg.

Mr KEMPTON: Doctor, you mention in your submission about compulsory third-party insurance for all e-mobility devices. Would that currently mean that a pedestrian who is injured is left up to his own devices in terms of compensation and medical costs?

Dr Lockwood: That is outside of my area of expertise. I am sorry; I am not sure what the legal implications are. Those people are not insured at the moment, so I would imagine that is the case.

Mr KEMPTON: That could well represent another significant cost that has probably not been quantified.

Dr Lockwood: Absolutely.

CHAIR: You said earlier that it does not include economic costs and all that sort of thing, which would be a very large multiplier. I know this is not exactly your speciality, but in terms of fatal accidents only do you have an understanding of the higher speeds which are usually associated with private scooters and e-bikes? I am just trying to get a correlation. Many of the privately owned ones are much more high powered, so I am just trying to extend that and your datasets to see if there is something else we can gain from that.

Dr Lockwood: Our data includes no actual measurement of the speed that was being done at the time. We also do not have the benefit of the detail of police investigations that would go into most motor vehicle accidents. There really is not any analysis of that, so I can only really go into the capability of those devices. Fatal injuries have certainly occurred with the Lime and other corporate scooters, but their speed controls are reasonably effective. It is possible to exceed those speeds going down a hill and anyone can fall off one of those things. It is certainly possible to give yourself a severe injury even with an effectively speed controlled device, but the multiplier is extreme. There are devices that can be modified to go over 100 kilometres an hour. I do not recall the model names, but there are several of them and I know they are in use.

CHAIR: This would be anecdotal, but is speed the biggest factor or helmets?

Dr Lockwood: We do not have the data to answer that question. Obviously, there comes a speed eventually where a helmet will not necessarily save your life, but the vast majority of fatalities are related to head injuries, so I would rate the importance of a helmet as probably the first.

CHAIR: I know that is outside of your speciality, but obviously anecdotally your evidence is very strong. Dr Lockwood, we do have one question on notice, which was the breakdown for the HHSs that I asked about earlier. If you could provide that response to the committee by Tuesday, 12 August, that would be great. Thank you for appearing before the committee today and for the information you have provided, and thank you to your team for the submission they put together.

HALVERSON, Superintendent Mark, State Fire Safety Section, Queensland Fire Department

MALLOUK, Inspector Daren, State Fire Investigations Unit, Queensland Fire Department

SMITH, Commissioner Stephen AFSM, Queensland Fire Department

CHAIR: I understand that those of us here today are going to have a high-tech presentation on the screen. I am not sure how those online will be able to see that, but we will certainly make that available in the hearing. I would ask you to provide a brief opening statement and then the committee will have questions for you.

Commissioner Smith: Thank you for the opportunity to address this important issue with you today. Rechargeable lithium ion batteries, especially those from e-scooters, are a growing fire safety challenge in Queensland. The chemistry that makes lithium ion batteries lightweight and compact also makes them volatile if they fail. If compromised by damage, misuse or fault, these batteries can fail catastrophically. They can lead to fires that evolve rapidly, with the potential to be explosive and emit toxic and flammable gases. This volatility is the result of thermal runaway, a self-sustaining chemical reaction that generates uncontrolled pressure and heat in a battery cell. Once thermal runaway starts it cannot be stopped. It can trigger the same reaction in adjacent cells. Thermal runaway can result in sudden and intense fires that can spread rapidly. These fires are difficult to extinguish, with fire extinguishers generally ineffective. Firefighter response to lithium ion batteries in thermal runaway is aimed at cooling the other battery cells to reduce propagation or, if it is safe to do so, letting the battery burn itself out while protecting surrounded areas. Lithium ion batteries are also prone to reignition long after the fire appears to have been extinguished, with reignition reported to have occurred 68 days after ignition.

