

THE REGULATION OF ELECTRICIANS IN SCOTLAND

For the Scottish Government's Directorate of
Energy and Climate Change

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A report prepared for the Scottish Government by

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Executive Summary

This study was designed to investigate the risks and solutions surrounding incompetent electrotechnical work in the domestic context in Scotland. Its specific aim as specified in the original Invitation to Tender was to “identify evidence of the current extent of unregulated electricians in Scotland, assess the risk they pose to consumers, and develop a business case for justifying any changes to the current position”.

In view of the fact that no electricians are currently “regulated” it was agreed that the term should relate to “unqualified” electricians in the context of the existing apprenticeship and end-tests.

The background to the study is that, currently, anyone can call themselves an electrician. There is no statutory need for any qualifications or demonstration of competence.

There is a voluntary self-regulatory system in place which is largely supported by voluntary company memberships and accreditations¹.

Therefore, in practice, an unqualified person can undertake electrical work in commercial, industrial and domestic settings in the same way as electricians who have undergone a full apprenticeship and training. This applies to the whole of the UK not just to Scotland.

The risk from this situation, is that it can lead to consumers hiring unqualified and incompetent tradespeople and receiving poor workmanship, resulting in faults that can lead to fire or personal injury, such as electric shock.

Compounding this situation, there is also a proven lack of awareness among homeowners of the existence of organisations that work hard to protect the public by setting standards of work and governing the quality of the companies engaged in electrotechnical operations. A YouGov survey (2017) identified that 88% of Scottish homeowners had never heard of SELECT and 87% had never heard of NICEIC.

The research recognised that an unqualified electrician is not necessarily incompetent and that it is possible for qualified electricians to occasionally perform incompetently. However, as a good proxy for competence, qualifications were agreed as the appropriate metric.

The extent to which electrical work is undertaken by unqualified people is impossible to quantify. This is because, in the absence of overall regulations, a wide variety of people can act as “electricians” in a domestic setting, including a variety of

¹ the ideal/preferred requirements are: an ECS card, the passing of the latest Wiring regulations exam, and the AM2 or FICA in Scotland – is an assessment of occupational competence. The ECS card (previously known as the JIB card) is not mandatory.

occupations such as kitchen and bathroom fitters, plumbers, and handymen, and, of course, householders themselves.

In effect, there are multiple categories of person that could be undertaking electrical work besides the DIYers, bathroom and kitchen fitters. Electricians – even qualified ones – are not required to undertake processes of regular onsite assessment of competence in the same way as, for example, gas fitters registered to Gas Safe. Potentially, these categories of person might undertake electrical work, each of which suffers from the lack of regular onsite competence checks:

- “Apprenticeship-Qualified” and up-to-date
- “Apprenticeship-Qualified” and NOT up-to-date
- “Qualified” – and up-to-date
- “Qualified” – and NOT up-to-date; and,
- “Unqualified”

The study comprised four main phases of work: desk research and a review of the existing evidence base, a call for evidence that was very widely publicised and open to householders, electricians, and other stakeholders. The publicity campaign alerted the public, relevant bodies (such as Citizens’ Advice), and electricians to the call. Subsequent interviews gave further information all of which fed into the fourth phase of the development of a series of outputs through analysis and interpretation of the data.

An extensive search of records and data from known sources (e.g. Scottish Fire and Rescue Service, Citizens Advice Service, certification and membership bodies as well as Scottish media) revealed that there is no single source or combination of sources that can demonstrate that the cause of incidents and accidents leading to fatalities or injury is due to work conducted by unqualified or any other type of electrician.

The existing evidence directs to broad statistics for occupational groups and fire variables. It does not help very much in understanding how, why and by whom defective installations are conducted.

The most compelling argument, to-date, is from the report produced by SELECT - ‘Electricians as a Profession’ in 2017. The case is built on bespoke survey findings that show there is a lack of public awareness as to how to check an electrician’s qualifications, and that the public associate the title “electrician” with a set of relevant qualifications.

The evidence base also includes that of danger related to defective electrical installations provided by previous research such as that by Electrical Safety First and various case studies (largely based on the Scottish Fire Service records).

The Call for Evidence for this study generated 537 responses from stakeholders (88), the public (38) and electricians (411 or 76.5% of the total responses). It was widely publicised, but the lower numbers from the public could suggest that there has been an insufficient number of causes for complaint or that they saw fit to remedy defects themselves in various ways.

Although lacking in many relevant variables (e.g. the age of the installation, person who installed it, etc.) the fire statistics helped in estimating that there could be 400 plus accidental fires in Scotland caused by faulty electrical supply and lighting which might, assuming each fire occurs in a separate dwelling, involve some 1,000 people and might cause up to four fatalities and 100 injuries a year.

Looking at the number of defects submitted to the Call for Evidence by electricians we were able to scale these up to produce an assessment of the risks. We indicated a very conservative total of around 7,260 remedial operations (the number of times another electrician has to actually fix a defective installation) per year in Scotland. The total annual costs of defective fittings of electrical supply and lighting could, therefore, be estimated at some £15m plus the unquantifiable, non-fatal, non-injury human costs.

A proportion of these fires from defective fittings could be due to older installations and wear and tear due to age but this has been impossible to quantify.

Nevertheless, the research has shown relatively significant costs and consequences from defective installations in Scotland.

Again, acknowledging the research is limited in scope and coverage, this research has also demonstrated a significant belief among members of the public and electricians that there would be considerable benefits from regulation, and possibly the licensing of electricians and their companies. The SELECT research and responses from the public to this study have clearly demonstrated that the public would welcome certainty that the person undertaking their electrical work is fully competent and up-to-date.

The business case presents five options ranging from do nothing, to licensing and individual regulation (occupational licensing), under each of which is noted a series of pros and cons.

In the opinion of the authors and based on what the public and electricians are saying, protection of title, alone, will be insufficient. Given that the industry already possesses a voluntary registration scheme in the form of the SJIB and the relevant cards it seems reasonable to recommend a complete package: protection of title, licensing of firms to undertake electrical installations, plus individual registration (perhaps by mandatory extension of the SJIB scheme).

Such a scheme would pay for itself in a relatively short period and would cover almost all of the pleas from the public and qualified electricians: to provide confidence and safety to the general public by enabling them to check the registration of electricians and their companies, to underpin the safety of those undertaking electrical work, to reduce the annual costs of fires caused by faulty fittings, and to exclude from the industry “rogue traders” and incompetent fitters.

1. Introduction

1.1 Background

The electrotechnical sector in Scotland takes daily responsibility for tens of thousands of installations which have extremely important implications for life and property. In common with the gas sector, faulty work has the capacity to destroy homes, injure people, and take lives. The organisations which work hard to protect the public by setting standards of work and governing the quality of the companies engaged in electrotechnical operations are, therefore, deeply concerned about any and all instances of faulty installation. This is particularly the case where the faulty installation has been conducted by incompetent and/or unqualified people because, in theory, this is a range of error which can be addressed and ought to be avoided.

The exact nature and degree of incompetence is extremely difficult to pin down, but its consequences are felt in loss of time, additional costs, and sometimes safety implications. Incompetence arises from many different causes and, to an extent, we all experience it. On occasion everyone, even the most highly skilled and qualified person, can deliver sub-standard work. We can be distracted, worried, tired, or just plain out-of-sorts, but the result is usually work that is less than our best.

Sub-optimal work can, therefore, be delivered by almost anyone from time to time and, for most occupations, the result is usually a simple reprimand from the boss and a request to put it right. The risk from poor customer service or forgetting to follow the correct procedure in an office environment is generally measured in small amounts of time and money.

Certain occupations, however, carry far higher risks. Incompetence in an airline pilot or a nuclear engineer – whatever the cause – is considered totally unacceptable (although it still happens). Similarly, an incompetently installed electrical project involves risks that go beyond straightforward concerns about time and cash. They can mean large amounts of property damage and even risk to human safety. The most common routes we take to minimise such risks are legislation, qualification, and – sometimes – CPD and re-licensing.

This study was designed to investigate the risks and solutions surrounding incompetent electrotechnical work in the domestic context in Scotland.

Throughout the UK, at present, regulations do not require those working on electrical systems to have undergone or complete any formal qualification or competency training before conducting electrical work. In theory, anyone can undertake electrical work in commercial, industrial and domestic settings in the same way as electricians who have undergone and completed a full apprenticeship and training. In this report we recognise that the current situation suggests there a number of possible types of person undertaking electrical work:

- “Apprenticeship-Qualified” – having undergone a full three Stage apprenticeship and passed the final assessment of competence;
- “Qualified” – having passed a specific electrical qualification – usually after one to two years of college study; and,
- “Unqualified” – meaning that the person possesses no electrical qualification. This however does not necessarily mean that they have not acquired knowledge and skill in other ways.

However, these categories ignore the element of “currency of competence”. For example, an airline pilot undergoes six-monthly base checks and annual assessments to ensure that their competence is complete and up-to-date. Most, if not all, healthcare professionals whose title is protected – e.g. dentists, nurses, opticians, etc., are required to undertake continuous professional development (CPD) as part of their annual re-registration.

Electricians – even qualified ones – are not required to undertake similar processes of regular onsite assessment of competence – thus potentially putting consumers and the public at risk. Altogether, this means that there are an additional two categories of person who might undertake electrical work each of which suffers from the lack of regular onsite competence checks:

- “Apprenticeship-Qualified” and up-to-date
- “Apprenticeship-Qualified” and NOT up-to-date
- “Qualified” – and up-to-date
- “Qualified” – and NOT up-to-date; and,
- “Unqualified”

The extent to which electrical work is undertaken by unqualified people is impossible to quantify. This is because the absence of overall regulations means that a wide variety of people can act as “electricians” in a domestic setting, including a variety of occupations such as kitchen and bathroom fitters, plumbers, and handymen, and, of course, householders themselves.

In the commercial and industrial spheres there appears to be minimal concern surrounding the regulation of electricians. Public and commercial organisations which use electricians are generally well versed in the requirements necessary to assure competence. They are also more aware of the value in competence terms of commissioning trade association members, certification body customers, and registration body registrants, to prevent those without proven competence working on their electrical installations.

In domestic settings this is not always the case. The ability among householders to assess the technical quality and safety of work is often far lower than in a

commercial setting and, in many cases, could be said to be non-existent. With no expertise in the area, consumers expect, besides value for money, reassurance of the safety of what is installed, maintained or repaired. More often than not they depend totally on the tradesperson to deliver a fully-competent piece of work without any knowledge or skill being required on their own part. However, attempting to get the best financial deal, and a lack of technical understanding, can sometimes lead to householders taking on tradespeople who are not qualified or up-to-date, or who compromise on quality and safety for other reasons. Regardless of the level of qualification and up-to-date-ness tradespeople may also fall into categories such as “honest but incompetent” and “dishonest rogue traders AND incompetent”.

The recent tragedy at Grenfell Towers in London and the wall collapse at an Edinburgh school have tended to bring the construction and building standards system into a degree of disrepute. These tragedies led to the Government-commissioned independent review lead by Dame Judith Hackitt².

Whilst it is important to remember that the Grenfell fire was caused by a faulty electrical appliance and the fire spread due to faulty building material, Hackitt’s report in 2018 provides a comprehensive evaluation of the current system in the UK including competent person schemes. There is also the point (in part 2 of the report) ‘*It is important that the competence of those undertaking electrical installation works – where this may impact on building safety – is assured and verified*’. This is also integral to the theme in the Federation of Master Builders 2018 report ‘*Pathway towards Licensing UK Construction*’³ which sets out evidence in support of such a change.

In the same light, others are concerned at what they perceive as the lack of public understanding of what constitutes a “qualified person” and the risks of using unqualified electrical tradespersons^{4,5}. When considering the risk posed by unqualified electricians there are a number of interested parties some of whom have competing interests: the consumer/customer, the tradesperson or company, the Scottish Government, trade associations such as SELECT, certification bodies like NAPIT and NICEIC, registration bodies like the Scottish Joint Industry Board (SJIB), and the Scottish Fire and Rescue Service (SFRS) to name but a few.

In December 2016, the issue of regulation gained increased media attention with the release of a survey report by the trade association SELECT. The report “*Electrician as a Profession – The Case for Regulation*” claimed that members of the general

² *Building A Safer Future*, An Independent Review of Building Regulations and Fire Safety, Dame Judith Hackitt. 2018. Cm 9607

³ <https://www.fmb.org.uk/media/40313/fmb-report-licence-to-build.pdf>

⁴ <https://www.electricalsafetyfirst.org.uk/what-we-do/registered-electricians/>

⁵ <https://www.gov.scot/binaries/content/documents/govscot/publications/minutes/2018/04/electricians-working-group-minutes-january-2018/documents/e631655b-5e7c-46f5-b977-c270ab13ad30/e631655b-5e7c-46f5-b977-c270ab13ad30/govscot%3Adocument>

public are vulnerable to risk of poor quality electrical work, particularly due to a lack of experience in commissioning work and poor understanding of the background and qualifications of electricians and the latest Wiring Regulations. Some 89% of survey respondents to this study confirmed that they had no idea how to check the qualifications of electricians.

As mentioned above, the term “qualified electrician” includes anyone with an electrical qualification and this covers a reasonably wide swathe of people from fully trained and qualified, four-year apprentices, to those who have undertaken a one or two-year college-based qualification from an awarding body (for example, City & Guilds). And, again, as discussed above, a qualified electrician – even if qualified through a full apprenticeship – does not (unlike a gas fitter) have to re-accredit and update themselves unless they take personal action to do so.

The fact that workers without formal training in electrical and electrotechnical work may carry out related tasks could be argued to increase the risks to public health and fire safety as well as possible economic costs for insurance companies or the NHS. This is alluded-to in the SELECT report by several testimonials from electricians who said they have witnessed poor electric work having been carried out by unqualified workers. In this context, the SELECT report equates a set of qualifications with a sufficient set of competences. Therefore, it argues, the title of “Electrician” should be protected, so that only workers who are qualified to UK National Occupational Standards (SVQ in Scotland) may carry that title. The report argues that protection of title will thus reduce the risks of defective work and thereby reduce risks to public safety⁶. Others, such as NICEIC, have suggested that regular onsite assessment of competence - not just qualifications - should be at the heart of any changes.

The public debate on the issue of electrical safety gained further momentum on October 25, 2018, when the Scottish Parliament debated the issue of electrical safety and regulation of electricians. Tabling a related motion, a Member of Scottish Parliament called for the protection of the title of “Electrician” and argued that electricians should be added to the list of the 102 regulated professions in the UK. The SELECT report was quoted to support the argument for protection of title⁷. At the time of writing this report, no related legislation has been put forward.

In 2017, the Electricians Working Group (EWG) was convened to explore the challenge of ensuring the safety of electrical installations whilst protecting consumers and scrupulous traders.

⁶ SELECT (2016), Electrician as a Profession The Case for Regulation, <https://www.select.org.uk/wp-content/uploads/2016/12/Report-Electrician-As-A-Profession.pdf>

⁷ Scottish Parliament, Official Report, Meeting of the Parliament, 25 October 2018, pp.29-43

The EWG members are:

- Citizens Advice Scotland (CAS)
- Electrical Safety First (ESF)
- NAPIT
- NICEIC Scotland
- Scottish Electrical Charitable Training Trust
- Scottish Government
- Scottish Joint Industry Board
- SELECT
- SELECT Registration Board
- Society of Chief Officers of Trading Standards in Scotland (SCOTSS)
- Unite the Union

A number of possible avenues have been discussed and considered by the EWG for improving the situation including:

- an emphasis on increasing consumer awareness and making it easier to identify qualified professionals,
- a voluntary regulation scheme,
- providing title protection for electricians, and
- a mandatory scheme of regulation and/or licensing.

Although occupational licensing is not, yet, a major proposal, it has been subject to studies in England and Wales, and views on it were requested in our call for evidence (see section 2 - methodology) in order to ensure a rounded view.

This research report focuses on the evidence and possible need for changes to the situation regarding electricians as described above.

In December 2018, the Scottish Government commissioned Pye Tait Consulting to conduct secondary and primary research to develop, if possible, a clear evidence base to inform future strategies and interventions. The Scottish Government required that any solution must be proportionate and have a demonstrable ability to achieve the stated outcomes. These criteria will underpin any subsequent Scottish Government action, if it is deemed necessary.

The other interest in this context is that of the tradesperson, whether operating competently or incompetently, who may see the introduction of new or additional systems as unfounded, expensive, bureaucratic, and difficult to implement. Some had already also pointed to what they see as a lack of supporting evidence that

substandard electrical work is being carried out across Scotland. These views are supplemented by the newly-formed Electricians Working Group's⁸ own desire to acquire more data on evidence levels.

This study is vital, therefore, to the objective of attaining a better understanding of the extent of work carried out by unqualified or incompetent electricians⁹, and an assessment of the risk they may pose to consumers.

One further consideration which we have borne in mind throughout this research, therefore, is the question of the extent to which unqualified electricians may carry out competent work, and the contrasting extent of incompetent work being presented by qualified electricians. Neither question was a research target of this study but the unknown answers to both have critical implications for the actions which might be most desirable.

1.2 Aims and Objectives

The overall aim of the research has been to acquire and critically examine the evidence surrounding poor or dangerous electrical work, and provide the EWG, where feasible, with a strategy to reduce any risks posed by such work. This translates into the following objectives:

- Evaluate existing evidence and methodologies being used to identify unqualified electricians in Scotland.
- Identify where additional research is required and undertake that research to:
 - provide a profile of the number of electricians belonging to recognised trade bodies or holding recognised qualifications or registration;
 - quantify the number of tradesmen operating without demonstrable proof of competence;
 - provide evidence of any dangerous installations carried out by unqualified electricians; and
 - provide evidence of any harm caused by dangerous installations;
- Undertake a risk assessment based on the evidence identified.
- Develop a business case examining options for changes and the feasibility of the options.

⁸ <https://www.gov.scot/binaries/content/documents/govscot/publications/minutes/2018/04/electricians-working-group-minutes-january-2018/documents/e631655b-5e7c-46f5-b977-c270ab13ad30/e631655b-5e7c-46f5-b977-c270ab13ad30/govscot%3Adocument>

⁹ It is possible that unsatisfactory work may be carried out by electricians qualified to SJIB standards and by those holding other "electrical" qualifications, as well as by people with no training or qualifications in the field.

These aims and objectives will be re-addressed at the end of this report (see section 5.3 Summary).

