

Electrical Incident Safety Report 2013-14

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Preface

This report by *EnergySafety* summarises statistical information about electrical incidents in Western Australia during the 2013-14 fiscal year. *EnergySafety* is the electricity regulator in Western Australia.

The report provides historical information about how safely the State's industry and general community are operating in the supply and use of electricity.

EnergySafety uses the information to assess:

- the effectiveness of safety education and regulatory measures, including mandatory technical requirements; and
- potential changes to improve industry and community electrical safety.

These assessments are the subject of continuing policy work by *EnergySafety*, which include extensive consultation with electrical contractors, unions, training organisations and the Electrical Licensing Board.

I am confident that the report will interest those involved in the State's electrical industry.

Ken Bowron
Director of Energy Safety

October 2016

1 Executive summary

This report presents an analysis of electrical incidents reported to EnergySafety in the fiscal year 2013-14 and the preceding ten year period from 1 July 2004 to 30 June 2014.

The report examines three categories of incidents – fatality, accident and electric shock. Its aim is to provide a statistical basis to influence policy decisions to reduce the risks associated with electricity.

From 1 June 2004 to 30 June 2014, 26 electrical fatalities occurred in Western Australia. Western Australia's Fatal Injury Frequency Rate (FIFR) in 2012-13 was 0.8 per million persons. It has dropped to 0.4 per million persons in 2013-14.

Approximately 42 per cent of fatalities occurred in a workplace environment. Among non-workplace categories, the group most at risk is home-based members of the general public, including children, students and retired persons.

In the 10 year reporting period, fixed (installation) wiring was the primary contributor in 31 per cent of reported electrical fatalities. This is followed by flexible cords and power lines at 27 per cent each.

There were 113 serious electrical accidents requiring hospitalisation and 64 accidents requiring medical treatment. There has been a reduction in both these categories of accidents.

There were 12,759 electric shocks reported since July 2004. The trend for shocks shows a slight increase. The number of reported shocks has declined by seven percent compared to the previous year.

2 Introduction

EnergySafety administers the Electricity (Licensing) Regulations 1991 and the Electricity (Supply Standards and System Safety) Regulations 2001. A common element to both pieces of legislation is the mandatory reporting to the Director of Energy Safety and the relevant network operator of all electrical accidents causing or likely to cause, danger to life or property. The incidents reported to the Director of Energy Safety are recorded and presented as a number of reported accidents per million persons in a population.

In the case where an electrical accident involves an employee, it is acceptable for the incident to be reported to the employer in the first instance who in turn must report it to the respective network operator. It is the responsibility of the network operator to report the incident to the Director of Energy Safety.

This report focuses on the ten year period from 1 July 2004 to 30 June 2014. It takes into account all reported incidents recorded into the EnergySafety database. The incidents have been categorised into fatalities, serious accidents, accidents and shocks.

A new compliance management system has been developed to record incidents. The transition to the new system is ongoing. The information compiled in this report has been retrieved from the database and is correct as at August 2016.

3 Definitions and explanatory notes

3.1 Fatalities, Accidents and Electric Shocks

Electricity: The generation and supply of electric current for heating, lighting or powering appliances or apparatus, excluding where used for the propulsion system of a motor vehicle.

Electrical Fatality: An electrical fatality (electrocution) is defined as a death directly resulting from a sudden discharge of electricity, excluding a fatality deemed as a result of wilful self-electrocution.

Serious Electrical Accident (medical treatment): A non-fatal incident resulting from a sudden discharge of electricity causing injury sufficient to require first-aid or medical attention but not as an inpatient in a hospital, excluding attendance for a precautionary electrocardiograph (ECG).

Serious Electrical Accident (hospitalisation): A non-fatal incident resulting from a sudden discharge of electricity causing injury sufficient to admission as an inpatient in a hospital, excluding attendance for a precautionary electrocardiograph (ECG).

Electric Shock: A non-fatal incident resulting from a sudden discharge of electricity (excluding static discharge), causing insufficient injury to require first aid or medical attention. Note: Where the only treatment required is attendance for a precautionary electrocardiograph (ECG), the incident is classified as an electric shock.

Electrical Incident: An electrical incident refers to an electrical fatality, serious electrical accident or electric shock.

Property Damage (Reportable): Reportable damage that has occurred as a result of a sudden discharge of electricity or in some way has an electrical origin that has not been contained within an item of equipment and results in a fire or damage to property. It also includes damage to equipment that occurs as a result of voltage or frequency variations exceeding prescribed limits.

FIFR (Fatal Injury Frequency Rate): A measure of the number of electrical fatalities in a given period, expressed per million persons in a population. This is derived by the formula:

$$\text{FIFR} = \frac{\text{Fatalities}}{\text{Population}} \times 1,000,000$$

Wilful: Intentional; deliberate.

Workplace: A place where people work, such as an office, factory or work site.

3.2 Installation types

Network Operator: A supply authority and any other person lawfully operating transmission or distribution works.

Network Operator Installation: Network operator installation type refers to the transmission, distribution and service apparatus used to distribute electricity to consumers.

Notifiable Incident (in relation to a network): an incident of any of the following types -

- (a) the discharge of electricity from the network that -
 - causes the electric shock, injury or death of a person or the death of livestock; or
 - causes a fire, in vegetation, that extends for more than 200 m from its origin; or
 - causes a fire in a building or structure that is not a part of the network; or
 - causes a fire, explosion or implosion in or on a part of the network, including a building or structure that is a part of the network, other than a wood pole;
- (b) the supply of electricity to consumers in a way that does not comply with section 25(1)(d) of the Act and that causes damage to one or more consumer's installations, if the cost of rectifying the damage is likely to exceed \$20 000 in aggregate;
- (c) a consumer's installation becoming unsafe because of an error in -
 - connecting the network to the installation; or
 - connecting a meter to the installation;
- (d) a faulty neutral connection on the network that affects at least 2 consumers.

Mining Installation: Installations in mining operations as appearing in the Mines Safety and Inspection Act 1994.

Commercial Installation: Installations in a business premise area accessible to customers and not involving industrial processing activities. Commercial sites include, but are not limited to, offices, retail premises, restaurant public areas, hospital patient areas, railway platforms, carriages, classrooms, ovals and parks, storerooms, warehouses, commercial kitchens and fishing boats..

Industrial installation: Installations considered to be those involving manufacturing processes or normally subject to restricted public access for safety reasons. Industrial sites include factory floors, workshops, commercial railway tracks and overhead lines and construction sites.