E-mobility devices account for a large number of lithium ion battery fires in Queensland. E-scooters and e-bikes can have dozens of individual battery cells in their battery packs. This means that the propagation of thermal runaway from one cell to adjacent cells is a significant issue. If compromised, each of these individual cells can emit toxic and flammable gases, produce powerful jet-like flames, explode, or produce an explosive atmosphere and become projectiles that contribute to rapid fire spread. I would like to show you some examples of fire behaviour of lithium ion batteries in e-scooters and e-bikes. I would ask the committee secretariat to play the UL Research Institutes' video.

A video was then shown—

Insp. Mallouk: This video is a controlled experiment where an e-scooter is deliberately overcharged to trigger thermal runaway. If you look at the timeline along the bottom, at the 19-second mark you can see the battery start to offgas. This means that flammable and toxic vapours are being vented from that battery. At the 29-second mark, in the lower right-hand frame you can see the gases reach the ceiling height where the smoke alarms are and four seconds after an explosion occurs. At the 34-second mark, the temperature, which is up on the top right-hand corner in Fahrenheit, reaches approximately 1150 degrees Fahrenheit, which is 625 degrees Celsius. A further 20 seconds later that will peak at about 950 degrees Celsius, all within a very short window. The e-scooter itself is a European-style one not commonly found here, but the battery is the same that we see here. As you can see from that, the explosion dislodged the windows and the room went into what they call flashover. It took less than 40 seconds for that to occur from when the first offgassing was visible.

CHAIR: That is very graphic.

Commissioner Smith: If we could play a few more examples; could we play the second video?

A video was then shown—

Insp. Mallouk: This was from Crestmead here in Queensland in March 2023. This will demonstrate the speed of ignition, similar to what you saw in the previous video, and how quickly the fire will spread. The offgassing ignites and the destruction of that dwelling was near complete.

The next video that I will run through is of an e-bike battery exploding in a hostel in New South Wales in October 2023. Note the speed at which the room becomes fully involved in fire and flames are seen at ceiling height. Those flames are from the ignited gases.

The final video is of an e-bike on a train in Melbourne earlier this year. You can see it offgassing and then igniting. Thankfully this was not during peak hour. There are many more compelling videos available online if you wish to see other examples of e-scooter and e-bike fires.

CHAIR: Thank you for sharing those. Can you clarify what overcharging is? Is it remaining on charge for a long time or is it a problem with the amount of power going in?

Commissioner Smith: We will talk about a number of those things, but Daren might answer that question specifically.

Insp. Mallouk: Overcharging is exactly that. A very common thing we are seeing is people using incorrect chargers, so a charger that is supplying more voltage than that particular device is made to handle. It can also overcharge if it has stayed on charge for far too long and has not been pulled off charge. That does degrade the battery as well.

Commissioner Smith: The charger may fit, but the voltage and the flow is wrong so it can cause some challenges.

Supt Halverson: One point is that high-quality e-scooters and e-bikes generally have an in-built battery management system. Those that are not of high quality may not have that battery management system, which would largely mitigate the risk. That is a large problem where the low-quality products do not have that system to actually cut the charge off when they are fully charged.

Commissioner Smith: Luckily, the three incidents that you saw did not result in serious injuries. However, in Queensland there have been numerous serious injuries and fatalities as a result of the failure of e-scooter batteries. Since 2022, we have seen three fatalities directly attributed to e-scooter batteries and a further fatality of a young child that was suspected to have been caused by an e-scooter battery. One of those fatalities was from the inhalation of toxic vapours from an e-scooter in thermal runaway. Toxins from an offgassing lithium ion battery are one of the most significant hazards associated with these batteries. What may look like smoke is in fact highly toxic, highly flammable vapour that contains additional compounds not typically present in more conventional fires. The makeup of the vapour depends on the chemistry of the particular battery, but vapour commonly consists of up to 50 per cent hydrogen, small droplets of organic solvents, sulphur dioxide and nitrogen oxides, carbon monoxide, hydrogen fluoride, hydrogen chloride, hydrogen cyanide and carbon dioxide. These toxins also end up in the water run-off from fires.