2. Methodology

The research has been based on a four-phase approach.

1. Desk research and scoping of the current evidence base to ascertain the level of evidence that already exists.
2. A Call for Evidence seeking to develop an understanding of the scope and scale of defective electrical work being conducted, as well as collecting data on the views on risk and regulation.
3. A series of follow-up interviews delving further into the defective electrical installations and the impacts experienced by the respondents to the call for evidence.
4. The initial three phases formed the basis of a fourth phase, aimed at developing a series of outputs through analysis and interpretation of the data.

Desk research and scoping of the current evidence base

We first confirmed the perceived problem and, with the client, established definitions for internal use before identifying what existing evidence is available.

It quickly became apparent that minimal research has been conducted, hitherto, on this topic and that no reliable, searchable records of these types of activities exist.

The agreed basis of the work was to look specifically at defective or unsafe electrical installations¹⁰ within domestic settings in Scotland. In the wider context the HSE and particularly the Electricity at Work Regulations 1990, govern the safety of electrical employees in all circumstances. However, those regulations have no bearing on the potential for faulty electrical work to be installed in a domestic setting. Consequently, these regulations and legislation have not been addressed in this research.

Call for Evidence

The scope of the Call for Evidence and the draft questionnaire were initially discussed with the EWG during a webinar on December 20, 2018. Those unable to attend the scheduled meeting were given the opportunity to provide input via email or telephone. During the webinar, it was confirmed that the Call for Evidence would only register evidence of defective electrical work in domestic settings. The EWG also provided support by contributing to the pilot of the Call for Evidence questionnaire in order to assess functionality and content. Thereafter, the Call for

¹⁰ An electrical installation (in this research) is a fixed electrical item supplied through the electricity meter in a domestic setting. This includes cabling, sockets, switches, light fittings and the fuse box. It **does not** include electrical appliances and products such as white goods plug-in items such as hairdryers, smart technologies, and fire, emergency and security systems.

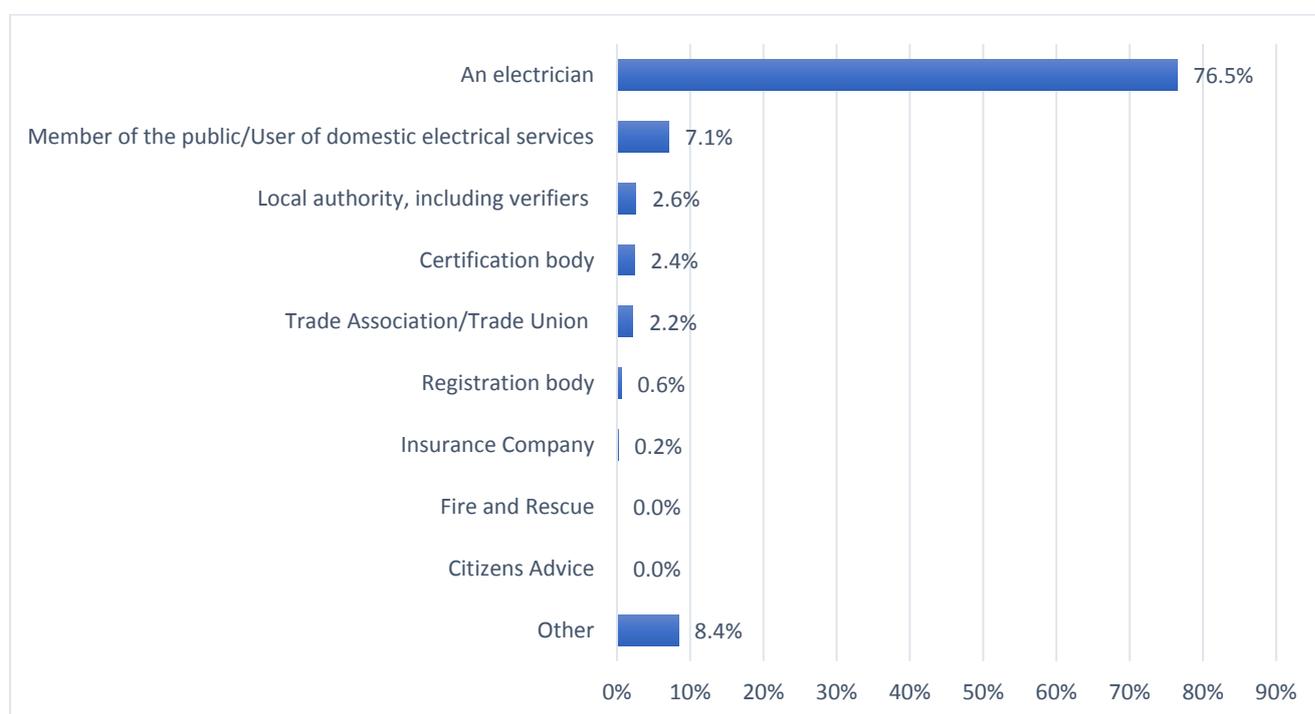
Evidence was live for a four-week period between January 21, and February 18, 2019. It was accessible through a dedicated online portal.

The Call for Evidence focused on all incidents occurring over a three-year period (between January 1. 2016 and December 31. 2018) of defective or unsafe electrical installations within a domestic setting in Scotland. The call was open for responses by any affected parties including the general public, the electrical workforce, those affected by any such defective or unsafe electrical installations, those completing retrospective work, emergency services, insurance companies, local authorities, trade associations, Citizens Advice, and certification bodies and other stakeholders.

The aim of the Call for Evidence was to establish a sense of the scale of defective and unsafe electrical installations, within a specified timeframe, establish how electricians are engaged for new or repair work, and gather perceptions on the options for the potential regulation of electricians and the possibility of protecting the title.

The Call for Evidence generated 537 responses from stakeholders (88), the public (38) and electricians (411 or 76.5% of the total responses). See Figure 1.

Figure 1. Respondent Profile



Base: 537 Pye Tait Call for Evidence 2019

Of the members of the public/users of domestic electrical services, four fifths of the respondents were homeowners, and one fifth described themselves as private tenants.

During the primary research, data were also collected on the local authority (LA) in which an incident(s) had taken place. The 404 respondents (351 of whom were electricians) who provided evidence of defective installations have been grouped into three Scottish regions: North, Central and South Scotland.

The response profile for each region was evenly divided and the response to the Call for Evidence could be said to be regionally representative of Scotland (see Table 1). The figures in brackets represent the numbers of electricians in each set of responses.

Table 1. Local Authority Grouping

Northern Local Authorities	Central Local Authorities	Southern Local Authorities
Shetland	Inverclyde	Scottish Borders
Orkney	Renfrewshire	Dumfries and Galloway
Comhairle Na h-Eilean Siar	West Dunbartonshire	South Lanarkshire
Highlands	East Dunbartonshire	North Ayrshire
Moray	Glasgow	East Ayrshire
Aberdeen	Clackmannanshire	South Ayrshire
Aberdeenshire	Fife	North Lanarkshire
Angus	Argyll and Bute	East Renfrewshire
Perth and Kinross	Stirling	Falkirk
Dundee		West Lothian
		East Lothian
		Midlothian
		City of Edinburgh
<i>Evidence by group and providers – Total (Electricians)</i>		
116 (103)	129 (112)	159 (136)

Promotion of the Call for Evidence

From the launch of the Call for Evidence, a substantial effort was made to promote it to the general public, and to electricians in Scotland. Aside from CAS, SELECT, NICEIC, NAPIT and SJIB kindly promoting the Call for Evidence through their

membership and social media channels, Pye Tait launched a comprehensive social media and internet campaign. Further details of the specifics of the survey promotion can be found in Appendix 1.

In-depth interview and case study development

Following the conclusion of the Call for Evidence the next stage collected the feedback from detailed, qualitative, in-depth interviews to provide a deeper qualitative evidence base and to develop a series of case studies¹¹ (Appendix 2) to provide anecdotal evidence on experiences with defective installation.

In order to collect these data, four key topics were discussed with all participants:

- Further in-depth discussion of the evidence provided through the Call for Evidence portal.
- Opinion on whether the interviewees perceive there to be a significant problem in Scotland with domestic electrical installations being incorrectly installed, and, if so, the scope and scale of the problem and the type and level of risk.
- Whether more needs to be done to improve the regulation of electricians and how this might be achieved in practice.
- Top tips and advice to someone seeking an electrician for work on their house, flat, or tenement.

Analysis and reporting

Iterative data analysis enabled key findings and themes to be identified throughout the project. A full review of the inputted data for the Call for Evidence was conducted on completion to confirm there were no small inconsistencies, out-riders, missing data, etc. Open questions were analysed on the basis of agreed coding, using content analysis to group together and draw out the main messages.

Findings from the call for evidence have been used in support of the desk-research and in-depth interviews to develop a triangulated view which answers some or all of the research questions. It delivers the findings by theme, using charts supported by quotes to showcase key messages (where appropriate and suitably anonymised).

Risk assessment, business case, and recommendations.

Risk is a difficult concept to assess but we attempt to estimate it in this context in terms of risk to property and life. There are other, even less quantifiable, risks

¹¹ In all cases, the individual concerned was happy to have their name mentioned but it was decided that this was not essential. All case studies provided in this report have been presented back to the contributor to verify and ensure accuracy of their views.

associated with the subject of this research – including for example reputational risk to the electrotechnical trade and even to the Scottish Government should it be deemed by the media not to be “doing enough”.

Recommendations discuss the possible pros and cons of different options.

The business case generated from the recommendations considers the most desirable actions which offer the potential to address any problems found by the research.

3. The Evidence

This section presents information gathered from existing reports and other research as well as that which we received as a result of the Call for Evidence (see Methodology). This exercise helped add to the overall picture of the type and quality of available evidence, our assessment of which is discussed in section 5.

The initial phase of the research sought to establish what was already known about defective electrical installations in domestic settings in Scotland and what kind of evidence base had been established thus far (see summation below).

Research by Electrical Safety First gives some useful statistical evidence of the safety hazards of electrical defects in Scotland and the UK. Added to that is some comprehensive research on the topic to date, developed by SELECT whose report “*Electrician as a Profession*” makes a case for more regulation of the electrician profession through protection of title.

The key facts from these sources and further research undertaken in 2019 are listed below:

SFRS (2016-2018)

75% of fires in Scotland caused by electricity (SFRS 2016)

598 electrical fire casualties and 9 fatalities in Scotland (SFRS 2016)

According to SFRS (2017-2018), 8% of fires in Scotland have electrical causes, but the human factor in such cases is not recorded

SELECT (2016)

93% of Scottish householders associate the term electrician with a set of relevant qualifications

89% of Scottish householders do not know how to check an electrician's qualifications

Case studies show a problem of defective electrical installations

SELECT calls for the title of Electrician to be protected

Further research (2019) noted that:

Citizens Advice Scotland (CAS) kindly provided some case studies but do not indicate a large evidence base of defective electrical installations

Local authority Trading Standards Services have very few cases on record of unsafe installations in domestic setting

Electrical Safety First data do not distinguish between unsafe electrical installation work and faulty white goods nor do they distinguish between faults caused by the decay of old wiring and incompetent installation.

3.1 Fire Statistics

The latest fire statistics for Scotland were presented in late 2018 by the Scottish Fire and Rescue Service (SFRS)¹². Earlier statistics – for 2016 - from Electrical Safety First (based on data from SFRS) show evidence of the importance of electrical safety for health and property: there were 598 casualties and 9 fatalities in Scotland in 2016. This equates to an average of 11 injuries per week from electrical fires in dwellings.

More detailed SFRS statistics for 2017-18 tell of around 26,000 fires attended in Scotland during that year, resulting in 44 fatalities and 1,113 other injuries. Within this total there were 5,700 dwelling fires, of which around 4,700 were considered accidental (note that some 25% of primary fires are classed as deliberate). These 4,700 accidental dwelling fires break down into different ignition sources as illustrated in Table 2.

¹² https://www.firescotland.gov.uk/media/1332742/incident_statistics_2017_18.pdf

Table 2: Ignition Source of Accidental Dwelling Fires in Scotland

Ignition Source	% (*)	Number of accidental dwelling fires
Cooking appliances	62.2	2,924
Smoking	7.7	362
Other appliances	7.4	349
Electrical supply	7.2	338
Heating equipment	4.1	193
Electrical lighting	1.6	75

(*) These proportions are of the 4,700 accidental fires in Scotland in 2017-18. The percentages do not add up to 100% because “other causes” (around 10%, of the total) have not been listed.

Accidental fires caused by electrical supply and lighting totalled 413 (just under 9% of the total of 4,700). This compares with 3,466 accidental domestic fires caused by appliances in the home.

For further context, there were 9,000 injuries and 146 deaths on Scottish roads in 2017.

3.2 Electricians in Scotland

To provide a baseline of the number of electricians operating in Scotland, data for the Standard Occupation Classification (SOC) code 5421 Electricians and Electrical fitters for the UK has been used against overall population data for the UK and Scotland.

ONS data suggest that, as of June 2018¹³, 265,000 people were operating under this SOC code in the UK. This includes both employed and self-employed. To determine an indicative number of electricians operating in Scotland we have used the Scottish population as a proportion of the UK figure (latest data 2017¹⁴) – 8.2% - as a proxy for Scottish electricians. SOC code 524 shows that there were around 23,400 Electricians in Scotland in 2017. For 2018 we have used an approximate number of electricians and electrical fitters in Scotland as c22,000¹⁵.

¹³

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/employmentbyoccupationemp04>

¹⁴

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2017>

¹⁵ This we felt was a conservative figure to use when considering NOMIS estimates 17,000 electricians in the construction industry using SIC codes and ONS lists total 35,000 across the 32

3.3 Profile of electrical organisations

In order to develop the scale of numbers that are aligned to trade, registration and certification bodies, and to estimate unaffiliated electricians, a profile of their memberships or registrants has been developed.

For comparison of electricians the SJIB provides the easiest basis as it has individual registrants. SJIB registrants account for 10,195 qualified electricians in Scotland, almost half of the 22,000 estimated total (c46%). In addition, there are an estimated 3,000 apprentices/adult trainees who are also registered with the SJIB, suggesting that up to 60% of those under SOC 5241 could be registered with the SJIB.

The Electrical Contractors Association for Scotland (SELECT) and the National Inspection Council for Electrical Installation Contracting (NICEIC) Scotland have members and registrants respectively that are electrical enterprises/contractors rather than individuals in Scotland.

SELECT has 1,231 member-businesses based in Scotland. NICEIC has 1,062 electrical contractor businesses registered on its schemes. NAPIT currently have 133 registered members in Scotland, 40 of which are registered solely as electrical contractors, with 93 electrical contractors undertaking Microgeneration Certification Scheme (MCS) solar voltaic installations. Additionally, NAPIT has 336 registered electrical contractors within 30 miles of the Scotland who are likely to operate on both sides of the border.

Membership requirements for these organisations differ and a selection of those are:
- specific qualifications for individual SJIB registrants, having personnel who meet National Occupational Standards is a stipulation for SELECT membership¹⁶.
Registration with organisations like NICEIC includes independent, onsite assessment of the technical competence of the qualified supervisor(s).

- However, there is a lack of awareness among homeowners of the existence of these organisations with a recent YouGov survey (2017) identifying that 88% had never heard of SELECT and 87% had never heard of NICEIC.¹⁷

Scottish local authorities using SOC codes. These figures should always be treated with some caution.

¹⁶ These are examples and not an exhaustive list.

¹⁷

<https://www.gov.scot/binaries/content/documents/govscot/publications/minutes/2018/04/electricians-working-group-minutes-january-2018/documents/e631655b-5e7c-46f5-b977-c270ab13ad30/e631655b-5e7c-46f5-b977-c270ab13ad30/govscot%3Adocument>

3.4 “Electrician as a Profession”

In 2016, SELECT commissioned a major consumer survey from the market-research firm TNS (Kantar-TNS). For that extensive survey, over 1,000 home-based interviews were carried out, with adults in Scotland, over a one-month period (June of that year). The sample was structured to be representative in geographic and demographic terms (age, gender and socio-economic group were subsequently weighted to ensure representativeness against the Scottish Mid-Year Census results)¹⁸. The survey only addressed people’s use of electricians and their attitude towards some form of registration and revealed some extremely interesting statistics.

- Some 93% of Scottish householders associate the term “electrician” with a set of qualifications. 89% of this group are not aware of how these qualifications can be checked and verified.

The evidence of a lack of awareness of qualifications is complemented in the report with a series of case-studies, provided by electrician-members of SELECT, of defective electrical installations. These were used to illustrate the inherent dangers of electrical defects and provide examples of poor practice.

- Electricians cited in the report describe electrical incidents or defective electrical installations in 15 cases with a brief description of the incident. They include images taken from completed Electrical Installation Condition Reports (EICR) that highlight safety hazards from such incompetent installation as reversed polarity, missing sockets and ducting, failure to earth a lighting installation, use of under-sized cable, and more.

The report does not cite any evidence provided by the general public or Scottish householders.

- Six case studies suggest that the work was carried out by workers having no electrical qualifications, such as plumbers and bathroom fitters doing electrical work, together with other examples of generally poor workmanship of electrical installations, equally supported by pictures¹⁹. In most cases the case studies in SELECT’s 2016 report give no indication of the date of the fault or problem.

¹⁸ Although not mentioned in the report, the margins of error are likely to be similar to those of national political polls (around +/- 3%).

¹⁹ SELECT (2016), Electrician as a Profession The Case for Regulation, <https://www.select.org.uk/wp-content/uploads/2016/12/Report-Electrician-As-A-Profession.pdf>

While the survey focused on the domestic sector, it is not clear if all the cases and case studies of defective electrical installation provided by electricians can be classed as “domestic” (two, for example, concerned a caravan park).

In addition, while the fifteen cases illustrate very well the existence and possible dangers of faulty installation, they do not (in most of the case studies) establish a clear link between a lack of electrical *qualifications* and poor-quality work leading to safety hazards.

Nevertheless, the six detailed case studies (from electricians) provide some evidence of electrical work being carried by non-trade-related people such as plumbers and employees of a kitchen installation firm, and bad practices, such as the failure to install residual current devices (RCD) as safeguards for socket outlets as per the Wiring Regulations (BS 7671)²⁰. The report argues that work carried out by unqualified electricians undermines prices for electrical work of the necessary quality and thereby inherently increases safety risks.

