

Electrical Fire Risk in Residential and Non-Residential Properties

**A Report prepared by
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Foreword

The Energy Safety Service (ESS) is responsible for ensuring safe production, supply, installation and use of electricity and gas. The ESS and the Ministry of Consumer Affairs form the Consumer Affairs Branch of the Ministry of Economic Development.

During 2005, ESS conducted a research project to determine the safety risks associated with wiring systems employed in residential properties during the 1940s and 1950s. This research found that about half (29,000) of total electrical fires occurred in areas other than residential properties during 1986 and 2003. Two-thirds (about 19,000) of the residential property fires were caused by heat from electrical equipment. A further analysis was not carried out for these two types of fires at that time because it was outside the scope of the project.

This report provides findings from an analysis of the electrically-initiated heat fires in residential property and electrically-initiated arc fires in non-residential properties.

A handwritten signature in black ink, appearing to read 'G. Boxall', is positioned above the printed name and title.

Graham Boxall
Operations Manager, Energy Safety Service.

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Executive summary

Recently the Energy Safety Service (ESS) undertook a research project to determine the safety risks associated with wiring systems used in residential properties during 1940's and 1950's.

The analysis found that about half (29,000) of the total electrical fires occurred in areas other than of residential properties* between 1986 and 2004. Two-thirds (about 19,000) of the residential property fires were caused by heat from electrical equipment.

This report provides findings from an analysis of the electrically-initiated heat fires in residential property and electrically-initiated arc fires in non-residential properties.

Heat initiated fires in residential properties

Heat-initiated fires in residential properties have more than doubled (from 500 to 1300 per year) during the 1986-2004 period. Cooking appliances (oven/stove, cook top unit) accounted for 40% of heat initiated-fires in residential environments. Heat-initiated fires, caused by portable electrical heaters, portable heating equipment (such as electric blankets), lighting fixtures, washing machines and dryers, were minimal (within a range of 1% to 4%).

Fires linked with cooking appliances are less destructive than portable radiant bar heaters, incandescent lights and electric blankets. However, the occurrence of a cooking appliance fires is comparatively higher. Most fires occur in the kitchen, with kitchen fires accounting for 85% (18,000 of 20,000) of heat initiated fires in residential properties.

Over half (10,000) of heat-initiated fires were caused by negligence (non-attendance or falling asleep while operating equipment) and other causes such as heat sources too close to combustible materials, carelessness, and failure to clean equipment, each contributed to about 4% to 6% of total fires.

In residential properties, fires initiated by heat appear to cause more readily casualties than arc fires. On average, one fatality occurs per every 200 heat-fires (approximately five people per year) while one fatality occurs per every 300 arc fires (approximately two people per year). In comparison, one person is injured for every 13 heat fires (85 people per year) while one person is injured every 23 arc fires (approximately 25 people per year).

Cooking equipment (oven/stove/cooking top) are the most dangerous appliances in terms of the fatality and injury. An estimated 40% of the total (10 of 26) number of heat-initiated fatal fires caused close to 50% (16 of 34) of the total number of fatalities over the six-year period from 1999 to 2004. Also, close to half (258 of 546) of the total number of all injury causing fires (and similar level of people injured) were due to cooking equipment. Negligence (unattended appliances or sleeping) while operating an

* Combination of vehicle and non-residential fires

appliance was the major contributing factor of fatalities and injury, with it being responsible for almost 50% of total fatalities.

Arc-initiated fires in non-residential properties

About half of the total (30,600 of 62,000) of electrical fires occurred in 'other than residential properties' (14,000 in motor vehicles and 17,000 in non-residential properties) between 1986 and 2004. About 75% (24,000) of these fires are initiated by an electrical arc. About half (12,000) of these arc fires are non-residential.

The risk of arc fires in non-residential properties is approximately 190% more than heat-initiated fires in non-residential environments. Both categories have increased at a constant rate over the last 19 years, implying the relative difference between them has also remained consistent.

Almost 50% (300 fires per year) of all non-residential arc fires occurred in commercial, retail, manufacturing and storage sites. A further 20% (140 fires per year) of non-residential arc fires occurred in rural, farming and forestry areas. 10% of arc fires occurred in health institutions and 5% in health and education institutions. Lighting fixtures are the largest contributor to arc-initiated fires and has increased from 20 fires per year (1986) to over 100 fires per year.