Rural Installation: Comprises any aerial distribution system extending from the property 'point of supply' (usually a pole mounted transformer), the electrical installation within buildings on the property (excepting the primary residence which is domestic by definition) and other installations such as pumps, irrigation equipment and any other agricultural or horticultural equipment. This excludes the Network Operator Installation components (e.g. aerial conductors and poles).

Domestic Installation: An installation in a private dwelling, apartment/flat or living unit utilised for residential purposes.

3.3 Occupations

Electrical Worker: A person carrying out electrical work who is licensed or authorised to do so under the Electricity (Licensing) Regulations 1991 and encompasses electricians and holders of restricted electrical licences, electrical apprentices, electrical fitters and electrical mechanics.

Electrician: An electrical worker holding an electrician's licence and those who prior to 1 July 2008, held an 'A' Grade electrical worker's licence endorsed as either an electrical fitter or electrical mechanic (or both) to perform electrical work in accordance with the Electricity (Licensing) Regulations 1991.

Electrical Contractor: A person who carries on a business as an electrician but does not include an electrician when in a capacity of an employee on an electrical contractor.

Restricted Electrical Worker: An electrical worker (not including an electrician) licensed in accordance with the Electricity (Licensing) Regulations 1991 to carry out specific types of limited electrical work associated with, or for the purposes of, the licence holder's trade or calling.

Electrical Apprentice: An electrical worker holding an Electrician's Training Licence who, prior to 1 July 2008, held a 'C' Grade electrical worker's licence and was therefore licensed to perform electrical work under supervision in accordance with the Electricity (Licensing) Regulations 1991 as part of a registered industry training program.

Electricity inspector: An inspector as defined in the Energy Coordination Act 1994 section 3(1) who is classified as an electricity inspector under section 12 of that Act.

Supply worker: A person employed by a Network operator.

3.4 Statistical divisions

Population: Estimated residents in Western Australia. Population statistics used in this report are obtained from the Australian Bureau of Statistics [ABS] - www.abs.gov.au/ausstats -

Census statistics are used where available; or estimated resident populations as available on the ABS website and extrapolated for years where the data is not available.

4 Electrical Incidents - 2013-14

There were 1,539 electrical incidents reported to EnergySafety in 2013-14. The table below outlines the number of incidents reported in each category.

Incident Type	Number of incidents reported
Electrical fatality	1
Non-fatal electrical accident (serious accidents)	9
Non-fatal electrical accident (medical treatment)	0
Electric shock	1,529
Total electrical incidents	1,539

4.1 Electrical fatalities

In 2013-14 there was one fatality reported in Western Australia where electricity was found to be the cause.

A rigger received a fatal electric shock while constructing a new 330kV power line when he made contact with an active conductor after removing the safety earths. The conductor became live due to an induced voltage resulting from a nearby 132kV power line.

4.2 Non-fatal electrical accidents

4.2.1 Serious accidents (Hospitalisation)

These are non-fatal incidents resulting from a sudden discharge of electricity causing serious injury and requiring hospitalisation for medical attention. There were 9 serious accidents in 2013-14.

4.2.2 Accidents (Medical treatment)

This category includes non-fatal incidents resulting from a sudden discharge of electricity causing injury sufficient to require first-aid or medical attention, excluding attendance for a precautionary electrocardiograph (ECG). There were no accidents in this category during 2013-14.

4.3 Electric shocks

Electric shocks are non-fatal incidents resulting from a sudden discharge of electricity (excluding static discharge), which does not require medical or first aid treatment – that is, no injuries were sustained, but precautionary medical treatment may have been sought (including an ECG).

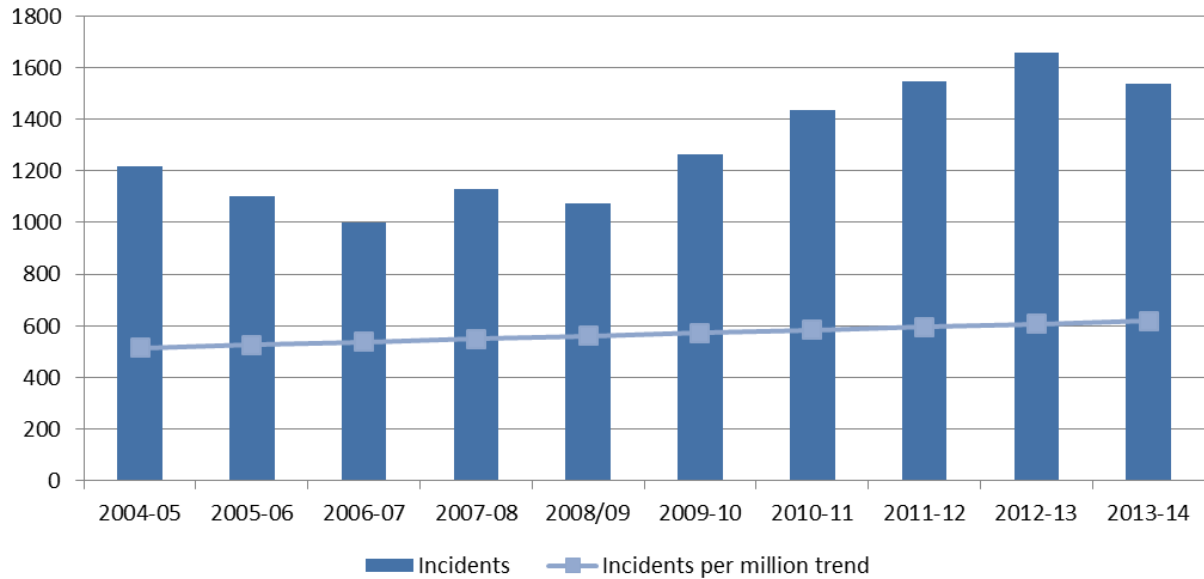
There has been a significant increase in the number of reported shocks over recent years. This may be due to an increased awareness about the requirement to report such incidents.

There were 1,529 shocks reported in 2013-14, which is a decrease of 7 per cent in comparison to the previous year. However, in comparison to the start of the reporting period (2004-05), there is an increase of 27 per cent in the number of reported shocks.

5 Electrical Incidents 2004-05 to 2013-14

The total incidents for the ten year period from 2004-05 to 2013-14 is 12,962. This is an average of approximately 1,300 incidents a year. A breakdown of the different types of incidents provides a better understanding of the trends of electrical incidents.

Chart 1: Electrical incidents in WA – 2004-05 to 2013-14



5.1 Electrical Fatalities

There were 26 fatalities over the ten year reporting period. 2011-12 is the only year in the reporting period where there were no fatalities. The trend for fatalities has been declining over the reporting period.