Thus, the SELECT case for regulation is based on two parallel pieces of evidence. The first is the lack of public awareness as to how to check an electrician’s qualifications, and the public’s association of the title “electrician” with a set of relevant qualifications. The second is the evidence of danger related to defective electrical installations provided by previous research such as that by Electrical Safety First and the cases with case studies.

Combining both bodies of evidence, the report calls for the protection of the title “electrician” as a first step. In practice, this would add Electricians to the list of Regulated Professions in the UK and associate the title with a prescribed set of qualifications. The inherent benefits, the report argues, would be the protection of Scottish householders, the general public, and other electricians, the outlawing of what the report calls “rogue” traders (presumably unqualified), and regulatory coherence.

3.5 Additional evidence

In order to bolster the existing evidence-base we also sought to acquire data from a range of other sources. Efforts to gain further evidence from other parties such as Citizens Advice Scotland (CAS) and local media clearly indicated that no-one is keeping a coherent and detailed record of electrical problems, their effects, causes and dangers.

Information on the type of issues presented to the Citizens Advice Bureau network is gathered by Citizens Advice Scotland (CAS). Until April 2019, anyone seeking advice in relation to this subject at the bureaux are directed to the Consumer

²⁰ <https://electrical.theiet.org/wiring-matters/issues/54/changes-to-requirements-for-rcd-protection-of-socket-outlets/>

Helpline (UK coverage) as they are the primary support for this type of issue. A review by CAS staff of the data from the helpline indicated 115 relevant cases over the space of a year (Electrical installation and supplies; Substandard service). The majority of which, however, were not labelled as a complaint against an electrician.

Several case studies also kindly provided by CAS staff provided deeper information but again did not indicate concerns being raised about lack of qualifications, but cite instead such variables as:

- overcharging for work;
- unwillingness by a trader to provide proof of qualifications; and
- complaints concerning such bureaucratic requirements as the need to obtain a certificate of completion from the local Building Standards authority.

Similarly, local media do not report domestic incidents unless a large-scale event occurs. Even then, clear causes and correlation to work by unqualified workers cannot be necessarily proven.

We found almost no evidence in the Scottish media²¹ and enquiries with SCOTSS (the local authority Trading Standards heads of service body) and examination of Electrical Safety First records threw little more light on the issue. Trading Standards receive enquiries in the main through the Consumer Helpline but only where there is a breach of relevant legislation, which may not be the case for domestic installations. SCOTSS noted that there is little evidence of unsafe domestic installations being brought to the attention of local authority trading standards services.

A few examples were mentioned of which two are quoted below as examples of the sort of issues being raised.

- One included a January 2019 case of a faulty installation of a kitchen which allegedly left numerous electrical defects such as electrical wiring being exposed. A failure to change the circuit board may have added to the electrical issue, but this case study did not provide explicit evidence of the qualification status of the electrician(s) who performed the work.
- In another case, a defective electrical installation carried out by a company in 2017, posed a serious fire hazard. The installation had to be rectified by another trader and the original company was taken to court by the consumer with the court deciding in the consumer's favour. This example illustrates electrical safety hazards and poor workmanship/ incompetence in a domestic setting but with, again, no indication of the qualification status of the people undertaking the work.²²

²¹ Most reports were of fires and almost all of these were attributed by the fire department to faulty appliances (tumble driers and hair-dryers being the worst offenders).

²² <http://www.scotcourts.gov.uk/taking-action/simple-procedure>

This feedback suggests that this type of incident is not a regular occurrence and does not provide evidence of a large-scale hazard for the general public.

Similarly, the records of Electrical Safety First could not determine which events took place in Scotland as geographic data were not collected. ESF data were also not segmented according to type of incident: i.e. due to workmanship or failure of appliances/white goods and whether the perpetrators were qualified or unqualified. In summary, the sources listed above even from such a small or limited sample there is no clear evidence to show that a substandard and, therefore, dangerous electrical installation was carried out by *unqualified* people.

3.6 The Call for Evidence (2019)

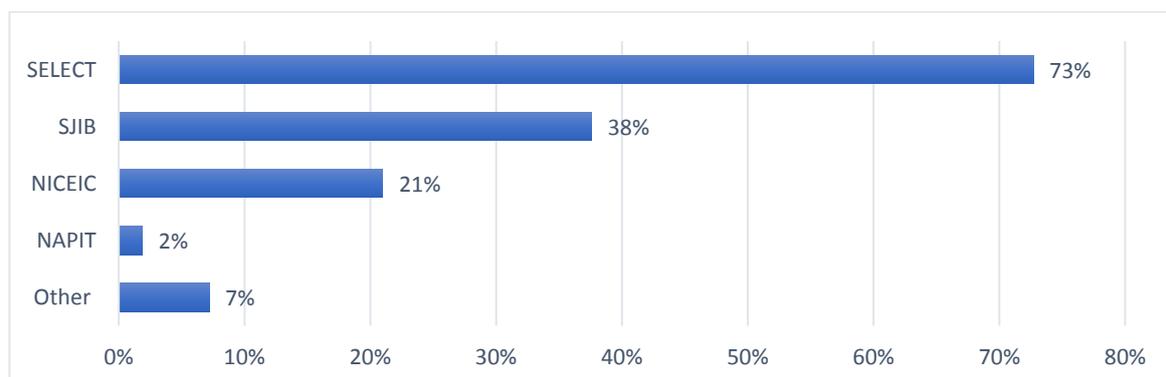
In this section of the report four key questions have been addressed:

- What is the potential scale of defective electrical installations in domestic settings in Scotland?
- What type of work is being defectively installed?
- Are certain regions of Scotland more susceptible to defective installations?
- How much are defective installations costing customers?

The Call for Evidence generated 537 responses from stakeholders (88), the public (38) and electricians (411 or 76.5% of the total responses). See Figure 1 (page 15).

In our primary research, 319 electricians confirmed being a current member of a trade body, certification body or registration scheme. Almost three quarters (73%) were members of SELECT (Figure 2). Some electricians are SJIB registered and work in an organisation that is either or both SELECT and NICEIC affiliated.

Figure 2 Respondent memberships²³ (Electricians)



Base: 319 Electricians Pye Tait Call for Evidence 2019; NB: duplicate memberships are possible within these figures.

²³ 'Membership' as a term has been left in as short hand but also includes 'registration' unless stated otherwise.

3.6.1 Sourcing Electricians

Part of the work on this study was aimed at gaining a deeper understanding of how domestic consumers source electricians for their work.

The apparent lack of awareness of the trade and registration organisations means that most customers are likely to use different avenues to look for electricians and this was verified by the survey. Qualitative feedback, corroborated by desk research²⁴, shows that a recommendation from family or friends is the most common source of an electrician (58%). Sometimes this can be family and friends who are electricians themselves (24%). Over a third of respondents use the same person they have always used (36%).

One member of the public who responded to our survey and had used the same electrician for multiple jobs, but went on to say that this approach allowed for defective work to go unnoticed for some time as the electrician did not identify their own work as defective.

We used the electrician on a recommendation from our son in law, who was working with him at the time. He [the electrician] had done work [on our properties] previously that also turned out to be faulty.

Member of the public

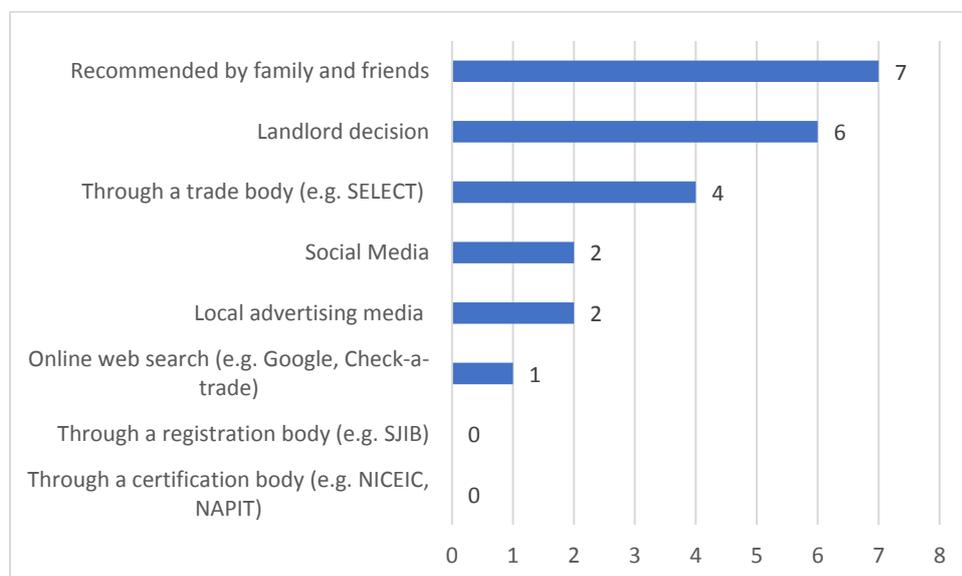
This respondent (albeit a lone case) said that it was only by getting an NICEIC-approved electrical contractor to check the work that the extent of the issues and the need for this work to be rectified were spotted.

Many of the public respondents said that they were unaware of, or could not remember, the method used to source an electrician. Of the 22 respondents – across all types - who could remember, taking advice from family and friends was where almost a third (7) got their information. Over a quarter (6) had to rely on a landlord decision but 4 took advice from a trade body such as SELECT (Figure 3).

24

<https://www.gov.scot/binaries/content/documents/govscot/publications/minutes/2018/04/electricians-working-group-minutes-january-2018/documents/e631655b-5e7c-46f5-b977-c270ab13ad30/e631655b-5e7c-46f5-b977-c270ab13ad30/govscot%3Adocument>

Figure 3: Sourcing the electrician who installed the defective work.

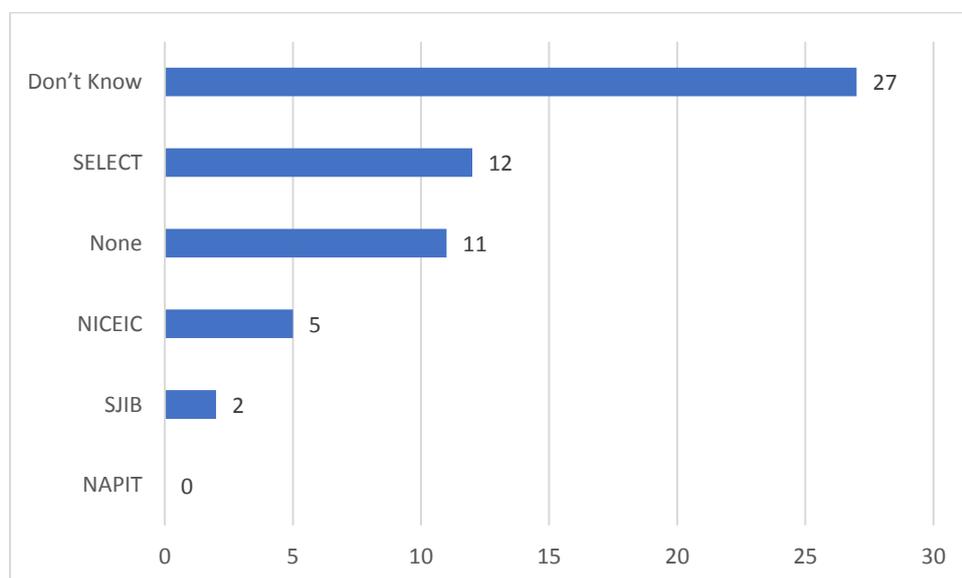


Base: 22 respondents; Pye Tait Call for Evidence 2019

In almost half of all those cases responding to this question (including the Don't Knows, Others etc), those hiring the electricians were unaware of any memberships they may have held and almost three quarters did not check for themselves the validity of the information if told that the electrician was a member of an association or trade body.

Of those total respondents to this question (57), 19 were able to identify from which trade or registration body the electrician completing the defective job claimed membership. The majority of the 19 were apparently members of SELECT (12), plus 2 SJIB and 5 NICEIC. The overall results are illustrated in Figure 4 below.

Figure 4: Trade, certification or registration bodies of those conducting faulty work



Base: 57 respondents Pye Tait Call for Evidence 2019

A lack of awareness among customers around the regulation of electricians may conceivably have led to defective work being carried out. But, that said, the extensive publicity and awareness campaigns put in place for this Call for Evidence (Appendix 1) attracted only 38 members of the Scottish public to respond and only 12 members of the public provided evidence of defective installations in domestic settings in Scotland over the past three years.

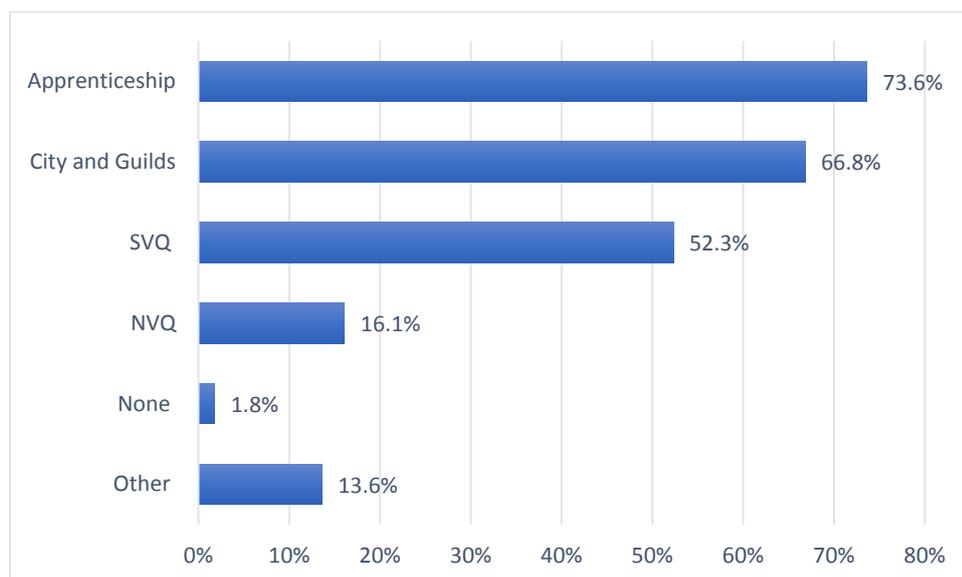
This might suggest that, at least from a public perception point of view, there is little evidence that a problem exists. Based on the information above there may be even less reason to suppose that it is an issue that is specific to those who are **not** members of trade, certification or membership bodies.

3.6.2 Qualification Type

Electrician respondents provided a total of 892 qualifications²⁵ of which apprenticeships were the most common and NVQs (usually specific to England and Wales) the least.

²⁵ Qualifications that are awarded by recognised awarding bodies such as City and Guilds, SQA, etc

Figure 5. Types of Electrical Qualifications (Electricians)



Base: 892 qualifications mentioned in Pye Tait Call for Evidence 2019

In addition, some electricians listed a range of other qualifications such as: Electrical Engineering HNC (12) and HND (2), CompEx (8), Degree level qualification or higher (6 in all, 3 of which are held by one individual who holds a PhD, Masters and BEng degree). Others listed courses run by SELECT (3) or other short courses.

3.6.3 The Scale of the Problem

The majority of electricians (83.4%) responding to the Call for Evidence (411 in all) confirmed that they had been asked to rectify defective electrical installation work in a domestic setting since 2016 – a total of 343 electricians.

Of these, 300 had been asked more than once. On average members of this group recall 30 cases of having rectified defective installations.

Respondents were also asked how long they had been an electrician. The average was just over 24 years, but the most commonly mentioned career-length was thirty years.

The scale of the problem is discussed further in the “Risks” section (4) below.

3.6.4 Regional Distribution

The question of whether there is a regional difference in the distribution of defective installations was addressed in the Call for Evidence in a number of ways. There was no significant difference between the regions as to whether an electrical contractor had ever been asked to fix a defective installation. Well over nine out of ten had been asked to do so across all regions (Table 3).

Table 3: Had an electrician been asked to fix a defective installation

	Scotland	North	Central	South
Yes	95.40%	96.10%	96.40%	94.10%
No	4.60%	3.90%	3.60%	5.90%

The average tradesperson in the North of Scotland had fixed 78 installations compared to 87 nationally and over 90 for both the central and southern regions. These figures were somewhat skewed by a few electricians who claimed to have fixed between 500 and 1,000 faulty installations – which is why the most commonly cited figures (the mode) are between 10 and 20. In the case of this question, the mode is probably the most reliable estimate of central tendency. The higher figures for totals of faulty installations (500 and 1,000) are by no means impossible but we used the modal averages in order to ensure that all resulting calculations are conservative.

Table 4: How many times had the individual fixed defective installations (career)

	Scotland	North	Central	South
Mean	87	78	95	93
Mode	10	10	10	20
Count	343	96	106	127

The pattern of defective installations by type (as shown in Table 5) across Scottish regions is also identical – with the possibility that there may be a slightly higher proportion of meter issues in the central belt. However, the differences are so small as to be virtually insignificant.

Table 5: Types of Defect by Region

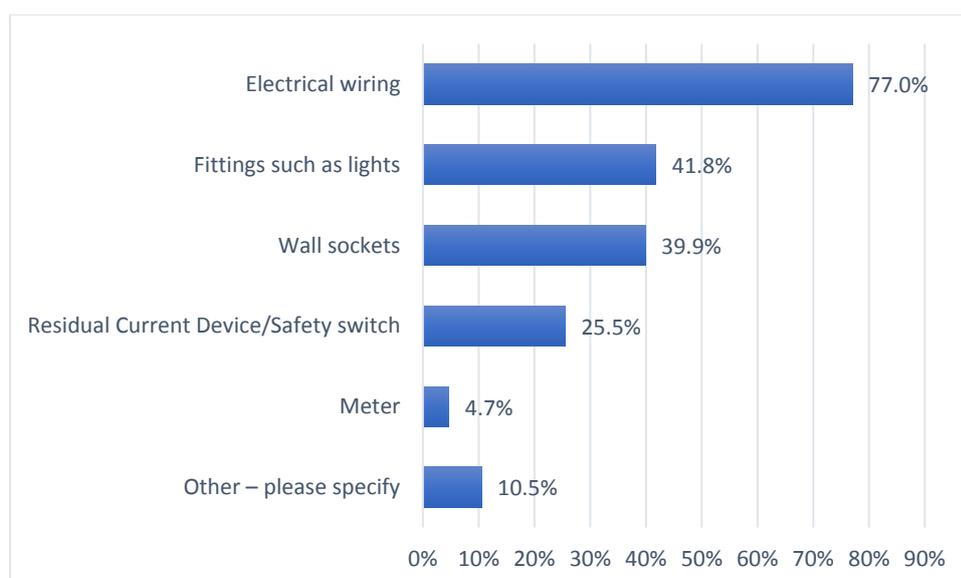
	Scotland	North	Central	South
Electrical wiring	76.9%	78.4%	77.7%	75.0%
Wall sockets	40.2%	41.2%	37.5%	41.7%
RCD/Safety switch	25.7%	22.5%	28.6%	25.8%
Fittings; e.g. lights	41.0%	41.2%	41.1%	40.9%
Meter	4.9%	2.9%	7.1%	4.5%
Other – please specify	11.0%	9.8%	11.6%	11.4%

3.6.5 Type of defective electrical installation

The most common type of domestic electrical installation fault is in wiring (77% of all defective work). The electricity meter appears to be the least frequent type of defective installation experienced (5% of all cases).