Unfortunately, our experience and our data both show that fires from lithium ion batteries and e-mobility devices are increasing. The QFD started using codes to identify specific types of devices associated with lithium ion battery fires in 2023. These codes cover broad categories and include a category for recreational personal mobility devices, e-scooters, e-bikes and hoverboards. In the 2023-24 financial year, there were 51 fire incidents directly attributed to e-mobility devices. For the 2024-25 financial year, there were 94. Firefighters' incident notes from those 145 fires have been manually reviewed to look for the type of e-mobility device involved. This review indicates that the majority of those fires were from e-scooters. With your permission, I seek to table QFD's latest figures as an update to the data we provided in our submission.

CHAIR: Leave is granted.

Commissioner Smith: Over May and June this year, there were a further 12 fires from e-mobility devices and another nine earlier e-mobility fires identified through data cleansing. It is worth noting that the pattern of e-mobility fires in Queensland differs from some other jurisdictions. For example, in New South Wales it is illegal to ride a privately owned e-scooter in public areas and e-bike fires are more prevalent.

I would also like to draw your attention to some of the specific practices that increase the risk of e-mobility device batteries going into thermal runaway, some of which we touched on earlier: home modification of or tampering with batteries, for example, to increase the power of the battery; homemade batteries where battery cells from other devices like vapes are repurposed; the use of an incorrect charger, as we mentioned earlier—just because the charger physically connects to a device and appears to be charging does not mean it is compatible or safe; and overcharging devices—devices should be unplugged once fully charged and not left to charge overnight or unsupervised. If a battery shows any sign of damage—for example, bulging, leaking, smelling unusual, making any sounds or getting very hot and not cooling down—the battery should be disposed of safely. If there are any signs of smoke, offgassing or flame, call triple 0 immediately. E-scooters and e-bikes should be charged in a well-ventilated area that is protected from heat and moisture. They should never be charged or left in areas that could impede an exit or an evacuation route.

Fires from e-scooters and e-bikes, and in fact all fires from lithium ion batteries, are a relatively new phenomenon. The nature of these fires in the built environment creates new challenges, both for occupants needing to evacuate and for firefighters. Building occupant safety and firefighting strategies need regular review to make sure they accommodate contemporary challenges like those created by

lithium ion batteries. Most rechargeable lithium ion batteries, when manufactured to high standards and used and charged appropriately, will be safe. However, when those batteries fail, the resulting fires can be extremely fast and evacuation times can be limited. In these scenarios, interconnected smoke alarms can save lives. Thank you for considering this significant safety issue for Queensland. We welcome any questions that the committee may have.

Mr MELLISH: Thank you, Commissioner and your team, for the presentation and the amount of work that has gone into your submission. I am sure it is a pretty confronting and unknown scenario when you are having to confront these particular fires. I will jump right to the end of your submission where you say that New South Wales provides a contemporary example of regulatory change. I am keen to get my head around what the New South Wales changes are and whether it would be useful for us to consider as part of this review.

Commissioner Smith: In terms of specific comparatives, the Office of Fair Trading or the Electrical Safety Office may be better placed to comment on new safety standards and information requirements for the sale of e-mobility devices in New South Wales. These changes have been managed by NSW Fair Trading, which is responsible for both consumer protection and electrical safety in New South Wales. We certainly do look to other jurisdictions in terms of the approaches they are taking, both in response and from a regulatory point of view.

CHAIR: Following on from that, Commissioner, I am interested in your opening statement when you said that there was a larger volume of battery situations with private e-scooters; is that right?

Commissioner Smith: In New South Wales, the personal devices are not able to be legally used in a public space so the reality is that the nature of their incidents is more about e-bikes. It is the same problem but a different type of device.

Mr JAMES: Looking at the revised report and the number of 145 fires for recreational e-devices, the numbers are running away. Can you break that down to privately owned e-devices as opposed to commercial ones? Is one more prevalent than the other?