Chart 2: Electrical fatalities in WA – 2004-05 to 2013-14

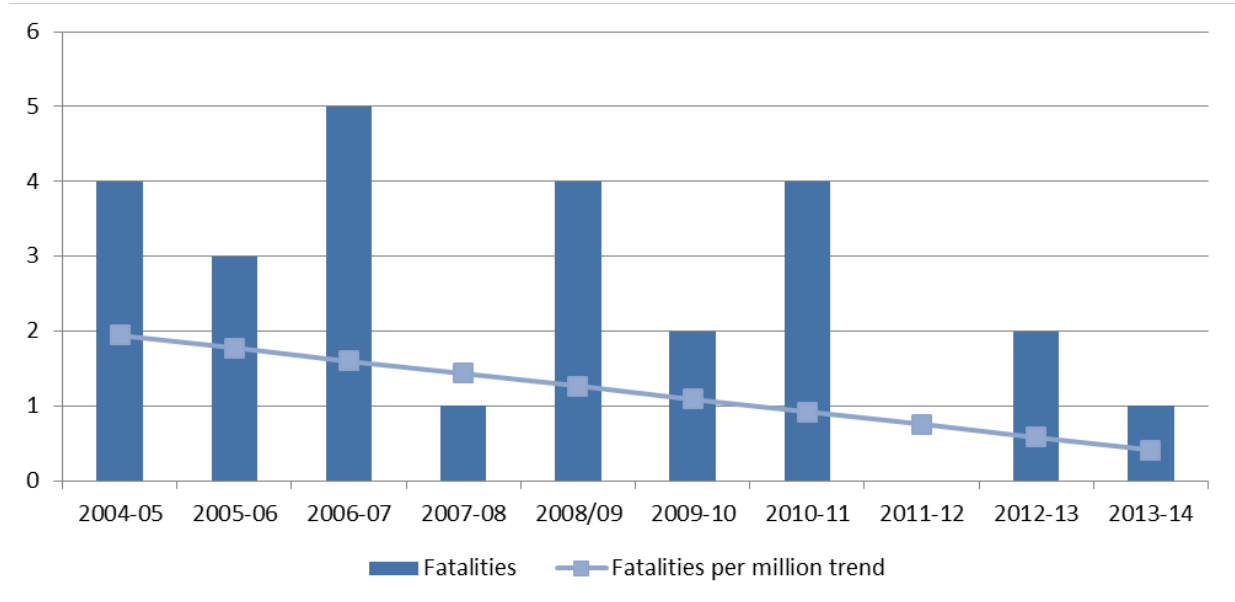
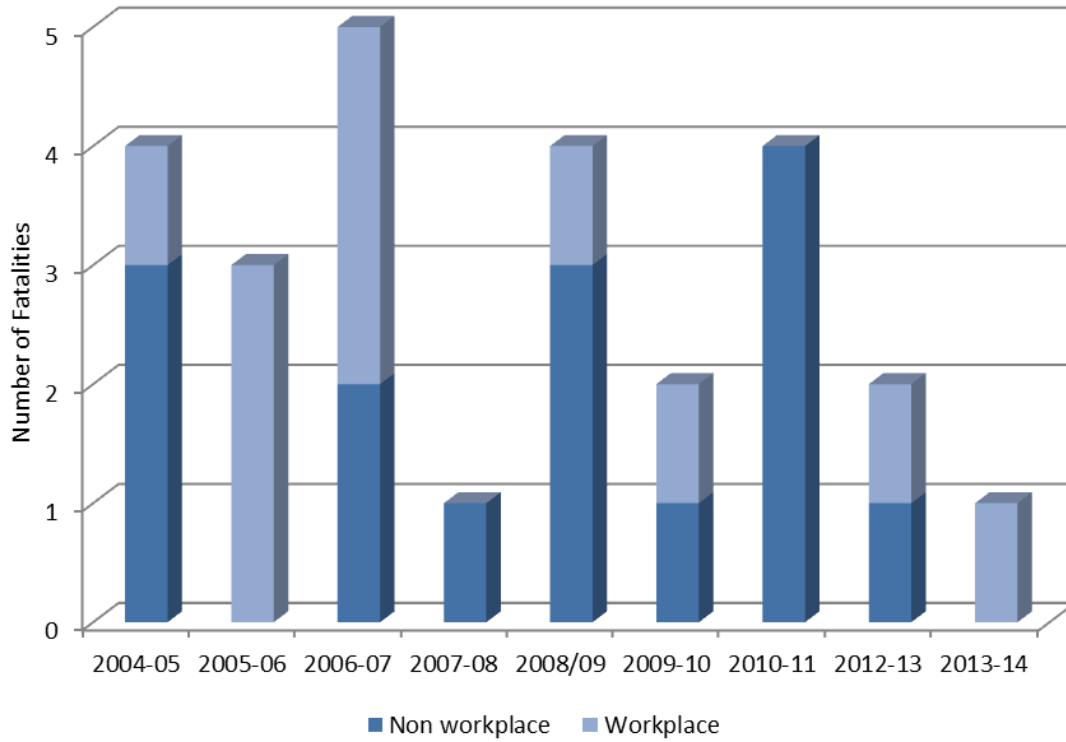


Chart 3 is a representation of the number of fatalities. 42 per cent of electrical fatalities occurred in the workplace. The rest of the fatalities occurred among members of the general public.

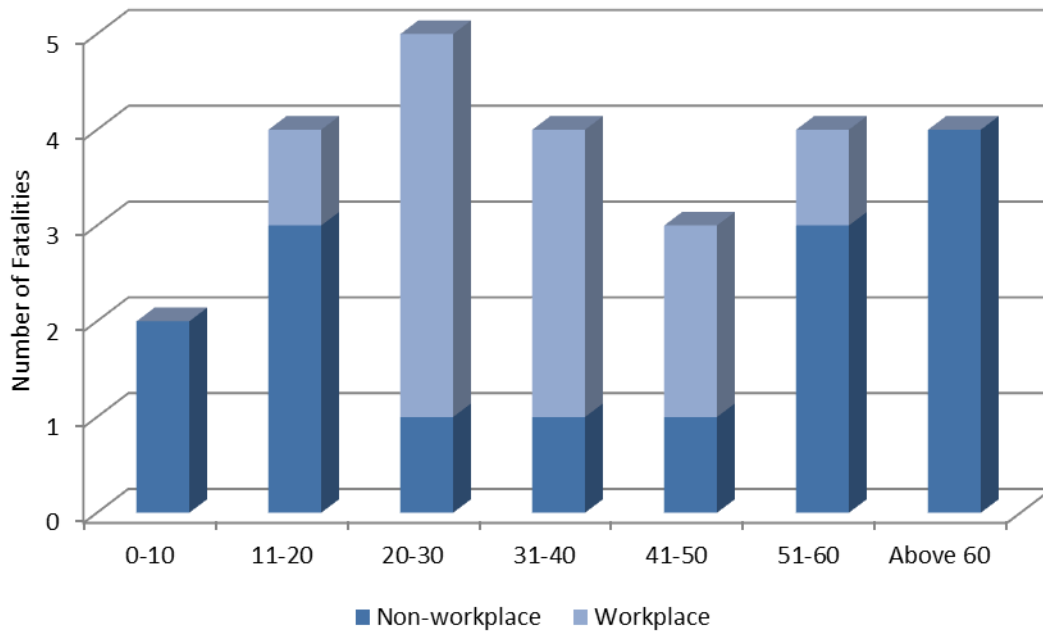
Chart 3: Workplace and non-workplace electrical fatalities