Electrician respondents and members of the public provided virtually identical proportions for what they believe are the most common electrical installation defects – around 40% concerning electrical wiring, 20% wall sockets, 10% RCDs, 15% fittings and lights, and meters only around 3%.

Figure 6: Types of Defective Electrical Installations



Base: 90 responses from public and 361 from electricians; Pye Tait Call for Evidence 2019

Evidence from the 38 electricians who selected the option “other” (not all gave an example) included the method and quality of installation (3), electric underfloor heating and other heating installations (3), electric shower units or parts thereof (6), of which two examples showed the failure to install RCDs and smoke alarms and detectors (4).

The frequency of wiring as the defective installation also corroborates qualitative feedback which argued that much of the problem is hidden in walls, floors, ceilings and behind fittings.

The quotes below are not meant to indicate the original cause – whether it was an electrical fault, faulty plumbing or some other issue - but make the point that they reflect the information sent to us that the problem is often ‘unseen’ until something triggers a problem.

I was asked to find the cause of lights that were constantly tripping, after inspection I found that an inadequate installation in the bathroom had caused a build-up of water and had been shorting the cables. This in turn caused the cables to burn up in to the ceiling of the house in to the loft.

Electrician, North Ayrshire

During a domestic installation of kitchen, the fitter wired the lights. Single wires came out of conduit and straight across floor joists they then terminated into an electrical joint box. When the customer walked on the upstairs floor the wires had shorted out and blew the fuse.

Electrician, Dumfries and Galloway

3.6.6 Costs of remedial work

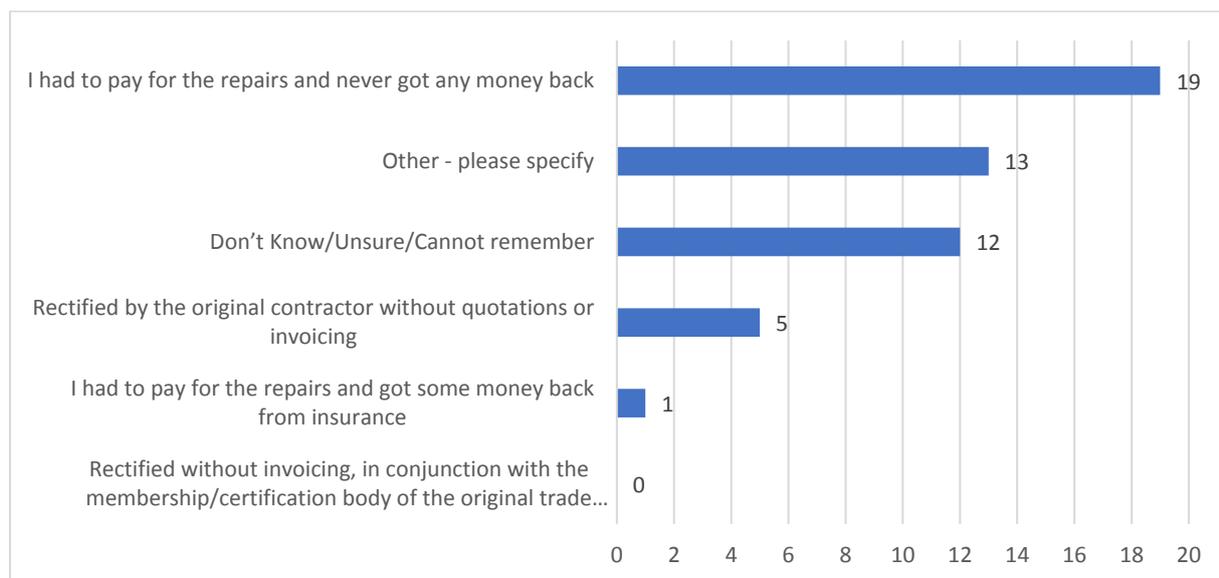
The average cost of the original installation work²⁶ varies from as little as £100 for work such as installing an additional wall socket, to a rewiring costing between £3,000 and £14,000 (for under floor wiring on a domestic council site). The average cost of work which was later found to be defective (as reported to the Call for Evidence) is £2,700.

The cost of remedial work to fix the defective electrical installation varies from £100 to £4,500 and averages £830.43. The smaller defective installations generally have a bigger mark-up rate due to the call-out cost. For example, a £14,000 project is likely to have salvageable products and some correct installations. Lower level issues can often have the opposite result with £100 for original work then costing £100 to rectify, or even more if there has been additional damage.

²⁶ This was drawn from data provided by the public and those who are stakeholders (i.e. not electricians). Electricians were not asked for this detail.

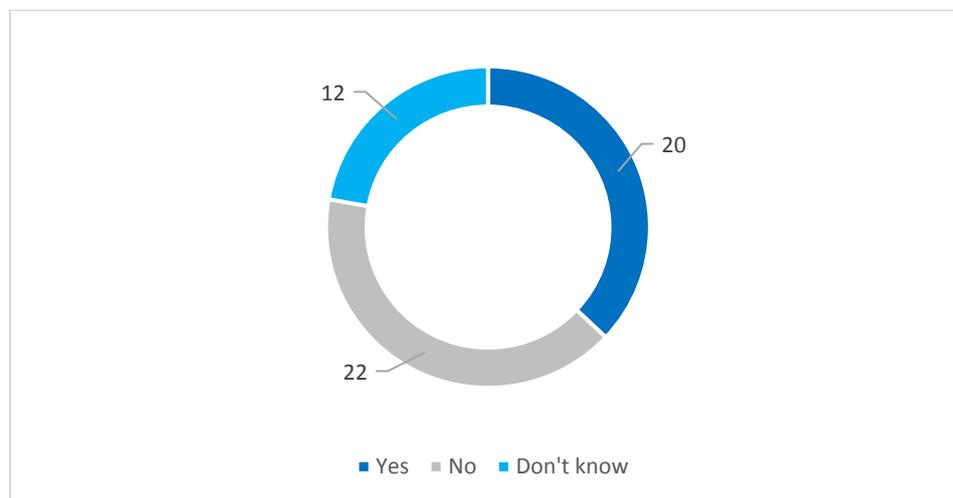
In three-fifths of cases, the cost of rectifying the defective installation is paid for by the customer, or their close acquaintances if they are unable to afford the repair, with only 10 being rectified by the original contractor (Figure 7). Only 20 (Figure 8) attempted to contact the original contractor.

Figure 7: How were the repair works paid for?



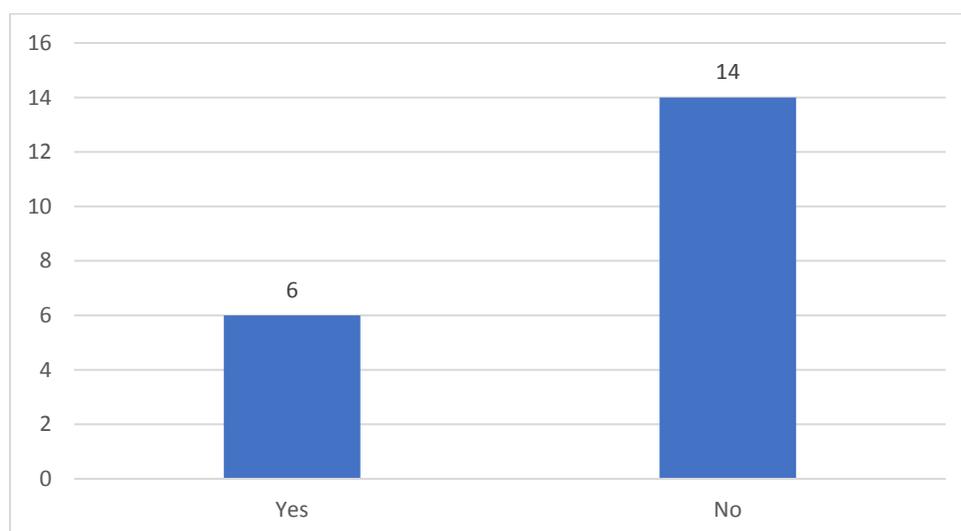
Base: 50 Respondents Pye Tait Call for Evidence 2019

Figure 8: Was the original electrician contacted?



Base: 54 Respondents Pye Tait Call for Evidence 2019

Figure 9: Did the original contractor put the work right?



Base: 20 Respondents Pye Tait Call for Evidence 2019

In cases where the original contractor did not rectify the defective installation those who could recall the incident reported turning to another electrician to rectify the defective work. Although the option for completion in the Call for Evidence was provided no-one reported engaging with a solicitor, CAS, Trading Standards or any trade, certification or registration body.

3.6.7 Awareness of the status regarding Electricians

Electricians formed the vast majority of respondents to this research rather than the public/consumers. This was not from want of publicity and effort. We recognise that electricians who take the time to respond to such a Call for Evidence are more likely than others to have experience of defective work and more likely to have strong views on the subject.

This is, perhaps, illustrated by the case of one electrician respondent who, to the question of how many defective installations they had seen in their 25-year career, wrote in 1,000,000 (well over 800 per week for twenty-five years). The answer was obviously a deliberate exaggeration, but it does exemplify the strength of feeling about the subject among some electricians²⁷.

It would be fair to say, we feel, that the skilled electricians responding to the Call for Evidence came from that section of the occupation which had had more than its fair share of defective installations to repair and, perhaps, more experience of the impacts of low-competence operatives.

²⁷ Our statistics had to exclude several other similar responses ranging from 100 to 500 defective installations per week over the course of an electrician's career.

As such they might have more cause to be sympathetic to the concept of increasing regulation and to any change which would protect their skilled capabilities from being simulated by lesser-skilled people.

In order to reduce the impact of this bias in the findings we have presented the following results after dividing the respondents into two broad groups: those with experience of defective installations and those without such exposure.

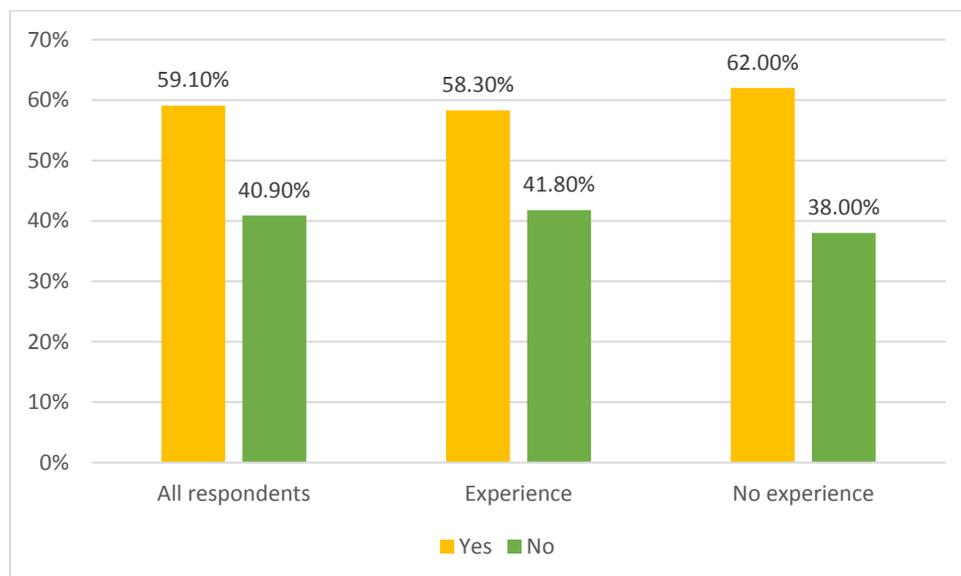
In almost all cases the difference of perception between those two groups is low or negligible.

One interesting finding of this research has been that relatively high proportions of people are unaware of the fact that one does not need a specific qualification or specified training in order to conduct electrical operations²⁸.

More than four in ten people – whether they have experienced defective installations or not – are not aware of this fact. Notably our findings include the fact that around 40% of electrician respondents to our survey are also not aware that specified education and training are not required to conduct electrical work. The equivalent figure for the general public is 58%. Well over half of the public might believe, therefore, that the title of electrician and a legal requirement for specific qualifications and training are *already* in place.

²⁸ It is to be noted that as set out on this webpage: <https://electricalqualifications.com/overseas-electricians/> the message to those considering practising in the UK, the preferred requirements are: an ECS card, the passing of the latest Wiring regulations exam, and the AM2 – the assessment of occupational competence. The ECS card (previously known as the JIB card) is not mandatory however despite it being “the sole ID and competence card scheme for electrotechnical operatives in the UK and (being) recognised and endorsed by the industry” – see here: <https://www.ecscard.org.uk/about-the-ecs>.

Figure 10: Awareness that electricians do not need formal electrical training to practise their trade (with or without experience of defective installations)



Base: 521 Pye Tait Call for Evidence 2019

The similarity of response rates between those **with and without experience of defective installations** is also reflected in the vast majority of respondents (89%) who believe that the current regulations are inadequate (Figure 11). More than nine in ten electricians and members of the public who have had experience of defective installations agree with the view that existing regulations are not adequate.

These majorities believing that current regulation is inadequate are repeated when the data are analysed by type of respondent – as in electrician and member of the public – with around 84% of both groups of the opinion that the existing situation is not sufficiently rigorous (Figure 12).

Figure 11: Adequacy of current regulations (by experience/no experience)?

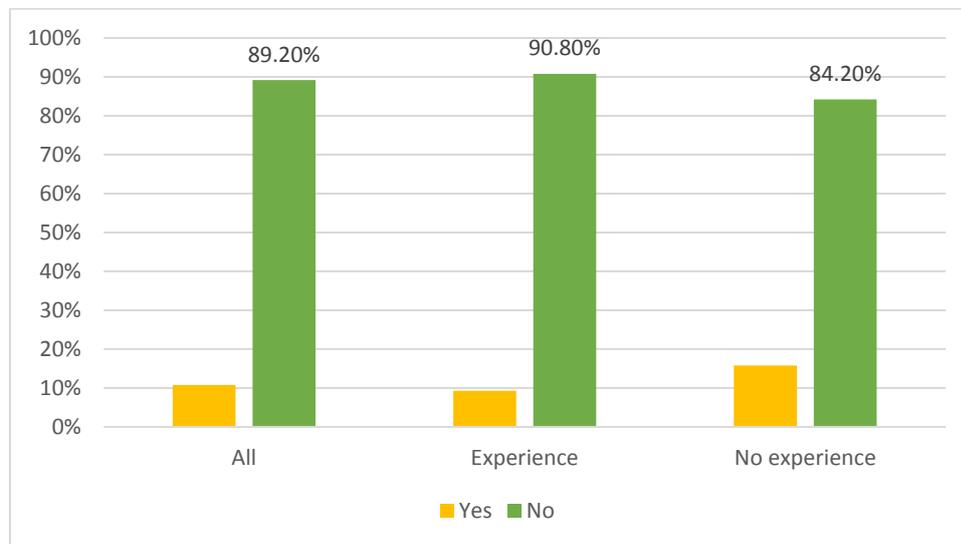
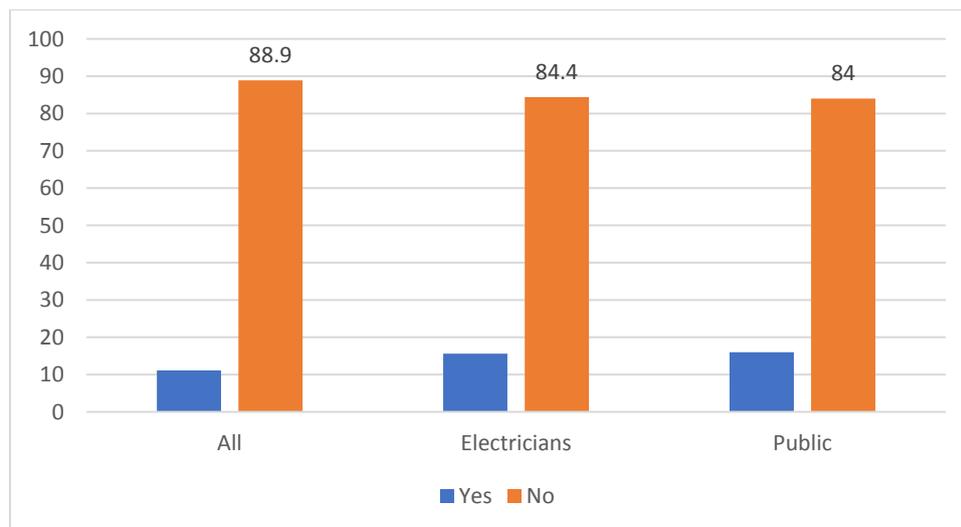


Figure 12: Adequacy of current regulations (by electricians/public)?



Base: 520 Pye Tait Call for Evidence 2019

The same pattern emerges when looking at whether people believe that the title of “electrician” should be protected by law. Over 90 per cent of both those with experience of defective installations and those without experience believe that the title should be protected. The weight of view between electricians and members of the public is almost exactly the same – over 90 per cent (Figures 13 and 14).