Insp. Mallouk: We can. If we are talking about the hire scheme ones in the city and things like that, from my personal experience we have had hardly any issues with any of those in terms of fire related issues. The bulk of these are privately owned, privately purchased devices.

Mr MELLISH: This might also be a question for Fair Trading. You may not have the data but do you have any anecdotal evidence on whether the fires are because the e-scooters are faulty or have been illegally charged versus products that do not meet a standard or where there should be a higher standard?

Commissioner Smith: I will get Daren to add to this, but the biggest threat there is inconsistent chargers. With second-hand devices, people may bring the wrong chargers, they do not have the matching chargers or it may have been damaged in some way, shape or form so it creates the potential that the battery is not operating in the way it was originally intended to be operated.

Insp. Mallouk: Unfortunately, my answer is pretty broad. Anecdotally, yes, it largely falls in an unregulated area. Typically, as the commissioner explained, one of the main causes is using an incorrect charger. Also, we are seeing quite a few DIYs or home modifications occurring. There is also a big second-hand market for e-scooters and e-bikes now so you do not know the history of the device you are purchasing and you do not know what abuse there has been of that battery previous to you purchasing it. It is quite a broad answer because it depends on lots of factors.

Mr KEMPTON: You have talked about fires caused by lithium ion batteries. What about the presence of e-bikes in a block of units where there is a normal fire and your officers are going in? Do they pose an additional risk of catching fire and exploding?

Commissioner Smith: Daren can provide some context of specific incidents, but what we described in some of that earlier dialogue was around any of these devices in a confined area, particularly if it inhibits escape paths, which creates a very significant risk and threat to those occupants.

005 **Insp. Mallouk:** That is a great question. We spoke initially about a single cell battery propagates to nearby cells. This is also apparent with devices like the e-scooters set-up or the e-bikes set-up. This is part of the review that we have done to improve our training and how we respond and getting crews to identify those as potential risks and moving them out of the way and, as the commissioner highlighted, moving them out of their evacuation or exit route as well. Absolutely, we are now training crews to look for these devices, identify them and move them.

Mr KEMPTON: Otherwise, safe batteries can become flammable in that situation?

Insp. Mallouk: Yes. Any of these batteries that are exposed to a heat source, be it a significant heat source like a fire, is enough, depending on the amount of time of exposure, and can trigger them to go into thermal runaway.

Mr KEMPTON: It would be a bit like storing your mower fuel in the pantry.

Insp. Mallouk: That is a good analogy, yes.

Mr KING: The scenario that was just spoken about, where e-scooters or e-bikes went up in a normal fire, after the fire is out is there forensically a way to tell anything from those batteries or do they completely disintegrate and there is nothing left? A normal fire would not burn as hot, from what I understand.

Insp. Mallouk: All of the above. Certainly, we have had some good success. The same could be said for any fire, not just fires related to lithium ion batteries. Depending on the level of damage or destruction it really limits what you can garner from it. But, yes, we have had some good success in that space. That is some of what we are also exploring as a fire service—different ways we can identify failure mechanisms and things like that.

Mr KING: It just piqued my interest in relation to modifications. If there is anything left to see if that is what it was to work out that dataset.

CHAIR: With regard to fires involving batteries, you mentioned in your opening the gas produced. Can you talk to us a little further about the hazard for both firefighters and the general public?

Commissioner Smith: From the general public point of view, what you are seeing with that gas cloud is that, first of all, it is toxic, but, secondly, it excludes oxygen so it would very quickly overwhelm an individual who comes in contact with it. That may be just a single breath, potentially, that impacts. From that point of view, it creates a toxic atmosphere that does not support life. From a firefighters' point of view, obviously we are approaching a fire of that nature with the appropriate personal protective kit to address that. The gas is one thing, but it is also the other explosive elements of it—projectiles that emit from it—and the rapid extension of fire that it creates around it. Do you wish to add anything?

Insp. Mallouk: Everything the commissioner has just highlighted, but the other part is the high level of decontamination of our equipment, our PPE and things like that. That has thrown in another element. Even though we do decontaminate it, it is probably a different level.