All fatalities recorded in 2005-06 and 2013-14 were workplace fatalities. The opposite is true for 2007-08 and 2010-11 which primarily involved members of the general public.

A large proportion of fatalities (38 per cent) involved members of the public in the younger age groups below the age of 20 and retired members above age 60. Chart 4 provides a representation of electrical fatalities by age.

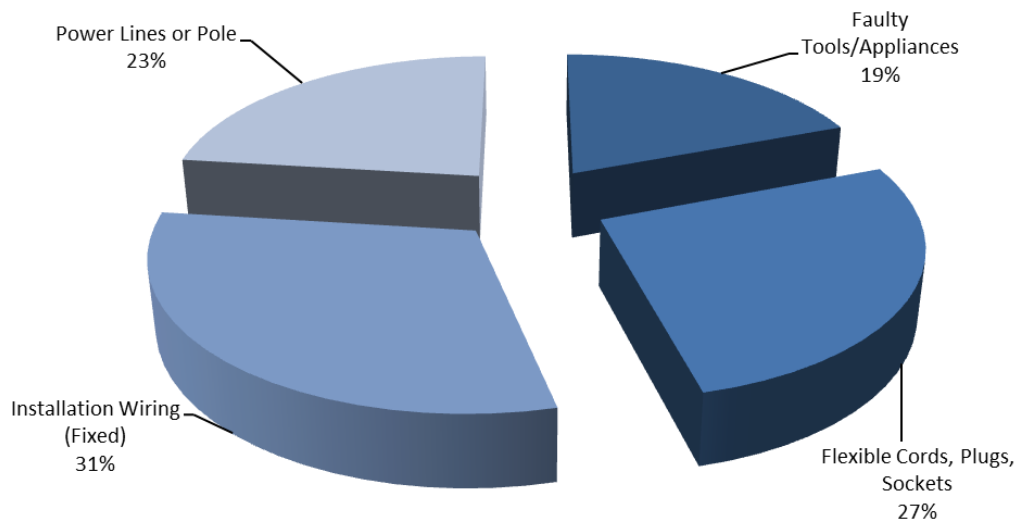
Chart 4: Electrical fatalities by age



Fatalities in the workplace seem to be significantly higher in the 20 to 40 age group which also largely consists of the working population.

Chart 5 below depicts the primary electrical source of electrical fatalities. Fixed wiring installations and flexible cords and plugs together accounted for 58 per cent of electrical fatalities.

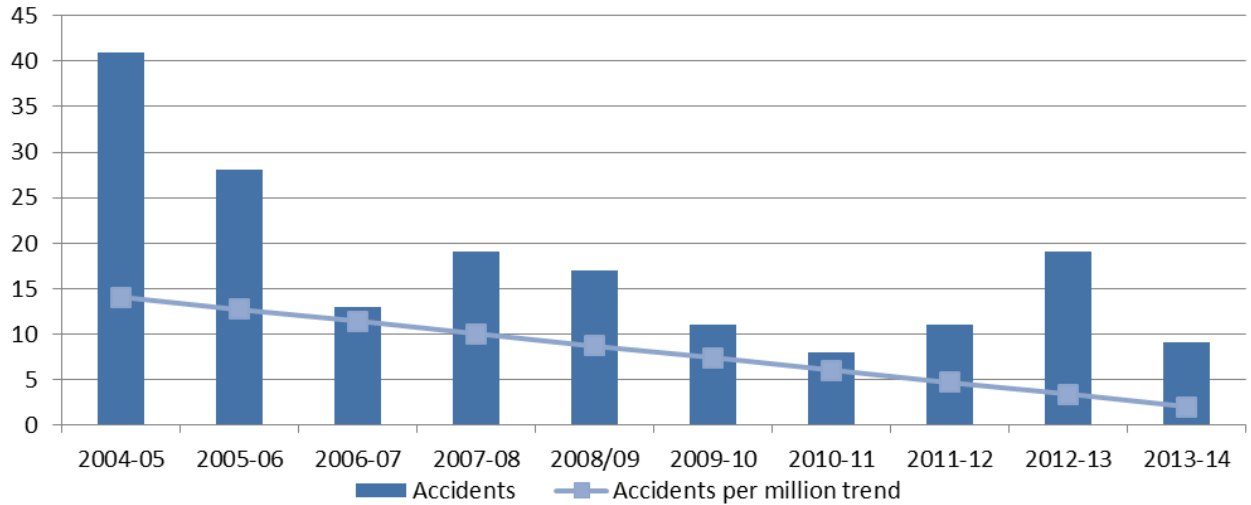
Chart 5: Fatalities - Primary electrical source



5.2 Non-fatal Electrical Accidents

There were 177 non-fatal electrical accidents over the reporting period. Chart 6 below shows a decreasing trend for non-fatal electrical accidents.