Figure 13: “Electrician” legally protected (Experience/No experience)

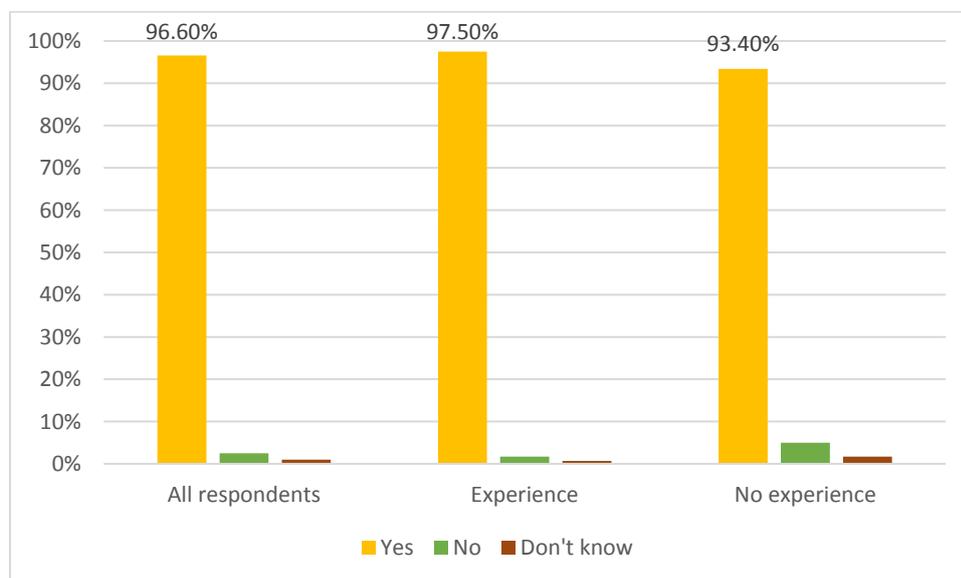
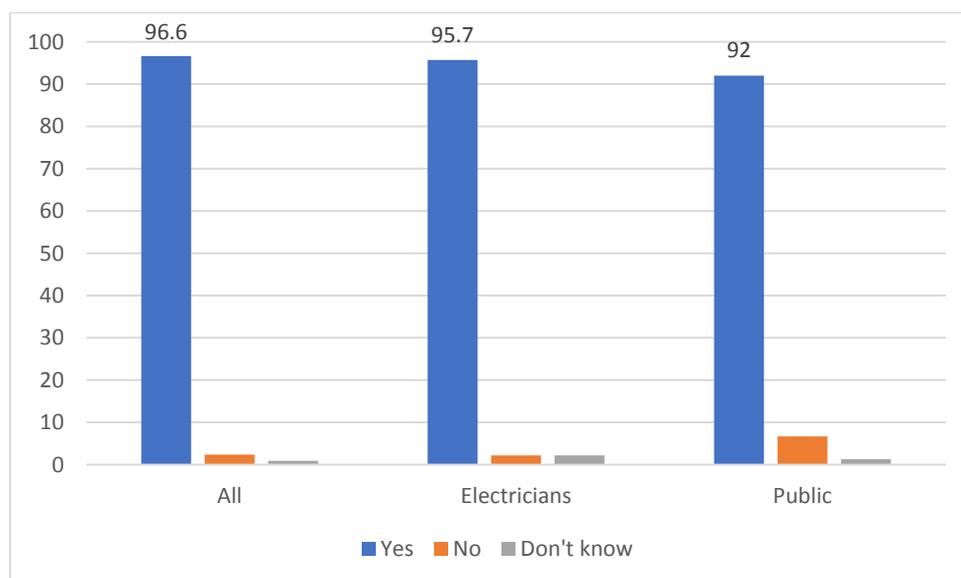


Figure 14: “Electrician” legally protected (Electricians/Public)



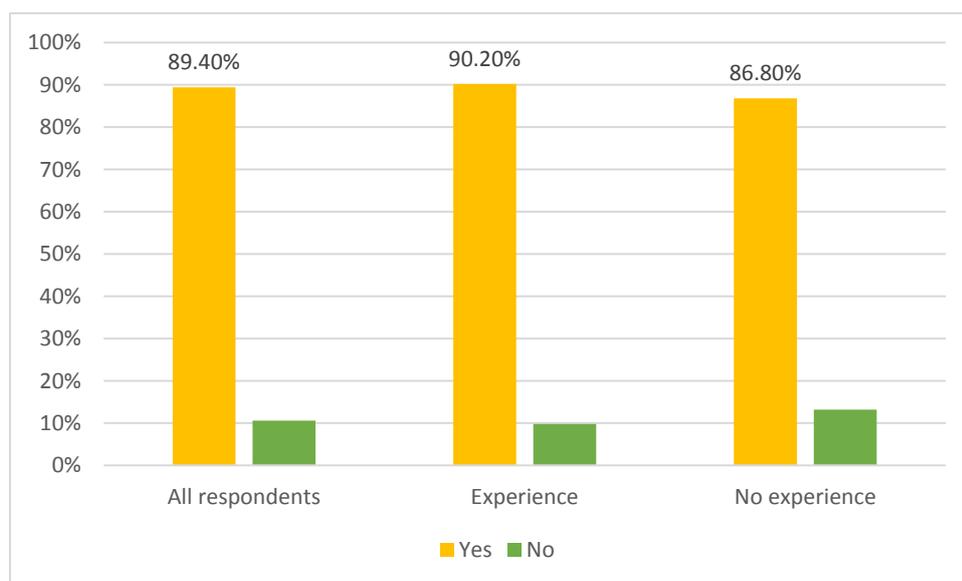
Base: 522 Pye Tait Call for Evidence 2019

Qualitative feedback from our interviewees suggests that regulation and protection is seen as having the potential to reduce the *amount* of defective installations by both qualified (64% agree) and unqualified electricians (91% agree). There is unanimous agreement, though, that such a situation would require legislative backing (that is, it would not work if made part of any voluntary approach).

A number of interviewees suggested that mirroring the GasSafe²⁹ register would be a suitable way of practically implementing a protection of title for electricians.

Similar – very strong – results emerged from the question concerning whether electricians should be required to keep up to date and be regularly tested for competence in the same way as GasSafe. As can be seen in Figure 15, very high proportions of both “experienced” groups believe that this should be implemented.

Figure 15: Regular testing of electricians on technical skills and knowledge

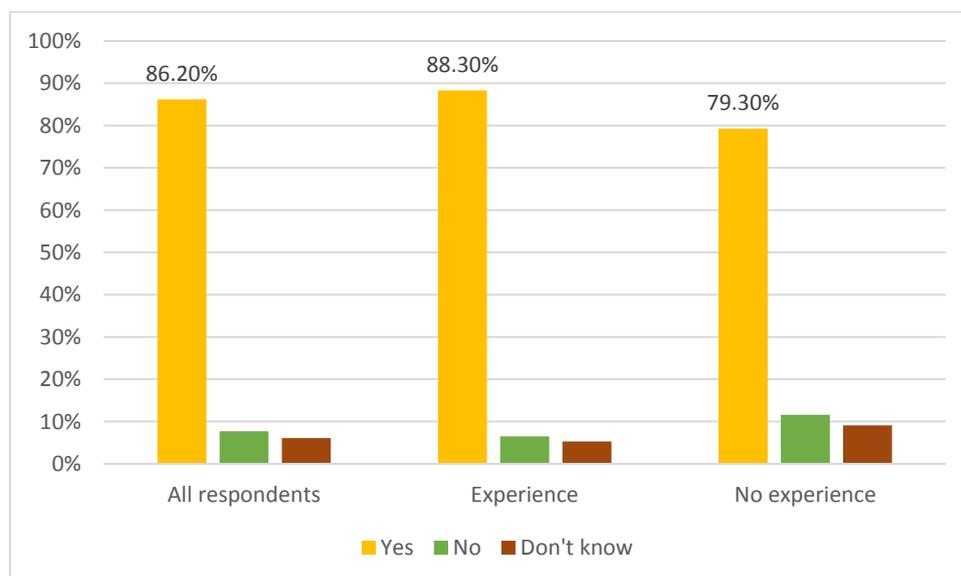


Base: 520 Pye Tait Call for Evidence 2019

High proportions also believe that a full occupational licensing system should be introduced.

²⁹ <https://www.gassaferegister.co.uk/>

Figure 16: Occupational licensing



Base: 521 responses Pye Tait Call for Evidence 2019

Licensing of certain occupations is a topic which has been examined in much detail over the past few years with supporters pointing to successful schemes from New York to South Australia, and the legal protection of occupational titles supported by qualification systems in Germany.

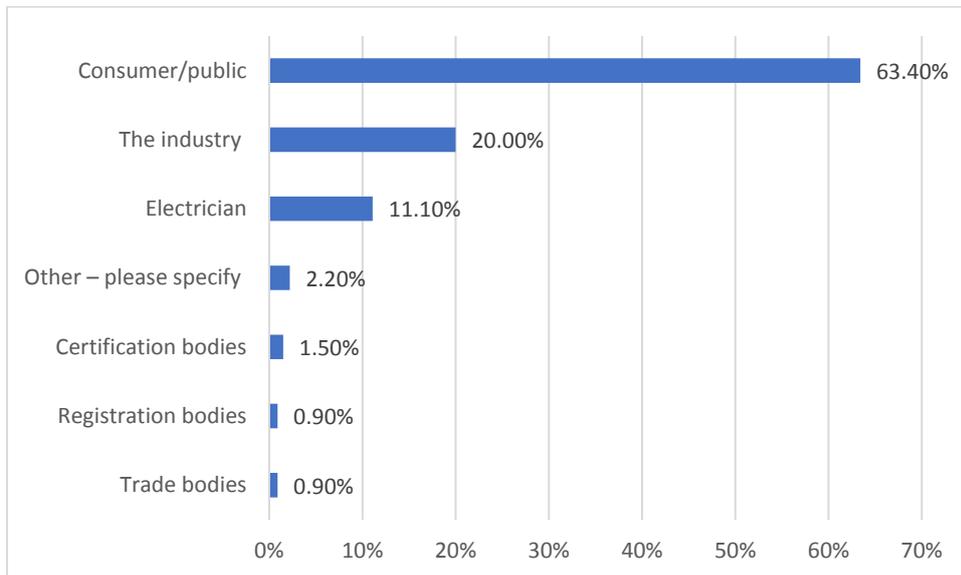
Interviewees for this research were generally in favour of licensing. High proportions of them argued that it would reduce the amount of defective installations by both qualified (67% agree) and unqualified electricians (100% agree).

Other recent research by Pye Tait for The Electrotechnical Skills Partnership (TESP)³⁰ in 2019 found that 66% of a sample of Scotland-based electrical companies would wish to introduce occupational (individual) licensing.

As might be expected, almost two thirds of respondents in the recent Call for Evidence argued that the general public would be the greatest beneficiary of any system of occupational licensing but a third felt that electricians and the industry would also benefit (Figure 17).

³⁰ <https://www.the-esp.org.uk/latest-news/over-12500-electricians-needed-for-new-technology-skills-demand/>

Figure 17: Beneficiaries of a system of occupational licensing



Base: 521 responses Pye Tait Call for Evidence 2019

When asked to consider other alternatives approaches to resolve the problem of defective installations most suggested that raising awareness and educating the public was an important need to reduce the problem in domestic settings across Scotland.

4. Risk from Defective Electrical Installations

4.1 Risk Assessment

We have adopted a four-stage risk assessment³¹ that requires the following steps:

1. Identifying the hazard (and its scope)
2. Deciding who or what is at risk
3. Assessing the risk
4. Recommending action

If necessary, a fifth stage could be added in future research to review the risk against previous data (i.e. this report).

All risk assessments have their limitations. This one does not deal with individual cases of defective electrical installations. Neither does it address the type of domestic location or all potential risks. Instead it looks broadly at defective electrical installations in domestic settings across Scotland.

4.2 The hazard/scope

The scope of the research focuses on electrical installations in Scotland. This was refined during project scoping discussions and interviews and a development webinar to target domestic settings only (i.e. excluding all electrical installations in commercial, industrial or agricultural settings).

The hazard was further refined to exclude defective wiring and components in electrical appliances and components which could not be adapted or rewired by the installing electrician.

The hazard was therefore, as stated above, defined as being defective electrical installations and the scope limited to domestic settings in Scotland.

4.3 Who/what is at risk

The second stage of the assessment was to develop an agreed list of potential areas of risk from defective electrical installations in domestic settings in Scotland and to include them in the question set for the Call for Evidence. These are:

- Risk to life
- Risk of electrical shock or electrical burns to a person

³¹ Based on the Health and Safety Executive risk assessment process - <http://www.hse.gov.uk/risk/controlling-risks.htm>

- Risk of fire/overheating
- Risk of damage to other appliances
- Risk of a short circuit
- Risk of no power to the circuit

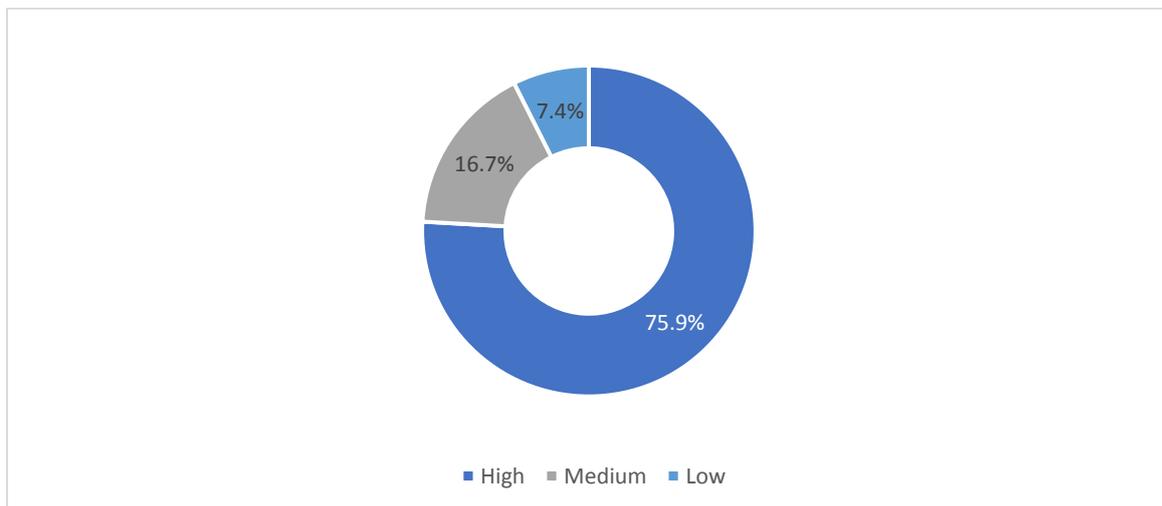
The aim was then to use the Call for Evidence to determine if there are other significant data that should be collected for inclusion in the analysis, as well as to undertake an initial data collection on risk and harm.

In the Call for Evidence, non-electrician respondents were asked to rate the risk to human safety of the defective installation and explain their answer.

The aim of this was to determine uninformed perceptions of the gravest possible outcomes and in doing so it was established that over three quarters (76%) of the 54 respondents felt there to be a high risk to human safety from defective installations (Figure 18).

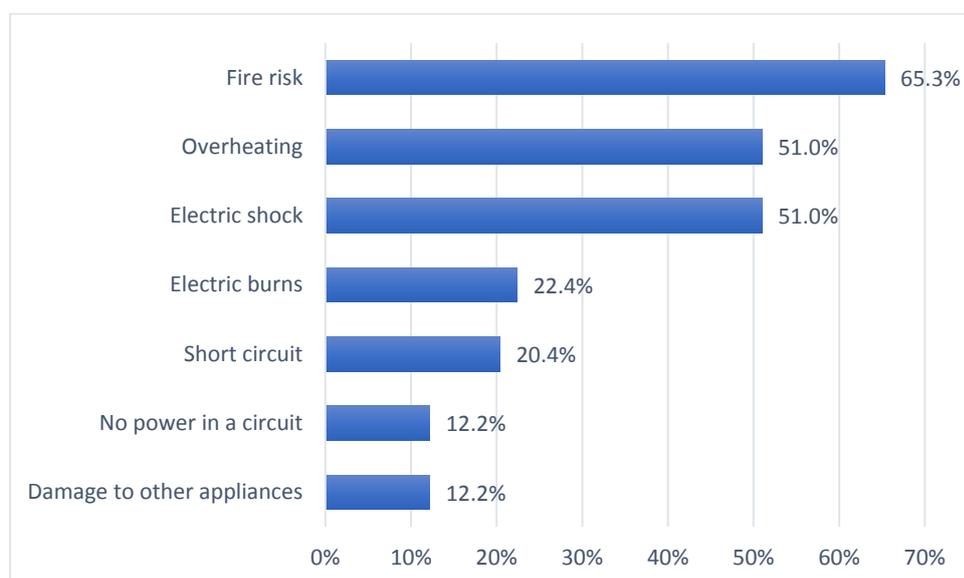
The three key reasons provided for a high rating are fire (26% of all reasons provided), poor quality work (15%), and the risk of death (14%). Fire also scored in the top two reasons provided for medium rating along with hidden problems, for example in cavity walls, with the suggestion that hidden problems could have been rated as high if exposed.

Figure 18: Public perceptions of the degree of risk to human safety



Base: 54 Pye Tait Call for Evidence 2019

Figure 19: Perceived Risk



Base: 123 responses Pye Tait Call for Evidence 2019

4.4 Assessing the risks

When considering risk one has to distinguish between perceived and actual risk. Human beings naturally tend to perceive risks as high in a number of areas where, in reality, it is not. A good example of this is air travel where a series of polls over the years have demonstrated relatively high risk perceptions among the general public. This, in spite of a steady flow of highly reliable statistics showing that it is the safest form of transport.

Similarly, a panel of thirteen expert stakeholders who we interviewed on risk gave us high averages of risk for almost all possible results of electrical defects – see Table 6. Risk to appliances came top and risk to life lowest (but still almost two out of three).

We can be sure that any electrical defect as defined in this study will carry one or more of these risks but the actual risk cannot be known in a Scotland-wide sense because we have no data on the actual impact of the narrow range of electrical faults under consideration (i.e. not appliance malfunction or short-circuit) – with the exception of fire.

Even were we to manage to get hold of statistics on hospital admissions for burns and shock it is extremely doubtful that the data would distinguish those patients reporting due to electrical supply and lighting faults as opposed to burns and shock due to a faulty hairdryer, tumble-dryer, cooker, etc.