Ms BUSH: Thank you, gentlemen, for coming in and for your written and verbal submission today. I am interested in understanding more about the risk profile. Often when we talk about risk we are talking about likelihood and severity of impact. You have convinced me on impact. I can see it is suddenly arising, it is very intense and often these items are located in the home. Can you speak to likelihood? It is probably in your submission. Is it one in 100,000? What is the likelihood and how frequently are these fires occurring? You have mentioned they are increasing. Are they increasing mostly where you are seeing modifications occurring? I just want a little bit more understanding of the risk.

Commissioner Smith: I might make a few comments and the team may then add to them. What we are seeing is an increase in those numbers and there are significant year-on-year increases. There is that relationship between that and underreporting of it, hence this idea of going back to try to understand the data more clearly in terms of reporting and tightening up the reporting mechanism in order to capture that. Part of the challenge in this space is, from a frequency point of view or impact point of view, we do not necessarily know what the scope of the market is or the number of devices out there and how that relates, but what we do know is we are encountering them much more frequently. It is the nature of the fires which are operating at a different level. The response to those is slightly different. Maybe Daren or Mark may be able to comment in the built environment, there are probably elements, and the response.

Insp. Mallouk: I can certainly add a bit more context to it, again without having the exact figures you are after. Definitely from a fire investigation perspective of the fires that we have investigated we are seeing—again the answer is quite broad as well because it hits everybody—more in the low socio-economic type areas. Because these are cheap, affordable devices we see a lot more of those fires. We do see in family houses that have a couple of kids, each child has an e-scooter and, alarmingly, they are on charge in their bedrooms. This is a common thing that we come across. That does raise that risk profile to extremely high. The ones we have come across are the ones that are on charge next to furnishings such as mattresses and lounges that have a high amount of energy so when the fire caused by the e-scooter or e-bike starts on the furniture we see those sorts of images of a rapidly growing fire.

Ms BUSH: Just to clarify that, without putting words in your mouth, there is no precise data but anecdotally certainly an observation that it is increasing. That increase could be due to a general increase in people using them more proportionately or it could be to do with modifications or a range of things. I see you nodding so I am assuming I am on the right track.

Commissioner Smith: I think they are fair remarks. I think also that you are getting a second-hand market now also so you are getting older devices in the system. It is not just our jurisdiction that is experiencing increases in incidents.

Ms BUSH: If I have time I will ask about second-hand ones as well. Are you doing any work now on capturing that data and trying to get a full picture of what it looks like or start benchmarking that or is that not a priority of the service?

Commissioner Smith: I think one of the areas, where significant improvement is still needed, both in terms of our internal capture but also nationally, is the quality of data and the availability of data—that is, how we capture the data and how we are able to pinpoint and narrow down our focus on some elements. There is an improvement that is required there in order for us to truly understand what the individual drivers of some of these things are.

Mr JAMES: You talked about lithium ion batteries generally in heat sources. What about the hot sun? Will that set a lithium battery off?

Insp. Mallouk: It can do. Probably not so much with e-scooters and e-bikes, but certainly we have seen it with smaller devices left on the dash of cars and things like that. Extreme temperatures either way can have an effect. Extreme cold can have an aging effect or degrading effect. The temperatures do not have to be that high. We are talking about 60 or 70 degrees Celsius starting to impact a lithium ion battery.

Mr MELLISH: Just reading through the data in your submission where you have the most common devices involved in lithium ion battery fires, am I right in saying—it might be that it is so low it is not on there—it does not include if someone has a lithium ion house battery? Is that separate to that table on page 9 of your submission?

Insp. Mallouk: If the data is not there it means we have not had any of those fires. Are you talking about the residential battery storage systems?

Mr MELLISH: Yes, your large-scale systems.

Insp. Mallouk: To my knowledge, off the top of my head, we have had one or two very minor ones. This probably goes to the point that Superintendent Halverson was talking about—the quality of the battery. The BESS (battery energy storage systems) residential systems—I know we are outside the scope—have really high-quality battery management systems hence one of the reasons we are seeing very few issues with those at this stage.