Chart 6: Electrical accidents

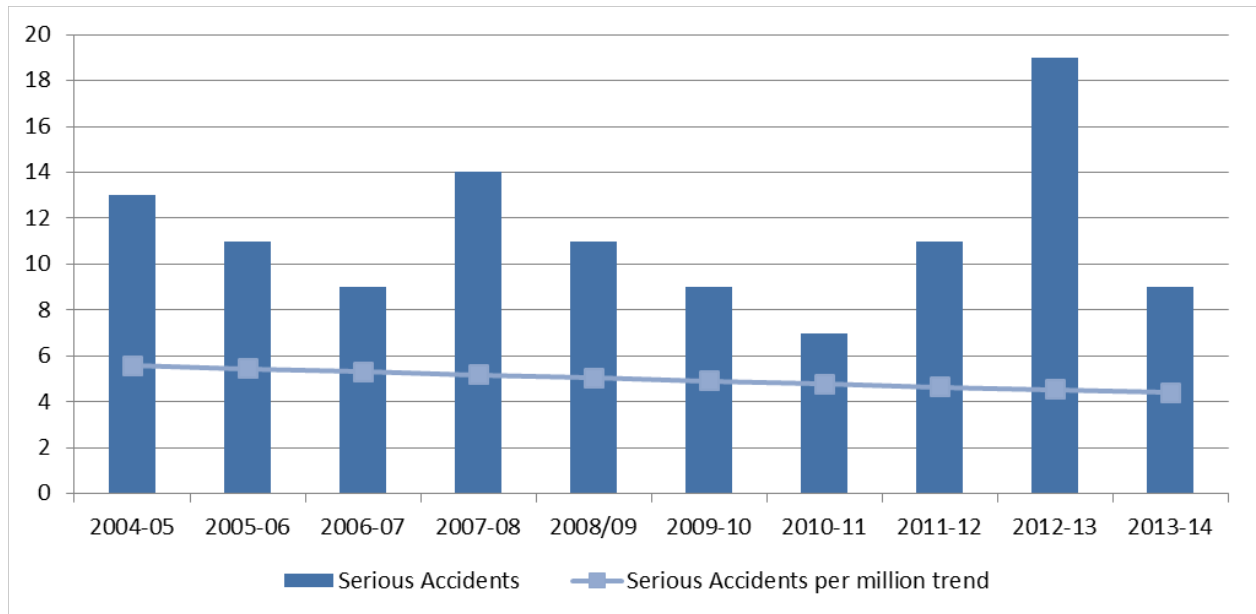


Accidents have been broadly classified into serious electrical accidents which typically require the victim to be hospitalised for treatment of injuries; and electrical accidents (medical treatment) where first-aid or medical attention, excluding attendance for a precautionary electrocardiograph (ECG) is sufficient for the treatment of injuries sustained in the incident.

5.2.1 Serious Electrical Accidents (Hospitalisation)

There were 113 serious electrical accidents over the ten year period, nine of which occurred in 2013-14 (Chart 7). The trend for such accidents shows a very minor decrease indicating an area that would benefit from safety education and awareness. There was a significant increase in this category in 2012-13 with 16 of the 19 accidents occurring in the workplace.

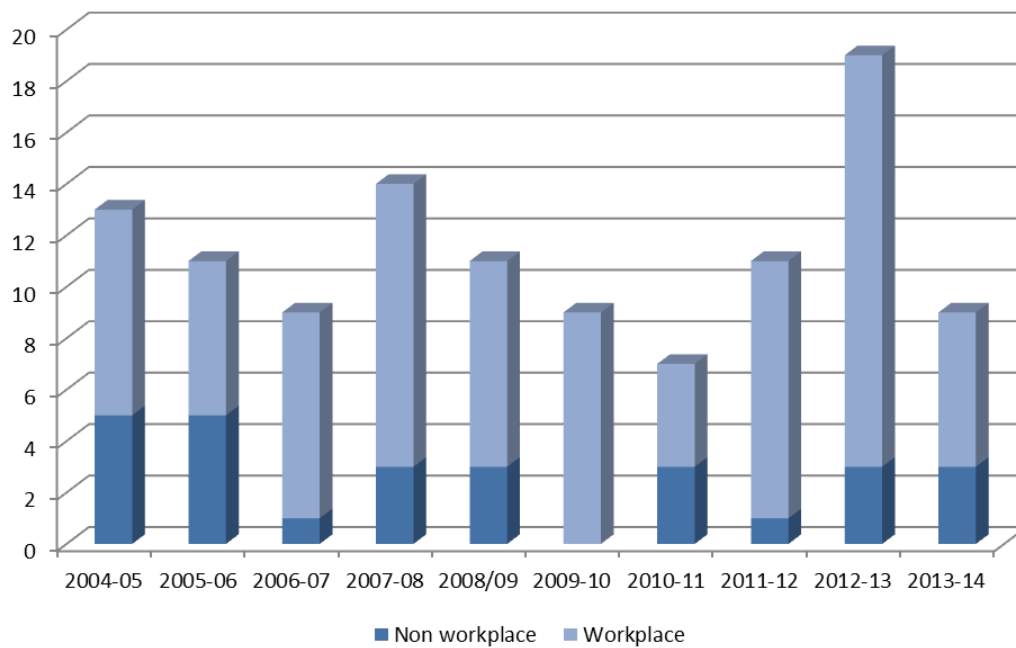
Chart 7: Serious electrical accidents



Analysis of serious electrical accidents indicates that 80 per cent occurred in the workplace (Chart 8). There was a significant increase in this category in 2012-13. 16 of the 19 accidents occurred in the workplace.

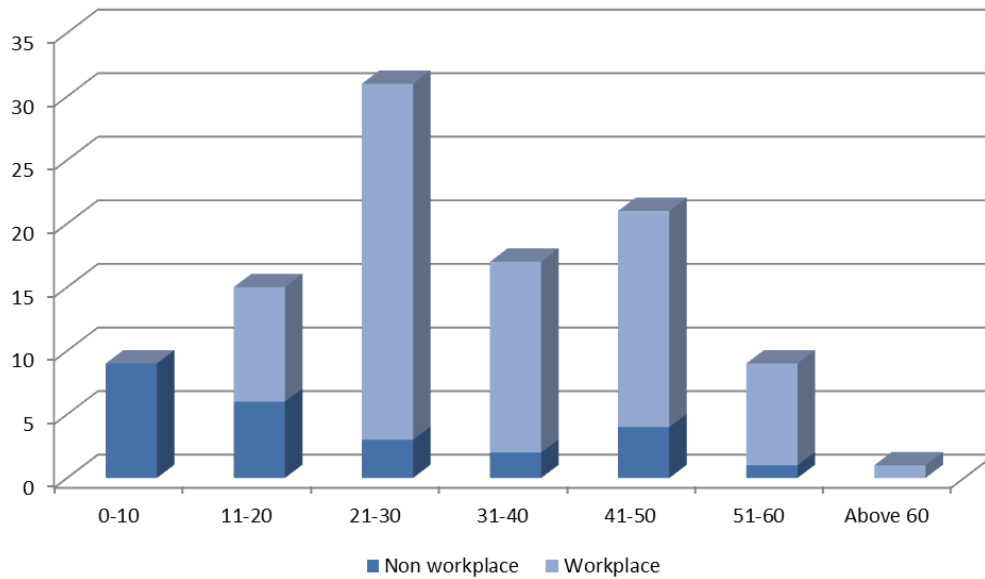
Working on or near energised electrical equipment is the leading cause of serious electrical accidents for workers. In 2008, the Director of Energy Safety issued a new *Code of Practice - Safe LV Work Practices by Electricians* (Code). The Code significantly restricts work on or near live parts of an electrical installation.

