

Senator Curry, Representative Roberts and members of the Joint Standing Committee on Innovation Development, Economic Advancement and Business,

My name is Richard (Rick) Reardon. I am a lifelong resident of the greater Bangor area and a lifelong electrical professional. I recently became aware of LD 126 “An Act to Allow a Journeyman Electrician to Supervise Three Helper Electricians.” I would like to share some thoughts, concerns, knowledge, experience, and suggestions from my 50 years of experience to assist you with your decision-making process.

I should begin by adding some clarity to the term “electrical professional.” At the age of 11, I began working with my dad, who was a licensed electrician, on weekends. Over a 7-year period those weekend “**one-on-one**” activities provided me with a clear definition of “**workmanship**,” an appreciation for the “**dangers of electricity**,” and a set of skills that would last a lifetime. Out of high school I worked as a helper electrician for a commercial contractor while waiting for my USAF training slot to become available. I then parlayed my four years of USAF training and experience, along with the GI Bill, into a BSEE from U-Maine. Out of U-Maine I went to work for GE as a Field Engineer. GE felt that even after all of the education I already had they needed to provide me with 4 more months of education and additional on the job training so I could “**work safely**” to install and maintain systems in a “**safe**” manner. A rewarding career with more education than you need hear about ensued.

I currently hold a State of Maine Professional Electrical Engineer’s License, a State of Maine Master Electrician’s License, and too many energy, alternate energy, and automation certifications to list. I have worked as an electrician, an electronics technician, a field engineer, a business owner, an E&I technician, a plant engineer, a planner, a supervisor, a manager, and now an educator. I have worked on residential, commercial, and industrial construction sites. I have performed maintenance and engineering for sawmills, OSB mills, power plants, chemical plants, paper mills, water treatment, waste treatment, and various manufacturing facilities across Maine and New England.

In my current role as an educator I am in constant contact with owners, supervisors, managers, and human resource professionals across the state related to their needs for skilled technicians and training for their existing workforce. I can assure you that they all need “**TRAINED**” electrical professionals. They need them **now**. What will the demand be 10 years from now?

I have watched the video of the proceedings related to LD 126 that were recorded on Thursday, February 25th. Unfortunately, I did not find out about the proceedings soon enough to rearrange my schedule to offer live testimony. Given the low number of those who did testify, I would have to believe that I was not the only one who was caught unaware.

In the testimony that follows I will try to provide some insight into the questions that were asked on the 25th as well as provide additional input for your consideration.

Why is there a shortage of electricians or trades people in general?

1. Society has denigrated the trades and individuals without a 4-year degree for many years. A technical education is typically looked down upon by society. Media has a tendency to make fun of blue collar workers. It is rare to find a program on television where someone is not making fun of a blue collar worker or someone who only has a technical education.
2. This societal bias reinforced by the media has trickled down to the national and state DOE to ultimately land on local school superintendents, principals, and guidance counselors. It is now perceived as better for the reputation of the school, the town, and the state to encourage a student to seek a 4-year degree in

a career with a low prospect for employment over a technical education. This is also the primary contributor to the student loan crisis. Please note that a significant portion of construction workers make more than average income. Many construction workers make more than 4-year college graduates.

3. Parents, family, and friends have succumbed to the same bias and typically encourage a 4-year education despite the career path or prospect for employment.
4. Helper electrician pay has typically been slightly above minimum wage. Over the past 20 years I have trained numerous individuals only to see them stay with their existing dead-end careers. Most of them have been in some form of social work that pays \$4/hr. more than a helper electrician but way less than a Journeyman electrician.
5. This is construction work. It is physically demanding and for one reason or another our society has grown softer. The Maine climate doesn't help.
6. Through the years, construction workers are the typically the first to suffer layoffs whenever the economy turns down. The last major downturn was only 12 years ago. People remember that.
7. The electrician field has typically had the highest educational requirements of any of the trades. Individuals who are not fond of school or may have math phobia tend to shy away from the electrician field.

Safety

In 1897, during its infancy, the National Fire Protection Association (NFPA) formed a team tasked with creating a National Electrical Code of standards for electrical installations. By pulling together the 5 or more codes of standards that had been mostly crafted with input from manufacturers and installers of electrical equipment, that team came up with the first National Electrical Code (NEC). At that point in time fires initiated by electrical faults resulted in epidemic levels of property damage and lost lives. Since that time, thousands of individuals have labored to create standards and guidelines for the manufacture of safe electrical equipment and the installation of safe electrical systems with the goal of saving lives. Critical to achieving their goal is **education and training.** The National Fire Protection Association is headquartered in Quincy, Massachusetts, where training is still a key element of their strategy and the ratio of apprentices to journeyman is still one to one.