Mr MELLISH: Just a follow-up to that, it does mention alternative power storage systems, which is probably what I was getting at. Does that show that in an environment where it can be regulated in terms of the charging, in terms of the infrastructure and in terms of not having a second-hand market that is unregulated, that it can be done safely and be much more manageable?

Insp. Mallouk: You can extend that to electric vehicles. The only fires we have seen are ones that have been involved in high impact or high-speed collisions. In terms of battery faults, we have not had any in Queensland yet. Again, that goes back to that same point. The technology is largely being driven by manufacturers in the battery energy storage system and in the electric vehicles side of it. So that is high-quality batteries and really good battery management systems. I suppose to answer your question, it is a significant help.

Commissioner Smith: Whilst the quality of the management system dramatically improves safety it does not mean that they will not fail or you will not have faulty manufacturing even in those advanced processes. Product safety standards are an incredibly important element within this whole mix in terms of these devices.

Mr KEMPTON: We are obviously dealing with an inquiry into e-mobility devices, but perhaps one of the tools in that box is greater regulation around the manufacture, import, transport and distribution of lithium ion batteries, given that there are controls over a whole lot of other flammable and dangerous substances. Would you agree with that?

Commissioner Smith: I think it goes back to the product safety standards that are applied to lithium ion batteries or the products that use lithium ion batteries to power them. I think they are critically important elements to support the safe operation of those products. That is a fair statement.

Mr KEMPTON: Do you think there are sufficient safeguards now in respect of lithium ion batteries generally in terms of their sale, distribution and transport?

Commissioner Smith: Lithium ion batteries in many devices goes to the manufacturing standard. When you talk about many of the advanced products with great systems behind them—battery management systems—the figures have not demonstrated that they have proven to be an issue to this point. They do provide different risk profiles when they do fail, but those with advanced product standards have not demonstrated that. It is a cautionary approach and a risk-based approach to that. Perhaps Daren has something to add.

Insp. Mallouk: I think this would probably be a question more suited for the Electrical Safety Office and the Office of Fair Trading about the regulations that are currently available and their scope to enhance their regulations.

Mr KING: I understand lithium ion batteries contain cobalt. There are new styles of batteries and I am wondering if they are deemed safer—lithium ion phosphate and sodium ion? Have you seen things that are manufactured with those and are they safer?

Insp. Mallouk: There are lots of different battery chemistries. The one you mentioned, cobalt, they call it NCA, nickel cobalt aluminium, and LFP is lithium ferrous phosphate. They all have a letter particular to them. There is a whole bunch of them. The ones that we are seeing commonly are the LFP chemistry and the NMC, which is nickel manganese cobalt. They have different characteristics, but failure mechanisms are generally the same and the results when they fail catastrophically are the same. There are lots of different chemistries and they will be industry specific depending on the device or the component that they are for. There is not just one particular thing you see.

006 **Mr KING:** I was hoping the lithium ion phase was going to be over and we were going to get into safer batteries.

Insp. Mallouk: I suppose anecdotally you can say that the technology is moving at a rapid pace—an absolutely rapid pace. There is new technology around the corner that is going to come out, especially as we spoke about EVs and the battery energy storage systems, and you would think that would slowly filter down into these products as well.

CHAIR: I was going to ask the same question but you have clarified that. On another point of clarification, we have the Electrical Safety Office coming to talk to us in August. You mentioned another group in relation to the standards for batteries?

Insp. Mallouk: The Office of Fair Trading.

CHAIR: Again, is there any correlation between the issue of the battery management system versus the quality of the battery?

Supt. Halverson: Yes, there definitely is. A quality product is almost certainly going to have an in-built battery management system which will largely control the battery. Once it reaches its full charge, it will automatically drop it back to a trickle charge, as opposed to the poor quality products where that does not happen. Products that are quality are typically far safer than those that are not.