Chart 8: Workplace and non-workplace serious electrical accidents



The age profile of serious electrical accidents (Chart 8) shows that most accidents occurred between the age group of 20 and 50.

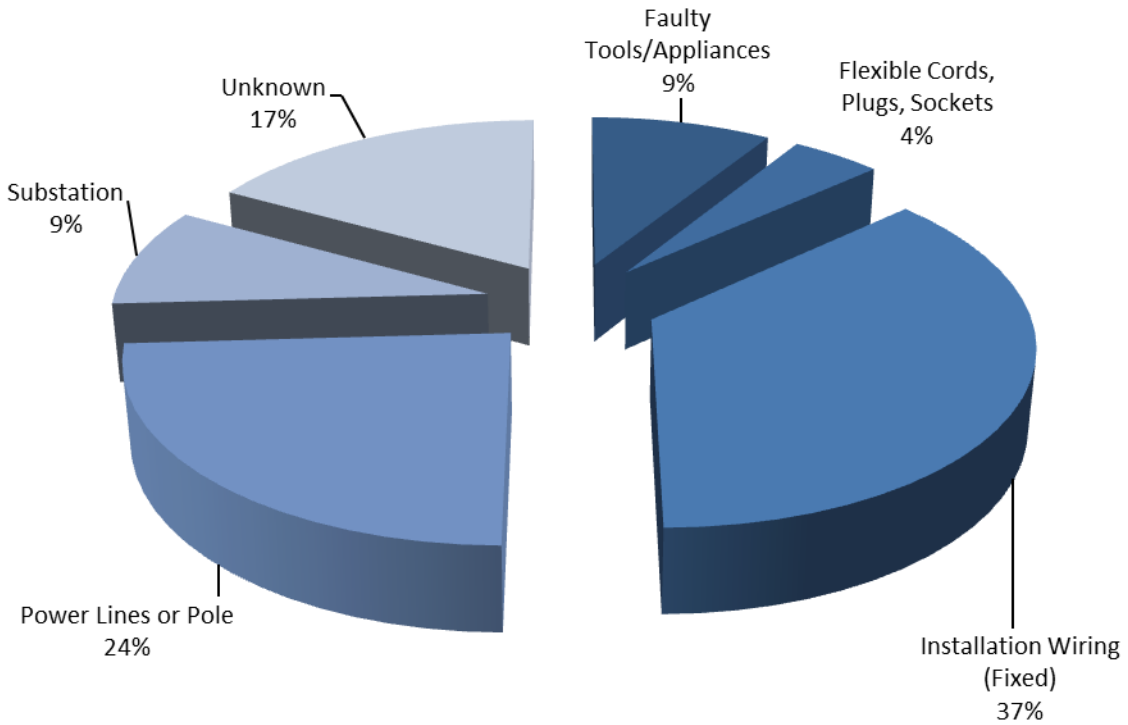
Chart 9: Workplace and non-workplace serious electrical accidents by age group



The primary electrical cause of serious electrical accidents is fixed wiring installations with 37 per cent of incidents in this category (Chart 10). Incidents related to power lines/power poles accounted for 24 per cent of serious electrical accidents.

Historically work near power lines, including tree pruning has been a safety concern.

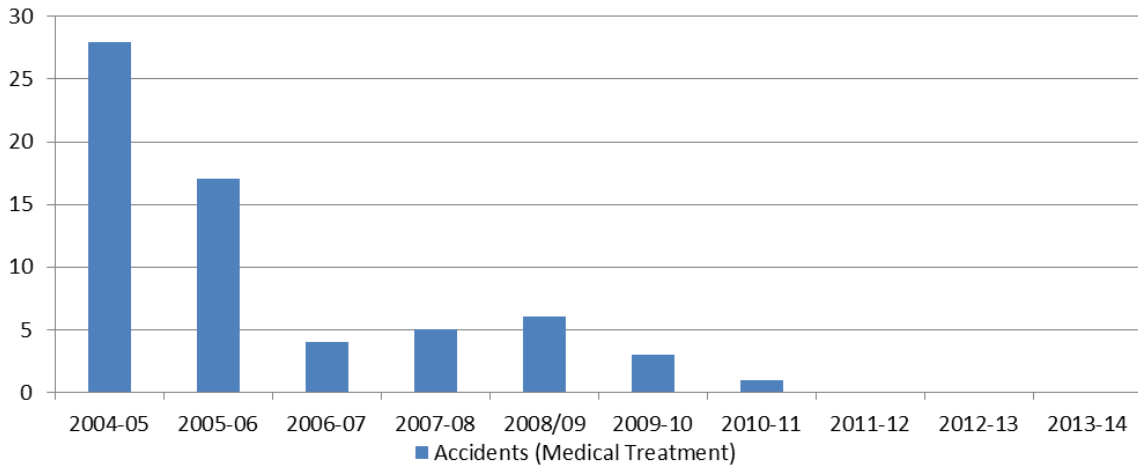
Chart 10: Serious electrical accidents - Primary electrical source



5.2.2 Electrical Accidents (Medical Treatment)

Some accidents require medical treatment but are not serious enough to warrant hospitalisation. There were 64 such accidents over the reporting period, with no accidents reported for the three years 2011-12 to 2013-14.

Chart 11: Electrical Accidents (Medical Treatment)



77 per cent of accidents requiring medical treatment occurred in the workplace (Chart 12).