Table 6: Expert Perception of Risk³²

Risk Description Risk of ...	Risk Rating (Number of Respondents)			
	High	Medium	Low	Score
Damage to appliances	6	4	0	2.60
Electrical circuit overheating	7	3	1	2.55
Short circuit	8	3	1	2.58
No power to the circuit	3	3	4	1.90
Fire	6	3	3	2.25
Electrical burns or shock to a person	6	6	0	2.50
Loss of human life	3	1	4	1.88

Expert view (13 respondents)

The collection of data during this research has indicated that non-electrician respondents perceive there to be a high risk to human safety from defective installations in domestic settings across Scotland.

The average Scottish consumer clearly is at much greater risk from death in a car accident than from a fatal fire caused by a defective electrical installation but the *perception* of risk is nevertheless high.

Another aspect that needs to be considered is the unknown risks. Some defective installations are hidden beneath floor or in cavity walls and therefore the full extent of the problem and risk cannot be determined. Some defective installation may have met regulatory standards at the time of their installation, however on discovery are defective or unsafe when considered against current regulations. Many halogen light fittings for example were installed a few decades ago under very different regulations. We have heard of examples of such fittings which were discovered to be burning floor beams but which, at the time of installation, had been correctly fitted.

³² 13 respondents, not all provided a view, those that are not totalling 13 are where respondents did not provide a response.

There are also likely to be individuals that have faced issues of small scale, low cost defective electrical installation who are put off reporting them and seeking a resolution due to the perceived hassle involved and risk of additional costs. For example, some might deem it easier to pay £100 to fix a defective wall socket than to seek out the electrical contractor to fix their defective work, seek legal advice that might cost more than the work, or spend a day chasing down evidence that results in the loss of pay.

5. Assessment of the Evidence

5.1 Causes of fire accidents

1. In 2017-18, accidental fires caused by electrical supply and lighting totalled 413, just under 9% of the total of 4,700 dwelling fires considered accidental. The statistics do not permit us to know what exact deaths and injuries resulted from these fires but, if we could assume that the numbers were proportionate, accidental electrical fires might have been responsible in 2017-18 for 4 deaths and around 100 injuries in Scotland.
2. This compares with 3,466 accidental domestic fires caused by appliances in the home. Proportionately this equates to around 33 deaths and 824 injuries.
3. The statistics do not reveal the importance of human factors in causing accidental fires. Thus, there is no way of correlating accidental electrical fires with the quality of electrical installation work carried out, or the age of the wiring or fittings. Neither do they provide any indication of the persons responsible for the installations or any indication of the division between unqualified people – whether unqualified electricians offering their services for hire or unqualified householders undertaking their own work – and qualified electricians (such details are not currently requested on SFRS fire report forms).
4. Consequently, our research has been able to reveal no indication from official or unofficial statistics that such incidents are *caused* by a lack of qualification, training or up-to-date-ness of the person carrying out the electrical installation.
5. Risks from defective electrical installations are to property, equipment and people and they can be quantified by looking at the numbers of fires caused by electrical supply and lighting.

The 400 plus accidental fires per year in Scotland caused by faulty electrical supply and lighting might, assuming each fire occurs in a separate dwelling, involve some 1,000 people and might cause up to four fatalities and 100 injuries.

5.2 Electricians and Memberships

6. There is a minimum of around 13,000 “qualified” electricians in Scotland (based on a combination of SJIB registrant and apprentice data). We can also estimate a minimum of around 22,000 people in total working as electricians across the nation. What is impossible to estimate is the number of people outside SOC Code 5241 who may work on domestic electrical installations. The fact that 60% of electricians in Scotland are registered with the SJIB does not necessarily mean that 60% of all Scotland-based electricians are qualified

and 40% unqualified. SJIB registration is voluntary. Neither does the fact that we can estimate 22,000 electricians from SOC Code 5241 mean that that total is an adequate representation of the number of people in Scotland who carry out electrical work. Even ignoring DIY householders there will be a reasonably large number of kitchen and bathroom fitters, plumbers and other trades who might turn their hand to electrical work.

7. To make things even more interesting there is the further fact that a number of these other trades-people may be “qualified” electricians who classify their job role as other than ‘SOC code 5241’ electricians. Some of them may be qualified, but not working in their main role as an electrician, some will be unqualified. However, those totals are impossible to estimate without detailed further research.

5.3 Scale of faulty work

8. In the Call for Evidence, 343 electricians reported having to address faulty work during their careers. Using the modal figure of 10 faulty installations fixed per electrician, the total number of defective installations would be around 3,450. For the modal 30-year career this would imply around 114 per year or just under 0.3 defective installations per year per electrician.
9. If we scale this up by the SOC code figure of c.22,000³³ electricians in Scotland it results in a very conservative total of around 7,260 remedial operations on defective domestic installations per year in Scotland. Note that this is not the total of defective installation – because we have no way of estimating that figure – but the number of times another electrician has to actually fix a defective installation.
10. There is no way of understanding what the total number of electrical installations (or amendments) there might be in Scotland each year (the definition of “an installation” is crucial), but we can make a rough estimate based on a number of assumptions. We could conservatively assume that each electrician completes perhaps three installations per week; a total of possibly around 3,168,000 “installations” per year in Scotland (some will take a matter of minutes, while others will take much longer).
11. To that we can add a small proportion of the numbers of householders to represent DIY installations. We might sensibly assume that ten households per hundred will undertake a single instance of some form of DIY electrical installation or repair each year – 10% of Scotland’s 2.4m households). Furthermore, we might add 0.1% of households having electrical work done by kitchen fitters and other non-electrician operatives.

³³ As stated earlier, we estimate there to be roughly 22,000 electricians in Scotland and 2.4m households (National Records of Scotland, 2016)

The calculation would therefore result in, per year:

- Installations completed by electricians: c3.168m
- Installations and amendments carried out by DIY householders: 240,000
- Installations and amendments carried out by non-electrician trades-people: 2,400

Total c3,40,000 electrical installations or repairs across Scotland each year.

12. The 7,260 defective installations therefore represent 0.2% of this total number of electrical “installations” - around two in every thousand original installations (a “defect ratio” of 1:500). One also has to take into account that an “installation/repair/amendment” may, in reality, involve a number of separate sub-installations and components of which only one may later prove defective. If the average number of steps or sub-installations per installation is as low as three, the defect ration would drop to 1:1500.
13. Each case will, of course, vary in scope, scale and risk and we discussed an indicative risk assessment for defective electrical installations in the domestic setting in section 4.
14. However, taking the average cost of repairing a defect as £850 (as revealed by the survey conducted for this research), the total annual cost to Scottish consumers of remedying electrical defects might be around £6.2m (£850 x 7,260 defective installations). This is not the cost of the possible consequences of some of the defects (e.g. fire) but we have only a limited means of calculating those costs. We saw, earlier that there were some 413 accidental electrical fires in 2017-18 caused by faulty electrical supply or by defective lighting. There is no way of arriving at an average cost per fire through official statistics but even a rough average of (say) £5,000 per fire (not including the use of the emergency services etc – see below) would lead to a possible cost to Scottish insurers of a further £2m.
15. There is, in addition, the costs to the Scottish economy of fighting fires resulting from defective electrical installations. The evidence shows around 400 such fires per year and each represents a cost to the SFRS. If each call out and firefighting exercise could be averaged at (say) £10,000 in costs the overall annual cost would be another £4m.

16. Insurance companies would probably value a life at a multiple of probable remaining years of life times an average of likely salary or earning power over those years. We cannot calculate this accurately without knowing exact details of the fatalities. But a rough estimate might value the four electrical fire deaths at perhaps twenty-years times average annual income – a cost per life of a minimum of £600,000. Four deaths from defective electrical in 2017-18 therefore cost a minimum of £2.4m and injuries probably added another £500,000 due to NHS and personal costs.

17. Risk is very much in the eye of the beholder, especially where members of the public are concerned, but we have shown that there are quantifiable consequences from defective installations which might be summarised as:

- Around £12m in financial costs to consumers and insurance companies per year.
- Up to four people's lives each year.
- Up to around 100 injured people each year.

Total annual costs of defective electrical supply and lighting could, therefore, be estimated at some £15m plus the unquantifiable, non-fatal, non-injury human costs.

5.4 Summary

This research has demonstrated a call for further regulation of electricians, the legal protection of the title of electrician, regular updating of skills and knowledge and, possibly, occupational licensing.

It is very apparent that there is a lack of awareness in the most important groups – the public and electricians themselves – that electricians do not need to have undergone any formal electrical training to practise their trade.

Over half of the general public might be unaware of the ability for someone to call themselves an electrician, even without qualification or competence. This, alone, might prove to be a powerful driver behind poor decision-making when employing an electrician in a domestic setting.

The overall aim of this research has been to acquire and critically examine the evidence surrounding poor or dangerous electrical work, and to provide the Scottish Government, where feasible, with a strategy or options to reduce any risks posed by such work. This translates into the following bulleted objectives each of which is annotated with a summary of our findings.

- **Evaluate existing evidence and methodologies**

Most of the existing evidence is directed at broad statistics for occupational groups and fire variables. It does not help us to understand how, why and by whom defective installations are conducted.

There could be argued to be a pressing need for further evidence on such questions as – who, exactly, is installing defective electrical supply and lighting? How old are such installations and to what extent is changing wiring regulations responsible for apparent “defective” installations today (i.e. could the installation have been compliant with regulations when originally installed)? To what extent are householders themselves at fault, and so on.

There would also seem to be a need for further evidence as to the amount and type of electrical installation work being undertaken by householders. A properly-designed survey could provide a good estimate of this and might be worthwhile as poor DIY can cause fires and injure people through shock just as readily as faulty work by unqualified or qualified electricians.

Further evidence may well be desirable but the findings from this research would seem to indicate a need for action in the short-term rather than immediate further research.

- **Identify where additional research is required and undertake research to:**
 - ***profile the number of electricians belonging to recognised trade bodies or holding recognised qualifications or registration;***

We know that there are at least 22,000 self-assigned “electricians” in Scotland in the national statistics of the Standard Occupational Code (SOC). We also know that there are around 13,000 qualified (or near-qualified) electricians registered with the SJIB. As other trade bodies engage with companies rather than individuals, this is the most reliable indication of qualified numbers.

However, these findings do not mean that the other 9,000 plus are necessarily unqualified.

- ***quantify the number of tradespeople operating without demonstrable proof of competence;***

This objective has proved to be impossible to answer. If proof of competence is restricted to qualifications (rather than simply membership of a trade body or competence gained through experience) we know only that there are two groups of people whose qualifications we cannot be certain of: the 9,000 or so SOC electricians who are not registered with the SJIB, plus the unknown quantity of people undertaking electrical work whose main trade is not electrical (e.g. gas

installers, kitchen fitters, plumbers, and handymen). The number of the latter undertaking electrical work could be reasonably high, but without detailed further research it is impossible to even estimate.

These might constitute the potential pool of “tradespeople” undertaking electrical work without relevant qualifications, but we must also remember that householders, themselves, are able to conduct their own electrical work (unlike in Canada where this is prohibited in most Provinces). What quantities of householders do their own work, what volume, and to what level of complexity is as yet unknown but there are 2.4m dwellings in Scotland and, just because a householder tells the electrician that another electrician installed a defective fitting, does not mean that they are being entirely forthright.

- ***provide evidence of any dangerous installations carried out by unqualified electricians;***

This research has estimated that there may be over 7,000 defective installations repaired each year in Scotland, but it has been impossible to ascertain whether those installations were old or recent, whether they were conducted by qualified or unqualified electricians, and perhaps most importantly, whether the qualified electricians were entirely up-to-date in their trade.

Official records do not, as things stand, require details of such variables as age of fitting, person who undertook the job, qualifications (if any) of that person, or the degree to which they were up-to-date in electrical regulations.

- ***provide evidence of any harm caused by dangerous installations;***

We have shown that (while there may be a slight exaggeration in the statistical approximation) there may be up to four deaths and 100 injuries per year caused by accidental fires due to electrical supply and fitting faults³⁴. There may, additionally, be injuries and possibly even deaths associated with faulty fittings due to electrical shock. Official health statistics record the incidence of electric shock but they do not distinguish between shock caused by faulty fittings and shock caused by such things as misuse of appliances, faulty/worn appliances, accidental shock due to placing implements in electrical sockets, and so on. Even were these details recorded it would be impossible to know to what extent the faulty fittings were installed by qualified or unqualified people.

Costs to the householders and damage to property may total around £12m at conservative estimates (plus the costs of deaths and injuries).

³⁴ These totals are proportionate estimates and there is no evidence that such a basis for estimation is necessarily justified. It assumes that defective installations are proportionately as dangerous as other causes of death in fires in Scotland – appliances, deliberate setting of fires, etc. – and that we can assume that roughly 8% of deaths and injuries due to fire (44 deaths) are due to electrical supply and lighting defects.

There is also however no way of understanding the proportion of this harm and damage caused by qualified electricians making mistakes or not being up-to-date, and that caused accidentally by incompetent, unqualified people.

- **Undertake a risk assessment based on the evidence identified.**

In comparison to other risks to the Scottish public, those from defective electrical supply and fittings are quite low. The dangers of electrical fires from misused or faulty appliances (cookers, hair-dryers, fires, etc.) are far higher.

The cost to the Scottish economy each year from defective electrical supply and light fittings is likely to be at least £15m, not to mention the human costs in lives lost, injuries sustained and lives disrupted.

It is essentially a value-judgment as to whether it warrants increased regulation.

- **Develop a business case examining options for change and the feasibility of the options.**

See the following section.

6. Business case

The options for the future include the following. Each has been briefly described and associated with a set of pros and cons.

6.1 Do nothing

Pros – do nothing

- No implementation cost
- No further action required of the Scottish Government

Cons – do nothing

- Fails to improve public knowledge around the regulation of electricians
- Creates continued opportunities for poor workmanship and 'rogue trader' to operate
- Does not address the costs to the public and the Scottish government of defective installations
- Does not address the issue of a need for CPD for qualified electricians

6.2 Awareness Campaign

There is a desire amongst the EWG, the Scottish Government and the general public to raise awareness of the qualifications necessary and the need for competence in electricians.

Over two fifths (41%) of all respondents to this research are unaware that electricians do not need to have undergone any formal electrical training to practise their trade.

The viability of this option would depend on an extremely effective and long-running marketing strategy through multiple avenues. It would also need to clarify the difference or links between qualifications/approved routes or pathways and competence. This would also warrant a clear statement surrounding the definition of competence (does it mean 'approved' qualifications taken at any point in the past for instance, and what about regular assessments of competence?). An awareness campaign would need to be started, and maintained, regardless if this or any of the other options (below) are instituted.

Pros of an awareness campaign

- Will improve public awareness - enabling informed decisions when hiring electricians
- May reduce the opportunities for 'rogue traders' and for poor workmanship
- Has the potential to improve the status of electricians

Cons of an awareness campaign

- Does not prevent unqualified operations
- There is no guarantee all members of the public will become aware. Experience shows that such campaigns are extremely expensive if they seek to be effective.
- Does not address the issue of a need for CPD for qualified electricians

For the remaining options, the pro and cons listed below in section 6.3 would be carried over into 6.4 and 6.5. It is also noted that all of these options/activities will take time to develop and embed.

6.3 Protect Title

There is clearly a desire amongst respondents to this research (although mainly electricians) for the legal protection of the title of electrician.

It would require a pathway to support those electricians, who are competent but not qualified, through the required steps. It would require clarity around the scope of work (i.e. only domestic, or all industrial, commercial and domestic). A phased approach to implementation would be beneficial.

There would need to be legislative change establishing certain criteria including on prescribing qualifications and the competences therein, and an organisation would need to be charged with ensuring implementation and management of the database. The funding for the system would probably be possible through registration and annual retention fees. This organisation would to all intents and purposes act as a 'regulator' whose role is to enforce the register. It is usually advocated that an independent organisation holds this role. Another consideration is a professional or similar body, but independence and impartiality of the statutory organisation is often favoured rather than run the risk of the regulatory function being regarded as potentially being unduly influenced by the self-interest of the profession itself.

Pros – protection of title

- Protection of the public and the sector (as only qualified and competent electricians are operating under that title);
- Would reassure the public by instituting re-training/re-registration at regular intervals as per the Gas Safe programme;
- Promotes Scotland as leading the UK;
- Removes space for ‘rogue traders’ and low standards (as long as the systems of registration, access to information by the public, and enforcement via removal/fitness to practice is adequate);
- Would enhance the profession itself - only those who can prove their right to protection of title through completing prescribed qualifications, and demonstrating their knowledge and skills, can call themselves an electrician. This would add to the respect due to such an important and safety critical profession.

Cons – protection of title

- Will increase costs for individual electricians (but electricians ultimately and consumers will gain from the protection) but see point 6.6;
- Will involve additional costs for registration, databasing and websites, investigating complaints (legal costs), fitness to practice hearings, etc.;
- There is still no assurance that unqualified personnel will not continue to undertake electrical installations under a wide variety of different titles – including all those currently under suspicion, such as bathroom and kitchen fitters, handymen, etc³⁵;
- It would not necessarily reduce or prevent confusion among the public when presented with the logos of trade bodies, etc. and a key purpose should be in giving consumers confidence that when they use an electrician, that person is suitably qualified and competent;
- There would be costs required to institute the necessary system of re-assessment of skills and competence to provide public confidence in the title;
- If instituted within Scotland alone, there would need to be considerable cost and effort in checking individuals to ensure that those working in Scotland under the auspices of other nations’ companies have also earned the right to be called an ‘electrician’;
- Unless associated with a requirement for regular re-testing and up-dating it would not necessarily reduce the amount of defective work being conducted by qualified and registered electricians – although if this emerges there could be a route to address such an event through complaints

³⁵ whilst this can also be said of GasSafe, that scheme is a more comprehensive system than simply protection of title and potentially more widely understood by consumers as a result.

- Would require a database to be accessible (on the internet) and constantly updated in order to ensure total public confidence as just protection of title will not prevent other trades from conducting electrical work. All it will do is prevent them from claiming to be electricians.

6.4 Licensing of Electrical Firms

Registration is, de facto, a licence-to-practise for individuals (protected by rules requiring up-dating and re-testing as under GasSafe).

It must be remembered, however, that domestic consumers often contract with a company and would wish to be assured that the firm is permitted to operate as an electrical contractor. Checking the registrations of individual electricians might be seen as an arduous prospect – especially where a company might use several different members of staff on a single job – whereas checking a single firm which is licensed to employ only suitably qualified electricians and can be penalised for shoddy work might appear to be preferable.