We touched on it earlier and the commissioner did as well around second-hand products. The biggest problem there is that you are largely buying from an unknown source and it is potentially from overseas. You do not know, firstly, the quality of the product and, secondly, the product's history. That is, has it been involved in some sort of a fire previously and is it now being reinvented and put back up for sale, almost certainly with some defects or deficiencies inside it? I guess the third part to that is the charger that comes with it. Once again, there is absolutely no guarantee that that charger is the appropriate charger for that device. We certainly recommend that people need to go to the manufacturer's recommendations to ensure that is there, but it may be difficult getting that message out.

CHAIR: In terms of questions for the Electrical Safety Office and the Office of Fair Trading, could you provide the committee with some guidance—whether it be today at the hearing or you can take it on notice—of what we should be looking at from them to make sure we get the best outcome from the inquiry? While you are looking for that, Daren, I want to thank you sincerely for the submission. Having all of the data and the facts that you have been able to uncover for us has been great.

Insp. Mallouk: One of the things we have noted is issues relating to electrical safety and the current regulation of battery chargers as distinct from the batteries themselves. Currently, they fall within the remit of the Electrical Safety Office in the Office of Industrial Relations. The Electrical Safety Office will be best placed to answer those questions where batteries are not currently within their

regime. The Electrical Safety Office chairs a lithium ion battery group which comprises representatives across the government agencies, and QFD participates in that group as well. I guess what I am saying is that they will both be best placed to answer and identify the gap that is in the legislation, as well as the Office of Fair Trading.

Ms BUSH: People in my electorate are very interested in waste streams. I was keen to get some views from you around the disposal of batteries, or bikes or scooters generally. What observations do you see, risks that you see emerging and opportunities that you think might be coming up for government, particularly linking into the second-hand market? Do you have any observations, risks or opportunities that you would like to highlight to us?

Commissioner Smith: The QFD website provides some information on how to dispose of lithium ion batteries in general. However, safe disposal options will differ depending on the battery's condition, its type, the size of the battery and where you live. In some areas, the local council provides advice about safe disposal. The Recycle Mate and B-cycle websites also provide a point for community members to contact and get information for safe disposal options. The Department of the Environment, Tourism, Science and Innovation is leading a body of work around the safe disposal of lithium ion batteries, including the 'Don't bin your batteries' campaign and measures to expand battery collection points. There is a range of information there from that point of view.

From our point of view—from a firefighting response point of view—we were looking at other jurisdictions in a response phase, or when something is going wrong with the battery, and what are the mechanisms used to approach that as safely and effectively as possible? We are looking at some of the work that is happening in other jurisdictions to see what we can adopt into Queensland.

Ms BUSH: Education is fantastic, but I think many of us sometimes throw our recycling in the waste bin instead of popping it in the recycling bin. I am interested in whether you have observed people not doing the right thing and the impact of that. Is the department looking at any kind of behavioural economics strategies around trying to nudge people to get better at that disposal of items?

Commissioner Smith: Consumer behaviour and education is an incredibly important element of this, given the nature of it. I do not think largely people are disposing of batteries with any intention for anything to occur as a result; it is just the nature of not understanding either the risks or the condition of what they are dealing with. There are some real opportunities with us to inform the community and educate them on safe and appropriate approaches to that and I suppose practical approaches to that.

There are probably a few things in terms of formal campaigns. We provide public information on lithium ion batteries through formal campaigns, community engagement activities, traditional and social media and dedicated pages on our website. The QFD's community engagement teams develop accessible materials and coordinate local engagement activities to amplify that safety messaging. Lithium ion battery safety information is integrated into a range of activities for our higher risk audiences—that is, our seniors, culturally and linguistically diverse communities and youth. In late 2023 QFD launched the 'Take charge' campaign to highlight rechargeable lithium ion battery risks and encourage safer behaviour around batteries. The campaign included paid advertisements, online TV, billboards, audio and digital. The post-campaign research demonstrated measurable improvements in the knowledge about safer use of rechargeables and delivered more than 28,000 views to the QFD's lithium ion batteries webpage. It did have reach and achieved outcomes. It continues to be an area where we link it into our home fire safety campaigns that we do annually, and that has the ability to reach and inform community.