Chart 12: Electrical Accidents (Medical Treatment) - Workplace and non-workplace

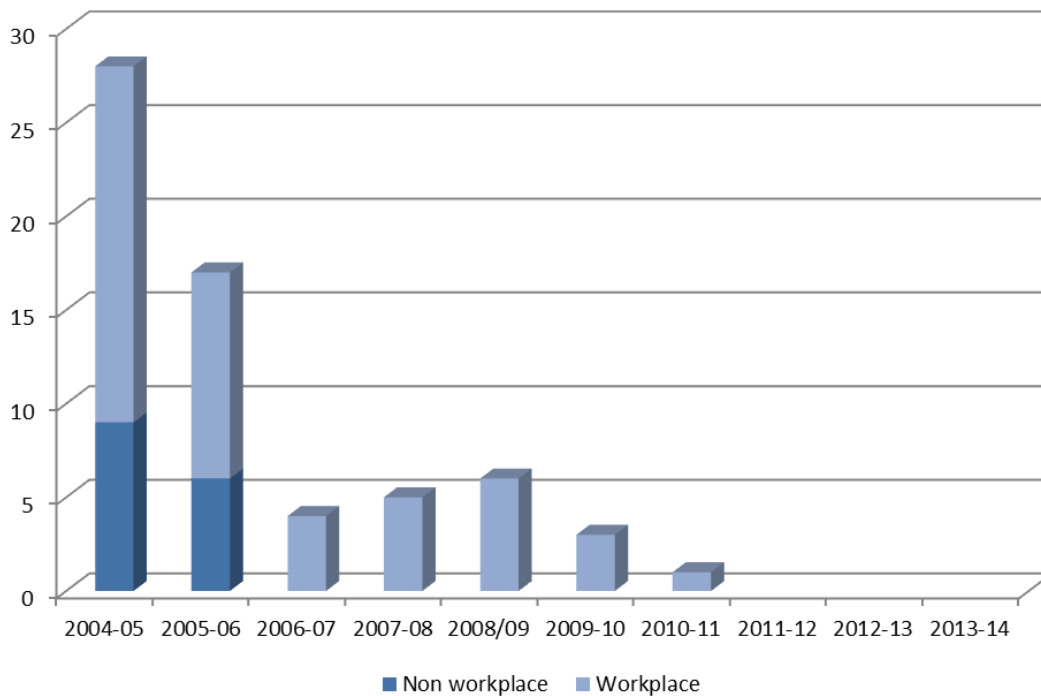
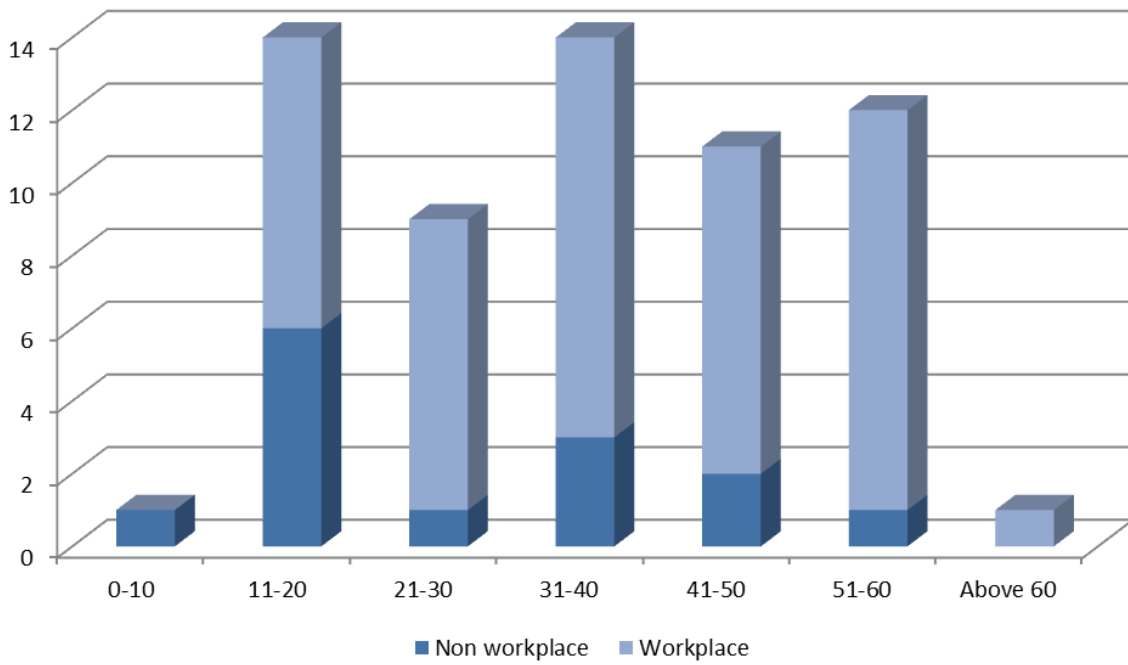
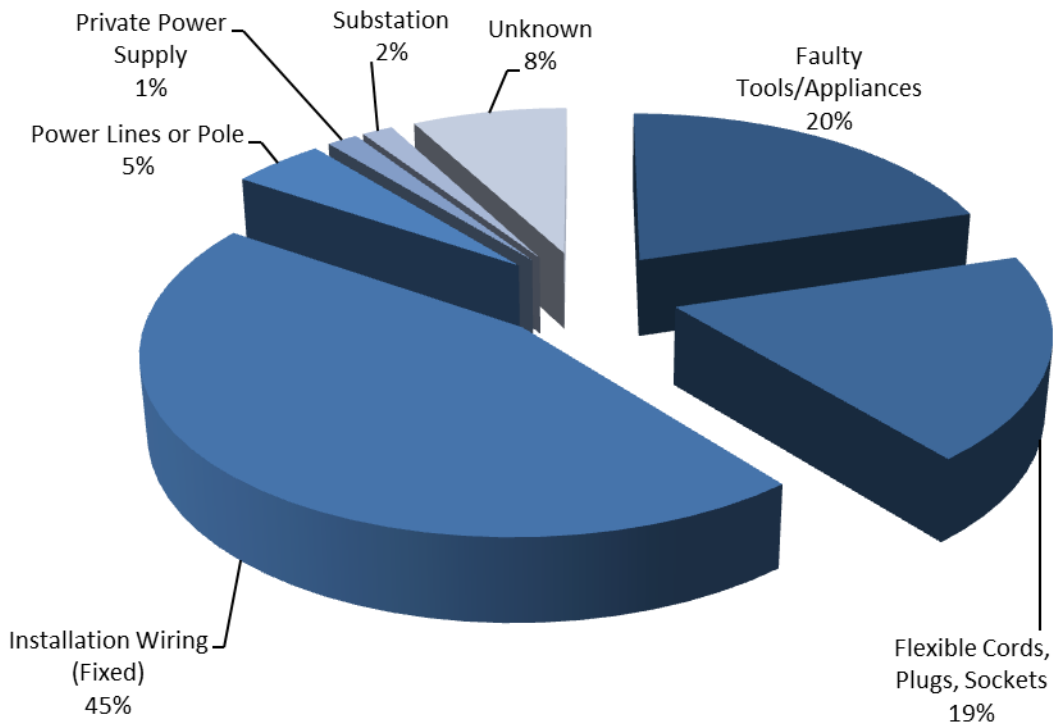


Chart 13: Electrical Accidents (Medical Treatment) - Workplace and non-workplace by age



The accidents were spread across the age groups with the most accidents occurring in the 11-20 and 31-40 age groups.