Short circuit, earth fault and 'other' electrical failure were the cause of over two-thirds of all non-residential fires. Approximately 30% of non-residential arc fires caused some form of structural damage to buildings. Conversely, 50% caused no structural damage, even though fire had occurred within a building.

Since 1986, the number of casualties by non-residential electrical fires is approximately one-third less than the number of residential electrical fire casualties. Approximately 18 fatalities and 470 injuries were caused by non-residential (arc-and-heat initiated inclusive) fires.

Electrical wiring fire[†] risk in residential and non-residential properties

Background

The Electricity Act aims to provide the safe production, distribution and usage of electricity. The ESS is responsible for administering the Act and focuses on safety, supply and measurement across the electricity sector. The safety of electricity supply and usage in residential and non-residential environment fits within this responsibility.

Recently ESS undertook research to determine the safety risks associated with wiring systems used in residential properties during the 1940's and 1950's.

Fire is perceived as the leading recognised hazard among electrical wiring and electrical equipment. Information pertaining to electrical fire accidents was obtained from the New Zealand Fire Service (NZFS) to establish the number of fires caused by electrical wiring in residential dwellings during the 1940's and 1950's, relative to fires associated by electrical wiring used today.

Between 1986 and 2003 an estimated 59,000 electrical fire incidents occurred, of which half of the fires (30,000) occurred in residential dwellings. The other half (29,000) were a combination of vehicle and non-residential properties. Recent fire data markedly demonstrates a continuing trend in the association of electrical fire incidents relative to the type of dwelling.

Approximately one-third of residential dwelling fires (11,000) were caused by an electrical arc and two-thirds (19,000) by heat from electrical equipment. The non-residential dwelling fires demonstrate a reversal of this trend. Three-quarters (about 22,000) of vehicle and non-residential combined fires are caused by an electrical arc, and less than one quarter (about 7,000) by heat from electrical equipment.

Objectives

Research from the older wiring project found about half (29,000) of total electrical fires occurred in properties other than residential during 1986 and 2003[‡]. Two-thirds (about 19,000 of 29,000) of the residential property fires were caused by heat from electrical equipment. Further analysis of such fires was not investigated given time constraints and that fact that it was outside the scope of the older wiring project. However, an examination of such data is important in determining whether action should be undertaken in addressing the fire issues raised. With this in mind, the objectives of this analysis were formulated as follows:

- To determine the specific cause and the equipment involved in electrical heat fires in residential dwellings.

[†] Fires initiated by electrical arc or heat from electrical equipment which has resulted in damage to property.

[‡] Electrical wiring systems and fire risk in residential dwellings, April 2005, Vallabh Patel ISBN 0-478-28436-5

- To determine the specific property type, cause and equipment involved in electrical arc fires in non-residential environment dwellings.

This report provides the findings of this analysis.

Method

The New Zealand Fire Service (NZFS) maintains a database of fire incidents attended by their officers. The database contains information of relevance relating to casualties, building age, type of equipment involved in the fire and the causes of fires. For this project, NZFS made electrical fire data available. Data between 1986 and 2004 were analysed for this study.

Electrical fires are identified by the following categories of ignition source in the NZFS database:

| Heat source code: | |
|--|---|
| Arcing or overloaded electrical equipment (fire initiated by short circuit arc) | |
| <i>Short circuit arc</i> | |
| 31 | Water cause |
| 32 | Mechanical damage |
| 33 | Defective or worn insulation |
| 34 | Unspecified |
| <i>Arc from</i> | |
| 35 | Faulty, loose or broken conductor |
| 36 | Switch or electrical fence and operating equipment (excludes static discharges) |
| <i>Heat from overloaded equipment</i> | |
| 37 | Heat from overloaded equipment |
| <i>Fluorescent light ballast</i> | |
| 38 | Fluorescent light ballast |
| 39 | Other – unable to be classified further |
| Hot objects (fire initiated by heat from electrical equipment) | |
| <i>Electrical lamps</i> | |
| 44 | Electrical lamps |
| <i>Heat from electrical equipment</i> | |
| 46 | Properly operating |
| 47 | Improperly operating |

Information pertaining to house, flat, home unit and apartment fires are separated from all electrical fire records and classified as 'residential fires'. The remaining electrical fires are classified as 'other than residential property fires'. Motor vehicle fires are separated from the remaining fires and left over electrical fires are classified as 'non-residential fires'.