Firms would need to be insured or bonded to cover costs of repair and restitution. All businesses claiming to carry out electrical installation work would need to be registered. Whilst this option is regarded by the EWG as a task for the UK Government, it has been, nevertheless, discussed below.

Pros – licensed electrical firms

- Provides reassurance to the public;
- Is perhaps slightly less onerous for the public if licensing is “per company”;
- Might serve to reduce the costs of defective installations;
- Would reduce or eliminate the incidence of low-cost competition for registered electricians from unqualified and rogue traders;
- Scottish Government already operates such a scheme – The Approved Certifier of Construction scheme – which could *potentially* be built upon and making it mandatory to join for all electrical contracting firms.

Cons – licensed electrical firms

- Costs to design and implement (requiring clear means of when a business is no longer fit to practice – due to Director bankruptcy etc);
- Would require web search databases to be kept up to date constantly;
- Would require a system of bonds or other financial penalties;
- Would require a system of investigation, discipline and appeal.

6.5 Licensing of Firms and Individual Registration

The final option would be a comprehensive system of registration and licensing for electrical firms, and registration for individuals under the “protected title” rules which include re-testing and re-registration.

Pros – licensing and individual registration

- Provides considerable reassurance to the public
- Will serve to reduce the costs of defective installations
- Would eliminate the incidence of low-cost competition for licensed companies and registered electricians from unqualified and rogue traders
- Would institute regular competence re-testing for electricians to ensure ongoing competence throughout an electrician’s working life

Cons - licensing and individual registration

- Would require legislation to protect title and to require licensing of electrical companies;
- Would require web search databases to be kept up to date constantly – but a single holder of the register/regulator³⁶ would be relatively easy for the public to remember and access all necessary information
- Would require a system of bonds or other financial penalties
- Would require a system of discipline and appeal

6.6 Business Case

The Scottish Government has a threefold overall set of strategic objectives of

- protecting consumers
- protecting scrupulous traders and creating an inhospitable environment for miscreants
- maintaining an environment that allows competition to thrive within the provision of electrical services.

The fundamental question – and the one set by the Scottish Government as a prime criterion for any recommendation from this report – is proportionality. What would be a proportionate response to the problems of defective installations of electrical supply and lighting?

³⁶ Clearly a choice will need to be made between a series of competing providers/registration bodies which feed into a common database and a single overarching authority. That is a policy decision and not within the remit of this research. There will be advantages and disadvantages to both.

The problem appears to centre around

- 400 accidental domestic fires per year – possibly four deaths and around 100 injuries.
- whether caused by qualified or unqualified personnel, the overall cost to the economy is likely to be at least £15m per year. If left un-addressed the problem will mount up in financial terms - £75m over five years and possibly twenty deaths; £150m over ten years and potentially forty deaths.

The effectiveness of five options in reducing or eliminating these impacts have been discussed above. The authors believe that:

- Protecting title might go a long towards helping, but in of itself would do little to prevent unqualified people using different titles to do electrical work.
- Protecting the title, requiring updating and re-registration could improve or maintain the competence of practising electricians but would, again, not resolve the issues of untrained, unqualified people undertaking electrical work.

Our research, albeit based on a limited set of data focussed purely in Scotland (and some consideration of other models elsewhere) has shown relatively significant costs and consequences from defective installations.

Again, acknowledging the research is limited in scope and coverage, this research has also demonstrated a significant belief among members of the public and electricians that there would be considerable benefits from regulation, and possibly licensing of electricians and their companies.

The annual ongoing cost (as outlined above) to the Scottish economy of defective electrical installations would seem to support a case for:

- statutory protection of title AND a comprehensive registration and licensing scheme involving elements such as an independent body to act as regulator and enforcer of requirements. Such a scheme would require individuals to prove possession of specified qualifications and completion of regular competence/knowledge tests as an essential part of any system of assuring competence in electricians, thus
 - individuals would undergo periodic retesting and re-registration, and
 - companies be licensed to undertake domestic electrical work against bonded or insurance-backed financial protection.

This research, while being unable to identify those who conduct defective electrical installations (i.e. as it seems it could be due to qualified and unqualified electricians as well as the general public) has shown at least 7,000 such installations occurring per year and a significant desire on the part of the public for reassurance that the electrician they appoint is fully competent.

Hence the recommendation is for all four options to take place: an awareness campaign supporting the protection of title, setting up a register that can be viewed by the public along with the licensing of firms and individual registration – in effect the whole bundle.

The main argument against a licensing/registration approach would be that it might not avoid ALL fires due to defective electricians. There would always be some caused by the general public and DIY (unless such work was outlawed) and there will always be accidents and omissions by qualified and licensed people.

But even if the action only cut incidence by half, the savings to the economy would be significant – around £7m per year, two people's lives saved every year and fifty cases of injury (with associated NHS costs) as well as clarity around and respect for the title of 'electrician'.

Registration fees of individuals at (say) £50 each per year would raise £1.1m per year and a licensing fee of £250-£500 per company would raise a further £1m to £2m per year. This income would be more than sufficient to make the licensing and registration system fully self-sustaining even allowing for free access to the database by the general public. Costs to the business or impact on the consumer has not been calculated.

The first case study in Appendix 2 provides some appreciation of the costs and benefits. The Security Industry Authority has very similar objectives of protecting the public and runs a mandatory individual licence system and a voluntary Business Standards scheme.

The costs of each option presented in section 6 'Business Case' have not been estimated at this stage but we would estimate the initial costs of the most expensive approach to be around £2m to £5m over two to three years. Against the five-year cost of defective installations to the Scottish economy of around £75m (five years), and the continued benefits for years to come, there would seem to be a reasonable business case for action.

Fundamentally, electrical work is a safety-critical profession, and this alone seems to justify statutory protection as a minimum.

Appendix 1 – Promotion of the Call for Evidence

In the first instance, this meant successfully inviting Electrical Safety First via Twitter to share a related tweet with their 19,100 followers. A second twitter invite was sent to Citizens Advice Scotland who sent the link on via their Twitter Channel.

Furthermore, four Facebook posts and two paid Facebook campaigns - the first running from 30th Jan - 6th Feb 2019, which targeted homeowners and people with interest in home improvement or electrical work/electricians aged 30-65+ reached 10,170 Facebook users in Scotland.

This was followed by a second Facebook campaign from 12th Feb – 15th Feb 2019 targeting the same age group to achieve a final boost, which reached another 9,945 users in Scotland. In addition, four posts inviting the general public were published on LinkedIn and a twitter campaign was launched aiming to reach members of the public which complemented the efforts of the above stakeholders in attracting interest from the general public.

In this context, the Scottish Fire & Rescue service and the Scottish Electrical Charitable Training Trust as well as online platforms of residential dwellers such as OpenRent, The Tenants Voice, Property Tribes (re-tweeted to 17,500 followers) and LandlordZone were targeted, with the aim to have these platforms promote the Call for Evidence by re-tweeting the initial Pye Tait message. This approach was also taken to engage with circa six local authorities in Scotland and which were cascade through their networks, all of which reflected the Scotland-wide scope of the Call for Evidence.

Other tweets targeted trade websites, such as Checkatrade, with 14,200 followers (re-tweeted) and DIY forums such as DIYNot and Ultimatehandyman as well as In addition, profiles were created in related online forums such as ElectriciansForums, DIYNot Electrics forum, Ultitmate Handyman - Electric Forum UK and DIY Doctor - Electrics Forum as well as LandLordzone and Property Tribes. In each case, however, forum rules either prohibited the posting of information on the Call for Evidence as non-permitted advertising or required a track record of regular participation in the relevant forum. Emails to the forum administrators and moderators outlining the purpose of the Call for Evidence and asking for permission to post the Call for Evidence link and description received no reply.

Appendix 2 - Case Studies

The Security Industry Authority – regulator to the private security industry

For a considerable time, the police, the public and the industry itself were concerned about the probity of the individuals working in the industry and running private security companies. There was no satisfactory way of checking an individual's credentials before he or she is employed in the private security industry and in fact anyone could set up a security company.

The growth of the industry together with the fact that the nature of the work of the private security industry means that those working within it often have access to individuals, property, documents or information of commercial value. However, this wasn't the main driver behind the regulator being set up. In fact the Government considered that it was the industry's increasing contact with the public, its potentially wider role in communities and the threat to public safety, particularly the more vulnerable members of society, posed by unscrupulous employers and employees who are placed in positions of trust that were the overriding factors.³⁷

The Security Industry Authority (SIA) was established in 2003 as the organisation responsible for regulating the private security industry. It is an independent body reporting to the Home Secretary. Its remit covers the United Kingdom.

The SIA has two main duties. One is the compulsory licensing of individuals undertaking designated activities within the private security industry; the other is to manage the voluntary Approved Contractor Scheme, which measures private security suppliers against independently assessed criteria.

Remit

The Security Industry Authority (SIA) is funded through licence fees from individuals, and Approved Contractor Scheme (ACS) subscriptions, (a small proportion (5%) of income, for capital projects comes from HM Treasury).

It is required by HM Treasury to operate on a full cost recovery basis and the SIA is not allowed to make a surplus.

SIA individual licensing covers: manned guarding (including security guarding, door supervision, close protection, cash and valuables in transit, and public space surveillance using CCTV), key holding and vehicle immobilising.

³⁷ The Government's Proposals for Regulation of the Private Security Industry in England and Wales 1999

Licensing ensures that private security operatives are 'fit and proper' persons who are properly trained and qualified to do their job

All individual licences have a three-year lifespan, with the licence application fee paid in full in the first year. SIA licence income follows a three-year cycle.

ACS is a voluntary scheme by which companies seek accreditation to attain SIA approved contractor status. Organisations that meet ACS standards are awarded Approved Contractor status. This accreditation provides purchasers of private security services with independent proof of a contractor's commitment to quality.

In making a decision about fee levels, the SIA Board takes into account:

- The fluctuation of income against a largely fixed cost base over the three-year licence demand cycle.
- The requirement to provide the industry and individuals with cost stability by ensuring that the fees do not fluctuate on an annual basis.
- The requirement in Managing Public Money only to recover costs and avoid making a surplus.

Income and Costs

Licensing income is the application fee for an individual SIA licence. There are 374,000 licence holders, during 2017/18 136,000 individual licences were granted (approximately 1500 licences were revoked, and a similar number refused).

During 2017/18 (1/02/17 to 31/01/18) the individual fee was £220 for a three-year licence

ACS income is composed of the annual registration fees and application fees for companies joining the voluntary scheme. There are 835 ACS companies, 139 new companies were approved in 2017/2018.

ACS fees are based numbers of licensable staff (see table 1).

Table 1: ACS (voluntary scheme) Charge out rates

Size of Company	Licensable staff	Application fee	Annual registration fee
Micro	Up to 10	£400	£15 per licensable individual
Small	11 to 25	£800	
Medium	26 to 250	£1,600	
Large	Over 250	£2,400	

Total cost of individual and company licensing in 2017/18 was approximately £23m (see table 2).

Table 2: SIA income/expenditure 2017-2018

Operating segment	Income £000	Full cost £000	Surplus/Deficit £000
Licensing	22745	20632	2113
ACS	2094	2289	(195)

The SIA directly employs 224 staff, total staff costs in 2017/18 amounted to £11.7m.

For interest we have also listed here the divisions or departments within the regulator to enforce its legal duty:

Enforcement team

The SIA works with the police, local authorities, other government agencies, training providers, trade associations and industry representatives to ensure that individuals and companies operating within the private security industry comply with the law.

Partnerships & Interventions (P&I)

This is outward facing, working with law enforcement partners, the private security industry and other key stakeholders in the regulatory regime. The function is responsible for providing robust and effective compliance and enforcement across the UK. It conducts operations and business audits to identify and tackle non-compliance using a range of interventions and sanctions at its disposal including criminal investigation and prosecution for the most serious offences. The function provides evidence to support the withdrawal or withholding of business approval in appropriate cases. The function is also active in working with partners to identify and disrupt serious and organised crime associated with the industry.

The SIA Criminal Investigation team (CIT)

The CIT investigates and prosecutes criminal allegations associated with Private Security Industry Act 2001, for example, document offences under the Fraud Act 2006 Act offences. The CIT prosecutes people for fraud and other offences associated with improving industry standards and reducing risk to people, places and property.

Operations and Standards

The SIA operations and standards directorate is made up of five functions

- Customer Support -
- Decisions & Compliance -
- Intelligence & Risk Management -
- Operations Support -
- Quality & Standards -

Corporate Services

The Corporate Services directorate is made up of six business functions:

- Finance & Business Planning –
- Human Resources -
- ICT Solutions -
- Legal Services -
- Risk & Information Assurance -
- Supplier Management & Procurement -

There is also a communications function and a series of teams that cover internal and external communication & stakeholder engagement.

The remaining case studies relate to actual incidents as reported through the call for evidence.

Case Study 1: Member of the Public, Aberdeenshire

A consumer based in Aberdeenshire requested a full rewiring of a new extension and a new shower room plus partial rewiring throughout the house. This work turned out to be defective.

The electrician they chose had already undertaken work in another part of another property, but this work was found to be faulty at a much later date. Since the discovery of the faulty work, they have investigated and learned that at least 10 further cases throughout their community exist based on the work of this one individual.

The extension required a building warrant and thus local authority verification on completion. Completion was not signed off on the work due to wrongly located CO₂

detectors installed by the electrical contractor. The consumer hired two NICEIC certified electricians to check the work that had been completed and to subsequently rectify the defective work.

“It was only because of the NICEIC certified electricians that we unearthed the defective work.”

The electrician that completed the defective work provided no proof of qualifications or certification and was hired based on a recommendation from a family member. In court the electrician stated that he was a certified electrician, although no further details were available about his qualifications or any membership he might possess.

The defective work consisted of defective wall sockets and a cable running underground and external to the building not being connected properly, with the poor record keeping the cable cannot be easily relocated.

The consumer recalls that the NICEIC electricians were notably angry with the work that had been installed because of its poor quality of work and the damage it does to reputable electricians. The consumers biggest concern is the ease of producing what appeared to be DCM6 Domestic Electrical Installation Certificate completion paperwork at a minimal cost by someone who it turned out is not an NICEIC member. However, this is not the case, this form is based on the model form in Appendix 6 of BS7671 available for free to electrical contractors from multiple organisations.

Following the rectification of the faulty work the consumer sought advice through a number of avenues including Trading Standards and CAS as part of their small claims case.

The cost to the consumer is calculated below and shows a total of **£8,226.40**, with only £80 being returned through the small claims court. The £2,500 is clearly a cost for the correct work. With this in mind the **net loss to the consumer is £5,646.40**.

Financial Loss

Item	Cost	Cumulative cost
The cost of the installation	£5,000	£5,000
Cost of the small claims court	£100	£5,100
Cost of remedial work	£2,500	£7,600
Loss of earnings ³⁸	£626.40	£8,226.40

³⁸ loss of earnings as estimated and advised by the consumer

The consumer's assessment of the risks posed by the defective installations are almost all high. Her reduced rating for loss of life was down to the rationale that the defective work was hidden in walls and floors.

Risk assessment

Risk Description	Risk Rating (High, Medium, Low)
Risk of damage to appliances	High
Risk of the electrical circuit overheating	High
Risk of a short circuit	High
Risk of no power to the circuit	Medium
Risk of Fire	High
Risk of Electrical burns or shock to a person	High
Risk of loss of human life	Medium

"I want to ensure this does not happen to someone else. People need to be aware that anyone can call themselves an electrician."

The consumer's view is that unqualified electricians are the source of the problem and that whilst she is unsure how a new regulation system may be successfully implemented she is clear that more needs to be done to protect consumers.

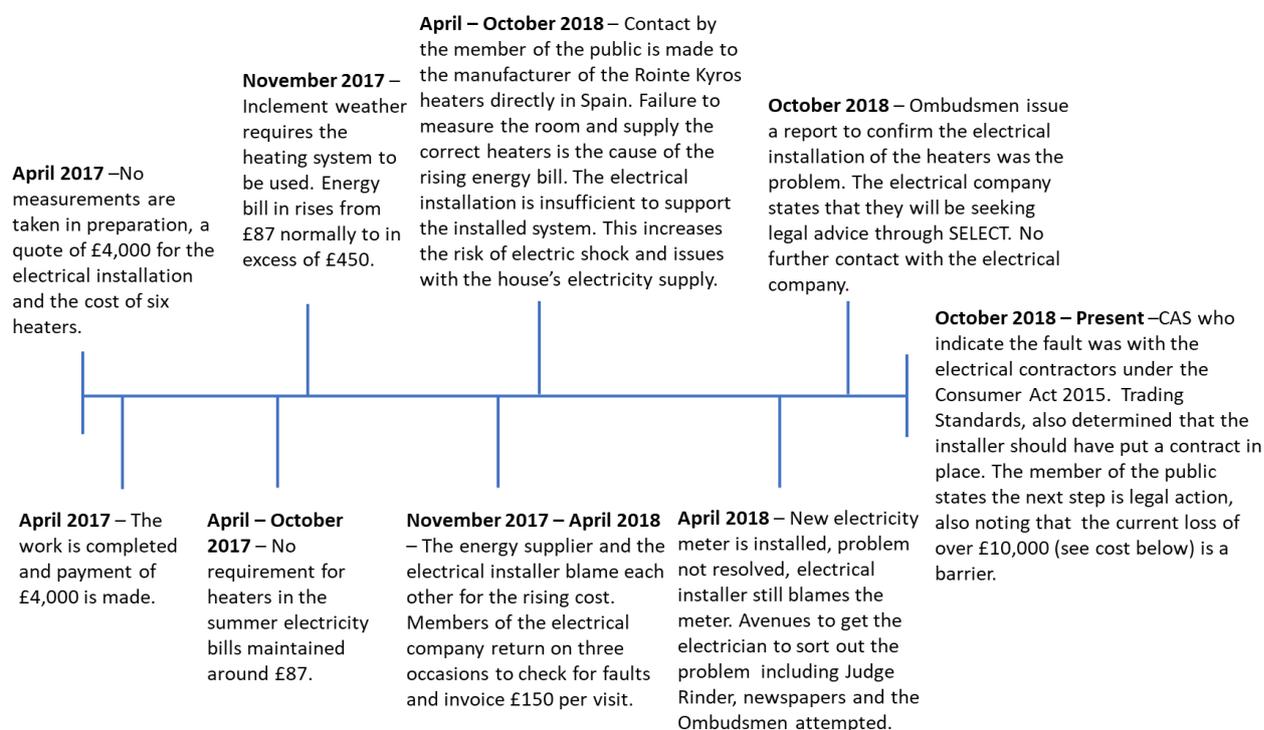
Case Study 2: Member of the Public, Dumfries and Galloway

In April 2017, a consumer decided to invest in a new heating system to improve energy efficiency and reduce their energy bills. On a recommendation, through word of mouth, they were introduced to an electrical installation company who quoted £4,000 for six Spanish manufactured, Rointe Kyros heaters and their electrical installation.