Ms BUSH: I know we have had a few other submissions along these lines. Do you see opportunities for the Queensland government or local governments to look at expanding battery return for disposal and drop-off points? Do you see an opportunity emerging moving forward with the uptake increasing?

Commissioner Smith: I think if you went back to more readily accessible, safer options and better community understanding and knowledge. It is always helpful in terms of reducing risks and incidents related to these items.

CHAIR: Once again, thanks for the submission. The traditional non-rechargeable batteries are obviously considered very safe and they have taken time to get to that quality and standard. Do you know why they have such a high standard now and why the lithium ion batteries are not? Is it around those standards?

Commissioner Smith: I will get Daren to talk in detail but it is the chemistry of the battery. The compression and the sheer volume of energy that is stored in that is very different.

Insp. Mallouk: It is 100 per cent as the commissioner said. The other batteries that you are referring to all use chemicals to generate electricity but it is done in different ways and mechanisms. The lithium ion batteries use those elements that we spoke about—the NMC and LFP—but it is the electrolyte which is different to all the other batteries. The electrolyte inside these batteries is the main driver of these catastrophic failures. The other batteries do not have that electrolyte in them.

Supt. Halverson: I think one of the real key points there is they have become so popular because they have the ability to be able to store a large amount of area in a very small amount of space, as opposed to the traditional batteries.

CHAIR: Sure.

Ms BUSH: I was not sure if we touched on the second-hand element and whether there are things we should be considering, recognising it is going to be an emerging issue for us. Are there things we should be considering—education schemes or technical specifications—as part of that to help support the safety of people wanting to purchase a second-hand scooter?

Insp. Mallouk: Yes. The second-hand market or the second lifing of batteries is a popular thing that is happening around the world. If we are talking about residential battery energy storage systems, at a certain point they will lose a certain amount of power and they can then be repurposed to drive other things. That is happening. There are issues that are still to be worked through with that as to how we track those batteries. It is about getting as much life out of those batteries as possible, but then hopefully get them to a more robust recycling scheme. We do not want them to go into household waste and things like that.

CHAIR: Based on that response, you might be able to answer this question that I was not going to ask you. Is there a value of these batteries after that use? Can they be recycled and repurposed or can the metals in them be used again?

Insp. Mallouk: Yes, they can. I suppose that part of the industry is still in its infancy, let us say, especially in Queensland and Australia. They can take some of those precious metals or minerals out of them and be reused in other places.

CHAIR: That is about the most promising thing we have heard. Once again, thank you for your submission.

Mr KING: On that, I have heard—and maybe you can put this to bed—that with Tesla, for example, when a vehicle battery at 60 kilowatts is unusable anymore because it is too low for the car you could then use it on a house at 40 kilowatts. That is what I have heard people talking about. Do you know about that?

Insp. Mallouk: I do not know if Tesla is doing that per se but that is an example of relifing or second lifing a battery.

Mr KING: That 40 kilowatts is still fairly good for a house.

Insp. Mallouk: Yes.

Mr KING: But there is a danger.

Insp. Mallouk: There are always inherent risks associated with that sort of thing. I know that other jurisdictions around the world are working through that as well.

Mr KING: That is a long way from e-scooters, but thank you for your indulgence.

CHAIR: It has been very informative. There is a lot of information that we look forward to getting some clarity around. That concludes our questions and these proceedings. I thank everyone who has participated today. As I mentioned earlier, there have been some problems with sound issues but it is being investigated by technicians. Thank you to our Hansard reporters and broadcast staff for their assistance. A transcript of today's briefing will be available on the committee's webpage in due course. I declare this public briefing closed. We will have a short break and the public hearing will commence at 2 pm.

The committee adjourned at 1.43 pm.