One question that was asked during the proceedings related to the number of incidents of electrical related fires by state. Perhaps it is my years of safety training, but I hoped we had evolved to a society where one preventable death was considered **one too many**. At least that is what the NARCAN ads running in the media are now saying. That is also a great example of what can happen with a lack of government oversight and allowing a profit motivated industry to regulate themselves. Do we want to be just as good as other states when it comes to the safety of our citizens or do we want to be better?

According to the NFPA in 2018 (the most recent data) nationwide there were 25,700 fires caused by electrical malfunction resulting in \$1.2 billion dollars in property damage, 825 injuries, and 255 deaths. That is 255 too many. Fortunately the number of deaths from fires has trended down for many years primarily due to the herculean effort put forth by first responders to educate the public to the danger of fires and the importance of smoke detectors. Again, they feel one death is too many and the solution is **education**. Also note that this is just residential data and does not include commercial properties, first responders, or deaths by electrocution.

Here is a link to a video that clearly shows what happens when a simple wire nut is installed incorrectly. Any electrician who has worked in the electrical field for a few years has seen at least one of these failures. I have seen several that either shorted, opened, or were noticed by the homeowner before they caught the house on fire.

<https://www.youtube.com/watch?v=nPhgQpRFe5A>

A loose connection is one of the top causes of electrical fires as it does not lead to an overcurrent situation that would result in a blown fuse or tripped breaker. A loose connection just arcs until it catches combustibles on fire or opens the circuit. A loose connection can happen any place that there is a connection between two or more wires or a wire and a device. An average residential bedroom would typically have more than 50 electrical connections. Each connection needs to be perfect, not just close enough, like a nail, drywall screw, shingle, floor tile, trim board, or piece of siding.

Loose connections are a result of poor workmanship. Poor workmanship is a result of lack of training and experience. I can tell you with certainty that our current generation of young people have very limited experience with tools. A likely result of the video game generation, the demise of erector sets, and absentee parents. On top of that we have an abundance of cordless power tools. Everyone wants to use power tools right out of the box before they learn how to use hands tools or what it means to properly tighten a connection. This results in the stripping of device screws and ultimately loose connections that that are hard to detect with a simple tug test. I fear there are already thousands of these faulty installations across the state.

There are many causes of electrical fires that are all a result of poor workmanship. That's not even touching the surface of the installation and bonding of equipment grounding conductors where electrical shock or electrocution is the end result. Most of these could be prevented with proper training.

From experience as a helper, a licensed electrician, a supervisor, and now an educator, I can tell you that it is next to impossible to closely supervisor more than one person at a time--especially on a large job site. More often than not, an unexperienced helper thinks they know what they are doing because it looks so easy. The helper might not want to admit they need help and look stupid in front of the boss so they guess. When I was working as a helper I might have been in contact with the licensed electrician once per day. When on a job site the licensed electrician always has their own work to accomplish and is rarely directly supervising the helpers. The licensed electrician counts on the helper as having some previous training. That's also where homeowners get in trouble.

In 1972 OSHA was formed with the mission to reduce workplace injuries. They have made great strides. Their contention is that all workplace injuries can be prevented. Their primary strategy for accomplishing that goal is mandatory "**training**." Over the last 30 years they have placed a greater emphasis on electrical safety in the workplace. Surprisingly, the National Fire Protection Association NFPA 70E is their standard.

According to the Electrical Safety Foundation International (ESFI), in 2019 across the US there were 1900 workplace injuries related to electrical shock or electrical burns and 166 fatalities. That is 166 too many. Please note those statistics are just workplace injuries and do not include US citizens who were shocked, burned, or electrocuted.

Thousands of professionals across the country have come together to create codes and standards to improve the safety of the workers and citizens. In Maine our Electricians Examining Board, state electrical inspectors, and local code enforcement officers work tirelessly to ensure the safety of the citizens. They are too few with too little time to tug on every wire, check the tightness of every screw, and test all grounding and bonding paths. They count on a **trained** workforce to perform that work in a workmanship like manner.

It seems that the national trend has been to improve safety through more training not less.

I guess the big question is how do we Mainers who pride ourselves on our “Dirigo” motto want to be known. For long-term workmanship and safety or short-term profit?

The future

Maine needs skilled workers now and will need even more in the green energy future. The maintenance and installation of wind farms, solar farms, electric vehicles, electric vehicle recharging stations, heat pumps, and the infrastructure to support those requires a highly **trained** workforce.

What I have learned about people through the years, which is especially true of young people today, is that they prefer to take the path of least resistance. I ask students every year why they chose our school. The consistent answer is that my mom, dad, grandma, grandpa, uncle, sister, or brother told me that I had to. Or they are working for an electrical contractor that told them they had to. In other words, it was not their idea and if left to their own accord would have taken a less difficult path.