The online profile of the electrical installation company suggests a 25-year experience in a wide range of electrical work in commercial and industrial settings. Nothing indicates that this organisation has experience with domestic work through their online website.

The organisation indicated that they are a SELECT member. This is reflected on their website as is their membership of NICEIC. The current detail of the situation is set out below.

Timeline of events as of 20th February 2019



“In hindsight, I should have visited the contractor’s offices, ensured a contract was in place and that all paperwork gave me a way to ensure I was getting a quality installation.”

The financial aspect of this case study goes beyond the cost of the defective installation. The current cost to date according to the consumer is **£12,807.52**.

Financial Loss

Item	Cost	Cumulative costs
The Cost of the installation and 6 heaters	£4,000	£4,000
Energy bill increases ³⁹	£7,157.52	£11,157.52
Additional charges by electrical installers for checks	£450	£11,607.52

³⁹ Previous bills for six months when heating in use £522 (£87 per month) now £4,100.76 for six months. The follow year this additional expense of £3,578.76 was incurred again. Total is therefore £7,157.52 for 2017/18 and 2018/19.

Phone bill to call Rointe Kyros in Spain	£120	£11,727.52
Loss of earnings ⁴⁰	£1080	£12,807.52

It is anticipated that further costs will be incurred as part of any legal proceedings, remedial work, interest charges and further loss of earnings.

The member of the public's assessment of the risks suggest that the biggest risks come from overheating and fire. She also believes this could prevent the circuit providing power if overheating occurs.

Risk Assessment

Risk Description	Risk Rating (High, Medium, Low)
Risk of damage to appliances	Low
Risk of the electrical circuit overheating	High
Risk of a short circuit	Medium
Risk of no power to the circuit	High
Risk of Fire	High
Risk of Electrical burns or shock to a person	Medium
Risk of loss of human life	Low

This on-going issue is causing the consumer to be concerned about paying their heating bills in the future.

Electricians

The vast majority of respondents providing evidence have been electricians and the majority of those are members of trade, registration or certification bodies and qualifications. This is not entirely surprising as they have a vested interest in this research and its outcomes. They are also more likely to have greater exposure to the

⁴⁰ as advised based on monthly pay.

details of faulty installations, have a repertoire of technical skills and knowledge that other stakeholders may not. Herein there is further detailed case studies on the evidence provided by electricians.

Case Study 3: Electrician, Ayrshire

An electrician working at Ayrshire College – which is sited within the jurisdiction of three local authorities: East, North and South Ayrshire – responded to the Call for Evidence. Having trained as an electrician, he was called by a member of his family to correct the defective installation of a boiler, which could not be isolated or made safe as it had been connected to the live side of a spur switch to allow lighting to be connected to and switched from the same spur. During the fitting of a new kitchen, the electrical work was carried out by a kitchen fitter rather than a qualified or registered electrician.

The issue here is that it seems fitters, like those working on the kitchen in this case study, feel reasonably qualified to install lighting (despite having no formal, electrical qualifications). The electrician here believes that such workers are either unaware of the serious consequences their work could have, or they may well be aware but disregard the risk. He rated the risks of the incorrectly installed boiler as generally high and felt the potential consequences could have been alarming.

Risk Assessment

Risk Description	Risk Rating (High, Medium, Low)
Risk of damage to appliances	High
Risk of the electrical circuit overheating	High
Risk of a short circuit	High
Risk of no power to the circuit	Medium
Risk of Fire	High
Risk of Electrical burns or shock to a person	High
Risk of loss of human life	Low to Medium

On this occasion, after he had corrected the work, no third-party inspection was required due to the small-scale nature of the work. This electrician sees defective installations in around 4-5% of installations he visits, and the cost implication for the customer varies from £30 to ten times that, depending on the severity of the defect(s).

“With the current situation, you’ve got to make sure electricians are registered with a relevant body like SELECT or NICEIC and ask to see evidence of registration. That’s all you can do at the moment.”

To protect consumers, he believes that regulation of electricians in Scotland is the way forward, and proposes a similar model to Gas Safe, where individuals, rather than companies, are registered once they have reached a certain level of qualification. This would mean consumers could check electricians’ qualifications and would, he thinks, reduce the number of defective installations and associated risks.

“It’s a worthwhile exercise to regulate the industry more closely to cut out some of the cowboys that carry out some of the work I’ve seen in my time.”

Being based in the further education sector at Ayrshire College (which has a gas training centre), this electrician sees gas engineers attend annually for training and re-certification to ensure they keep abreast of new initiatives and practices within the industry; he feels a similar model could work well for electricians.

Case Study 4: Electrician, Dumfries & Galloway

An electrician, working as an electrical installation contractor based in Dumfries, responded to the Call for Evidence with his personal experience. In 2017, he encountered the ‘*poorest installation seen to date*’ when he was called to a property that had just undergone rewiring but was not safe. Photographic evidence from the time shows wires hanging in mid-air, and the property owner could immediately see the severity of the issue themselves (see below). The electrician was called in to fix the issue and provide a certificate to the homeowner upon completion – at a cost of £2,000 to the consumer.

The electrician believes there is a widespread problem in Scotland with incorrectly wired domestic installations. The problem, as he sees it, is twofold. Firstly, the grey area surrounding the lack of clarity around what is meant by a ‘qualified’ or an ‘unqualified’ electrician. For instance, he notes that a heating engineer can change electrical components within a boiler under 1989 regulations but may not necessarily have been formally trained as an electrician.

Second, the electrician believes that cost and convenience to the consumer are significant drivers, with homeowners asking a so-called 'electrician' to work on their property while having little awareness of their qualifications or competence.

Over the course of his career, he has seen various issues, ranging in severity, in domestic electrical installations across Scotland. While not wanting to frighten customers, he does raise concerns and flag issues to homeowners, and advises further testing.

To make the industry safer, this electrician is supportive of both occupational licensing, and of protecting the title 'electrician'. Knowing several electricians without up-to-date training he believes that, should such a practise be made a criminal offence, the quality of installation work would increase. At the same time, incentives should be provided for the homeowner to use registered electricians. For example, he believes that the discount for homeowners to use a SELECT member for their electrical work if they undertook improvements under a building warrant was a good case in point. He believes that the regular radio bulletins and flyers from SELECT are useful and effective in educating the public too.

The electrician has two major personal focusses: to protect his customers, and to keep his training and knowledge up-to-date. He has spent thousands of pounds on training and feels that it is unfair that, while many like himself are taking all the necessary precautions, others get away with cutting corners and, by doing so, put peoples' lives at risk.

"I welcome training and keeping up to date. There's no second chance with electrics, and there's no way to keep on top of it unless you make it a criminal offence. Something needs to be done, definitely, as properties are at risk as well as lives."

Other stakeholders

In addition to this group there are also several other stakeholders that have specific skills and insights into the evidence provided in this research. Therefore, this next set of case studies will reflect interesting cases and perspectives from fire consultants, local authority verifiers and others stakeholders.

Case Study 5: Fire Safety Consultant, Glasgow

The respondent is a fire safety consultant based in Glasgow. He is a qualified electrician and has NEBOSH Health and Safety qualifications together with experience of designing intruder systems, and fire suppression and detection

systems. A large part of his work is concerned with new build, safety inspections and audits.

Risk Assessment

Risk Description	Risk Rating (High, Medium, Low)
Risk of damage to appliances	Low
Risk of the electrical circuit overheating	Low
Risk of a short circuit	High
Risk of no power to the circuit	Low
Risk of Fire	Low
Risk of Electrical burns or shock to a person	Medium
Risk of loss of human life	Low

The respondent has encountered several instances much of them being caused by:

- home owners over-confident in their DIY skills;
- handymen who purport to be able to 'fix anything';
- tradesmen e.g. plumbers who may have some electrical training but are not fully aware of wider issues e.g. overloading circuits and;
- to a lesser degree, electrical contractors unwittingly employing unqualified staff.

A recent incident involved a large property where a maintenance man had suffered a severe electric shock when attempting to change a light fitting. The maintenance man had no electrical qualifications and had not isolated the supply before trying to change the fitting. A previous maintenance man had installed the existing socket and transposed the neutral and live wires, hence though the socket was turned off at the wall it was still live. This could have resulted in a fatality.

In this instance both maintenance men felt capable of carrying out what should have been a simple electrical task. The activities of the first maintenance man gave rise to the risk, which was elevated by the incompetence of the second maintenance man.

The respondent believes that often homeowners will assume a job has been completed safely because a light or socket will turn on or off when switched.

The respondent believes that regulation of electricians in Scotland would be a positive step towards minimising occurrences of faulty electrical installations.

“Regulation should include some compulsory CPD for electricians and should not be a licence for life, it should also cover the wider industry including fire and intruder alarm installers.”

He feels that such a system would need to be publicised widely. but could never provide one hundred percent assurance. He believes that people will always cut corners and highlights infringements of Gas Safe regulations as an example.

Case Study 6: Building Services Fife Council, Fife

The respondent is employed in the building services department of a local authority. When supervising periodic maintenance on local authority housing the respondent often comes across incidents of dangerous electrical installation work. Some instances are seemingly minor (e.g. incorrect fuses in circuits) but could have serious consequences. Other instances are highly unsafe, posing severe risk of disastrous consequences.

One incident involved a local authority property where the tenant had installed new kitchen units and had the kitchen re-wired. The re-wire was entirely unsatisfactory: the materials (e.g. 1.5mm flexible cable for wiring kitchen sockets) were unsuitable, cable jointing was haphazard and earth protection was suspect.

Risk Assessment

Risk Description	Risk Rating (High, Medium, Low)
Risk of damage to appliances	High
Risk of the electrical circuit overheating	High
Risk of a short circuit	High
Risk of no power to the circuit	High

Risk of Fire	High
Risk of Electrical burns or shock to a person	High
Risk of loss of human life	High

After inspecting the kitchen, it was thought that similar faults with the remainder of the wiring in the property could not be ruled out, so a complete re-wire was ordered at a cost of £3000. In similar cases, the local authority legal department has sued tenants for recompense, with mixed results.

Incidents similar to the case above are encountered regularly by the respondent, often the cost of remedial work is in the low hundreds of pounds, but it is not rare for a complete re-wire to be the only safe option.

Major problems typically result when a tenant will have some minor work carried out e.g. a conservatory or kitchen extension, and the builder will complete the plumbing and electrical work. Householders believe that because 'everything works', the installation must have been carried out in a satisfactory manner. It is only on closer inspection that potential hazards become apparent.

Other more minor problems occur when a householder will attempt their own minor electrical work, typically moving a socket or installing a light fitting. While doing this wrongly is potentially hazardous – it is less costly to remedy.

The respondent has concerns about hazards presented by faulty installations, and the risk to DIYers while attempting work without isolating the supply correctly.

The respondent feels there is some correlation with incidence of poor quality domestic electrical work and deprivation; with homeowners in more affluent areas having the funds to employ qualified electricians.

Compulsory licensing of electricians, based on their experience and qualifications would, in his opinion be a step in the right direction, especially if it was made clear to the public that electrical work is a specialist trade. A

In the absence of compulsory licensing of electricians, the respondent would advise homeowners to use websites e.g. 'checkatrade' which give ratings to electricians and show feedback from previous clients.

Case Study 7: Housing Association

The respondent in this case study is an electrical supervisor for a Scottish housing association with responsibility for over 2000 homes. He is NICEIC qualified. He comes across faulty work during routine maintenance and inspection of new builds. He estimates that 70% of maintenance checks will reveal some compliance issues, and faults will be found in 2% of new-builds.

Risk Assessment

Risk Description	Risk Rating (High, Medium, Low)
Risk of damage to appliances	Medium
Risk of the electrical circuit overheating	Medium
Risk of a short circuit	Medium
Risk of no power to the circuit	Medium
Risk of Fire	Medium
Risk of Electrical burns or shock to a person	Medium
Risk of loss of human life	Low

A recent incident involved in a housing association property involved loose connections to metering services and a defective luminaire (fluorescent ceiling light) installation in a bathroom. The energy supplier had no knowledge of the work to the metering services, and the tenant was unable to provide details of the contractor responsible for the defective luminaire installation.

The cost of remedying the above faults was in the low hundreds of pounds. The costs were borne by the housing association, this is usually the case. Costs are typically in the region of £50 to £500.

Risks involved in the above installation were medium but could have been elevated to high risk by two or three factors e.g. if the tenant had attempted to change the already incorrectly installed light fitting.

Typically, by the time the association is aware of faults, it is difficult to locate the contractors responsible and practically impossible to get them to return to remedy matters. The respondent places the blame for faulty electrical work with DIYers and incompetent electricians, noting the latter appear to fix faults by just getting the electrics up and running without realising wider issues e.g. overloading circuits. Other issues that occur include: faulty earthing and incorrect allocation of circuit breakers and ring mains

'Too many people undertake electrical work without the understanding of the hazards of incorrect installations. This, in my experience applies to some SJIB qualified electricians who may have the qualifications but do not have the technical ability to understand the implications of incorrect installation.'

The respondent has drawn up a contract for electrical contractors who tender for work with his organisation – this lists the minimum qualifications and experience required of electricians employed.

The respondent would be in favour of a licensing system for electricians, and protection of the title electrician. Qualification would be by an independently audited skills assessment, and demonstrable experience, enforced in a similar way to Gas Safe. Other activity which could reduce the incidence of faulty electrical work would be a public awareness campaign highlighting the risks, and more activity by local authorities enforcing building standards.

Case Study 8: British Engineering Services

The respondent works for an engineering consultancy that does safety testing and is a member of SELECT. In this particular case, an insurance company has commissioned the verification of a re-wiring job at a hotel in Scotland. The work was found to be defective (around 19 defects were found) that a full inspection of the whole building had to be carried out.

Examples of defects included bad connections leading to fire hazards, poor light fittings and the potentially life-threatening danger of electric shock due to faulty earthing systems and failures to install residual current devices (RCD).

It was found that the contractor that had carried out the work had not been a company specialising in electrical work but had offered electrical work as part of other jobs at a price below normal electrician rates. In addition, local electricians had refused to verify the work due to its poor quality.

It was decided that bringing in another verifier was the best solution and the owner commissioned a qualified electrician who was registered with the SJIB to complete the work. The SJIB electrician spent over two weeks rectifying the defects. This was followed by further inspections over two weeks and further repairs. In summary, the risks to health and safety as well as additional costs could have been avoided if a qualified electrician would have been hired from the beginning.

The respondent noted that to prevent of this kind of case, people need to be made aware of the dangers of defective electrical installations. He noted that the onus is at the moment on the consumer to check and be provided with evidence of qualifications. Therefore, raising awareness of qualifications is in the interest of the public who generally associates the term 'electrician' with a set of qualifications and related competence.

He felt that the best starting point for regulation is the recognition of the electrician trade, based on a set of recognised qualifications. Furthermore, a national licensing system should be introduced including regular assessment and continued refreshment of knowledge. There is a cost implication, but registration with the SJIB for instance is already priced in. There is a fair price for quality and safety but, the market is presently distorted by the undercutting of prices by unqualified electricians.

Appendix 3 – Scottish Building Regulations

The requirements of Building Warrant system are based on the Scottish Building Standard regulations. The types of electrical work requiring a building warrant in the domestic sector (dwellings) in Scotland are listed in the Building (Scotland) Regulations 2004 Regulation 5, Schedule 3. The regulation distinguishes between types of domestic buildings (e.g. flat or house) and stipulates specific requirements for houses of more than three storeys. As such, the building warrant system is not based on types of electrical work and there are certain exemptions to the building warrant requirement⁴¹. It is the legal responsibility of the building owner to apply for a building warrant.

For instance, in the case of electrical installations such as “Rewiring”, “Wiring to artificial lighting” or “Electrical work associated with new boiler (large)”, a building warrant is required for flats and buildings over three storeys, while houses up to two storeys are exempt. By contrast, a building warrant is required for “Electrical work adversely affecting a separating wall, e.g. recessed sockets” all three types of domestic buildings, while no building warrant is required for “Electrical fixtures, e.g. luminaries”. If a building warrant is required, the electrical work has to be certified as compliant with the standards for electrical installation in the UK outlined in BS 7671 (IET Wiring Regulations).

Under the Building Standards system in Scotland, Approved Certifiers of Construction are recommended for electrical, drainage, heating or plumbing installations as they can self-certify that their work meets the Building Regulations. This means the electrical work requiring a building warrant can be carried out without further scrutiny from local authority building standards verifiers. To be on this list, individuals must work for an Approved Body which is a member of such a scheme⁴².

In comparison, all electrical work in each type of dwelling in England and Wales must be in compliance with the requirements of “Part P: Electrical Safety – Dwellings” of the Building Regulations⁴³. Since 2013, all electrical work involving the installation of new circuits or alterations to existing circuits at low voltage (230V), the installation of fuseboxes and consumer units as well as electrical work involving “special locations”

⁴¹ LABSS & Scottish Government, *Guidance on Electrical work not requiring a warrant*: <https://www.webarchive.org.uk/wayback/archive/20170112101551/http://www.gov.scot/Topics/Built-Environment/Building/Building-standards/publications/glf2>

⁴² Federation of Master Builders & Pye Tait Consulting (2018), *A licence to build – A pathway to licensing UK construction*

⁴³ The Building Regulations (2013 edition), *Part P: Electrical Safety - Dwellings*, https://www.labc.co.uk/sites/default/files/EXT.Approved-Document-P-Electrical-Safety-Dwellings-ENG-2013.JMCN_.v1.200417.pdf

such as bathrooms has to be reported to a building control body⁴⁴. As such, the electrical installation will have to be certified as compliant with the standards for electrical installation in the UK outlined in BS 7671 (IET Wiring Regulations). The homeowner or landlord are legally required to produce related evidence.

⁴⁴ Electrical Safety First, *Building Regulations In England: What is Part P of the building regulations?*, <https://www.electricalsafetyfirst.org.uk/find-an-electrician/building-regulations/england/>



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