Chart 14: Electrical Accidents (Medical Treatment) - Primary electrical source



Fixed wiring at (45 per cent) was the main contributor in this category.

5.3 Electric Shock

There were 12,759 electric shocks reported from 1 July 2004 to 30 June 2014. The reporting of electric shocks is encouraged, however due to the low severity of the effects of these incidents the accuracy of these figures in comparison to reality may differ. Across the reporting period there has been a steady increase in the trend for the number of reported electric shocks.

Chart 15: Electric Shocks in WA - 2004-05 to 2013-14

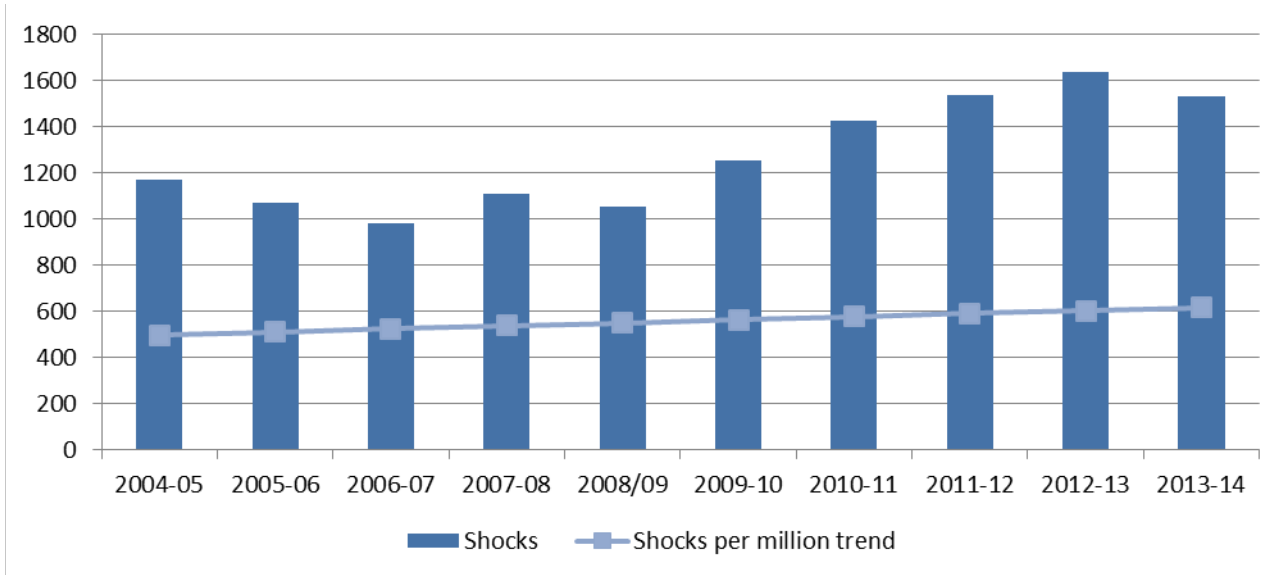
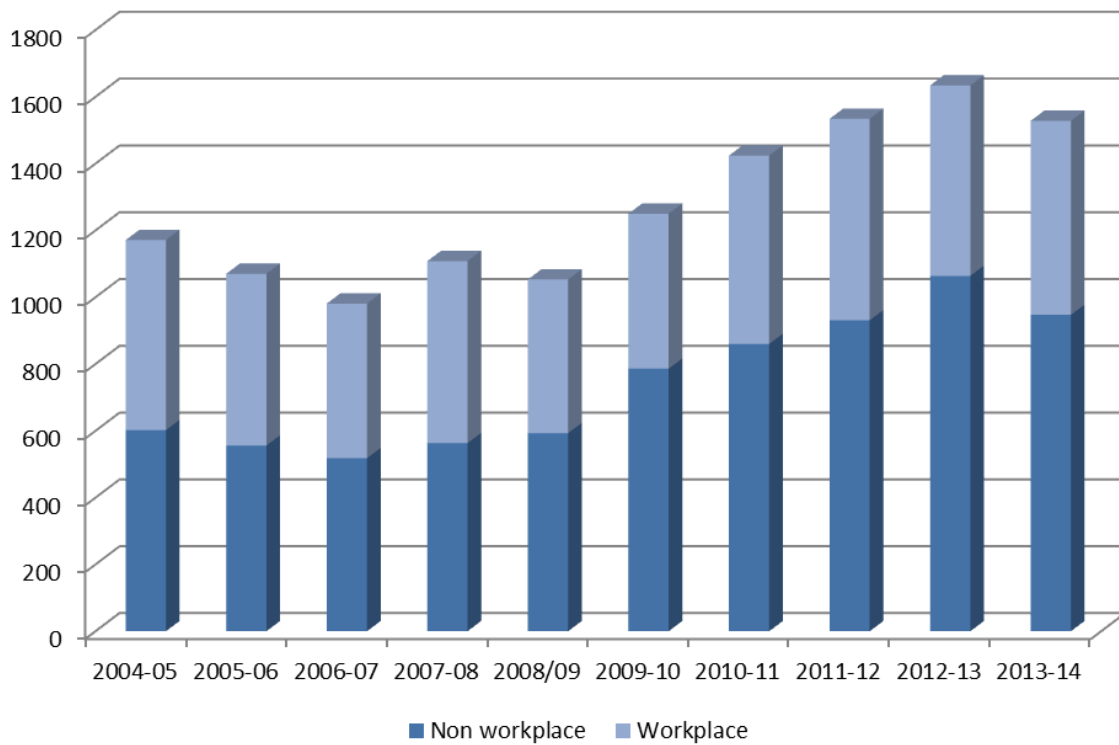


Chart 16: Electric Shocks – Workplace and non-workplace



42 per cent of shocks occurred in the workplace. The number of shocks reported in the non-workplace category has increased over the reporting period.

6 Conclusion

The analysis of incidents reported to *EnergySafety* indicates that members of the general public are most affected by incidents resulting in a fatality. There are significant risks for workers and specifically electrical workers, but these risks are mitigated by workplace safety guidelines and legislation. It is therefore important to continue to focus on electrical safety in the general community. This has previously been achieved through tailored advertising programs encouraging the safe use of electricity and the ensuring that work is carried out by licenced electrical contractors.

Electrical accidents have shown a decrease over the reporting period. The declining trends in this category may be attributed to improved work practices as a result of improvements in the electrical installation standards and other electrical guidelines issued by *EnergySafety*.

The reporting of electric shocks has also indicated that the majority of the incidents involve members of the public. This again substantiates the need for education and awareness programs or advertising that will help prevent serious incidents.