So if they take the path of least resistance, live with their parents, and get that minimum wage job, soon life starts happening to them. First it is a car payment, then a significant other, then maybe marriage, house payments, and children. All of sudden they realize they are stuck in a low paying career path, cannot appropriately support their family, and do not have the time to go back to school.

Without the current forces pushing these young people into education we will strand a generation in low paying dead-end jobs. Ten years from now there will be an even greater shortage of trained and highly skilled electrical workforce.

The State of Maine Electricians Examining Board has done a wonderful job through the years of adjusting educational requirements and offering limited licenses to satisfy the needs of the state. There have been numerous proposals to increase the educational requirements of the licensed electrician or impose the same post-license educational requirement as the PE board has done. Those suggestions have always met with resistance from the board. The board is not trying to invoke unreasonable educational requirements on those who choose the electrician career path. They have stayed with nationally accepted educational requirements. They are an incredibly competent, experienced, and reasonable group of professionals who are constantly trying to balance the needs of the businesses and the electricians with the safety of the citizens.

I wrote the previous paragraph because I’m not sure of the situation that has prompted this bill but have to believe the examining board would be receptive to a less draconian solution that would maintain the current safety standards. If solar PV installation is the issue, then perhaps there is an opportunity for a limited license for the installation of Solar PV with training and job experience requirements less than those required for a Journeyman?

Should the motivation behind the bill be for other reasons I would have to believe that there could be other alternatives.

Unintended Consequences

Has anyone considered that a high probability outcome of this bill would be to open the door for out-of-state contractors to show up with totally unskilled and poorly supervised helpers? These companies would

be long gone and impossible to hold accountable when problems arise. Would that help the safety of the citizens of Maine or provide high paying jobs for Maine citizens?

I am aware of this very scenario happening and not that long ago at a student housing project in Orono. The out-of-state contractor was using the laborers and drywall crew to install the electrical system when no one was looking. When the inspector arrived on site the workers all scattered to the woods behind the facility. The electrical installation at that facility was installed in a less than workmanship like manner.

From experience, I know Maine workers have always been respected as well-educated and hard working when they travel to other states. Do we want to diminish that reputation by watering down our educational requirements?

Right now, the State of Maine has licensing reciprocity with multiple other states. I know that the Electricians Examining Board has been working hard over the past few years to develop and cultivate these relationships. The biggest roadblock for establishing this agreement relates to educational requirements. LD 126 could weaken or destroy the relationships that have been established. This reciprocity allows Maine-based contractors with Maine-based electricians to bid on out-of-state jobs. This is critical to keeping Maine citizens employed when work is slow in Maine. Wouldn't we want Maine electricians to be the "most" educated so they could find work in any other state?

How could this legislation impact the long-term morale and pride of our current licensed electricians? The most important thing we have going for us is the pride that each electrical professional takes in their work and the fear of losing their license should they make a mistake. I am not sure that 3 out-of-state drywallers turned into temporary helpers would have that same level of concern.

How could this legislation impact the morale of the board, the morale of the state electrical inspectors, or the moral of local code enforcement officers who have always seen the safety of the citizens of Maine as their mission?

Alternatives

What has the state done whenever there are similar shortages in other professions? There has been a nursing shortage for some time. I suspect you know the answer. Employers increased wages to attract more potential nurses and educational facilities increased their training programs.

I have to believe that there are more than enough educational facilities in Maine to meet the training needs. There are the IBEW Apprenticeship Program, Cianbro Institute, Centers for Technical Education, Community Colleges, Maine Electrical Institute, and Revision Energy's new training program to name the larger ones. The examining board has 47 approved providers of electrical education listed on their site.

Not that many years ago a similar proposal to expand to two helpers per licensed electrician was brought before the legislature. The difference with that bill was that a statewide group of individuals chaired by industry met numerous times to discuss the benefits and concerns. When that bill was brought to legislature a compromise had already been reached with all of the stakeholders.

Increasing helper pay and providing greater access to training might be a better solution for the current situation. To accelerate the adoption of this pathway, the state could provide a temporary \$3/hr boost to newly recruited helpers. The state could offer to refund tuition through income tax refunds if the helper pays taxes to the state as is already done with many other STEM careers.

Perhaps the state could provide funding for targeted rapid training initiatives.

Perhaps additional limited licenses could be explored. The board has already approved 7 limited licenses with reduced training and work experience requirements.

In summary, I hope that I have provided sufficient commentary to help the committee see that LD 126 as initially proposed increases the hazards associated with electrical installations and places the citizens and the workers of the “Great State of Maine” at unnecessary risk of harm.

I am open to taking further questions from the committee or assisting with further research or commentary.

Thank you for your service to Maine and your consideration of my testimony.

Sincerely,

Richard K. Reardon, PE
Bangor, ME 04401
rreardon16@gmail.com