Electrical fires are commonly classified by two main types; arc-initiated fires and fires initiated by heat from electrical equipment. Arc-initiated fires typically occur due to

electrical short circuiting of worn or damaged cable or overloaded equipment. Conversely, heat-initiated fires normally occur by heat from correctly/incorrectly operating electrical equipment.

All electrical fires are classified on the basis of the ignition source provided by the NZFS. For simplicity, ignition sources 31-39 are classified as arc initiated fires and 44, 46 and 47 are classified as heat initiated fires (see table above).

Limitations

The correct cause of electrical fires may not always be accurately established by the NZFS given their limited electrical expertise. Therefore, minor uncertainties may exist in the actual cause of fires. However, for purposes of ascertaining general comparative trends and quantifying occurrences of significant fires by geographical locality, the data is considered useable to an accurate and measurable standard.

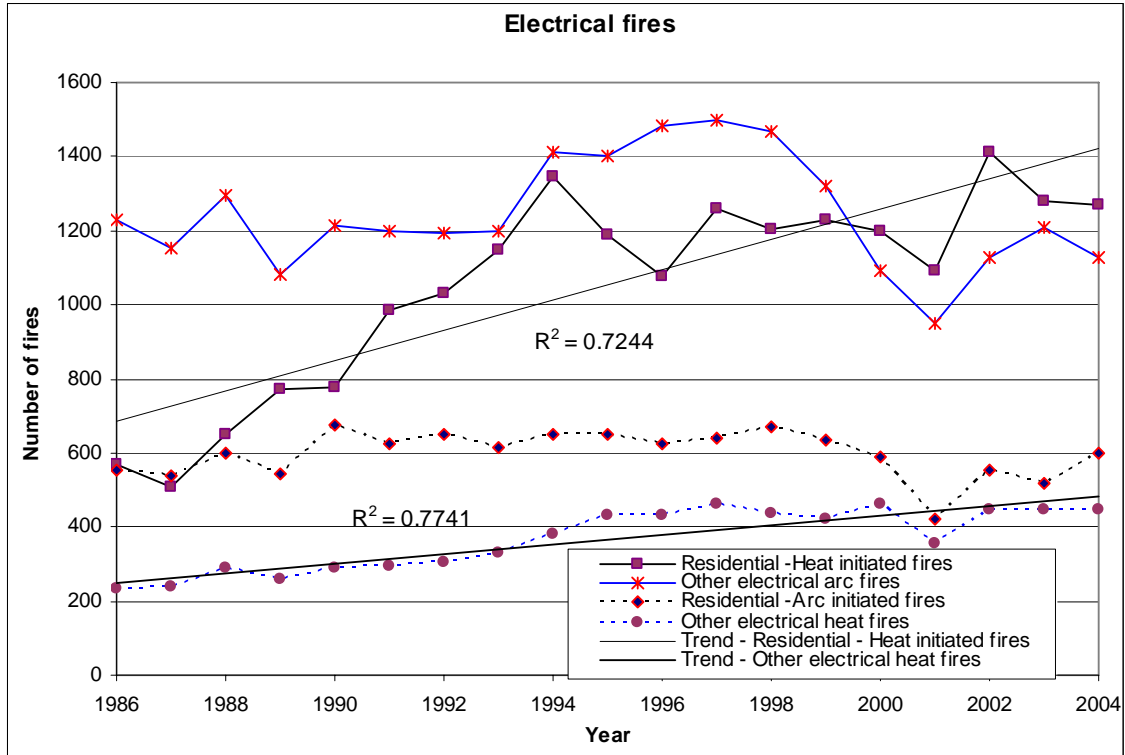
Work stoppages and industrial disputes between 1999 and 2000 resulted in incidents not being reported. However, these minor omissions in the data have not affected the analysis of the broader comparable trend.

Analysis and discussion

Before performing separate analysis of heat fires in residential properties and arc fires in non-residential properties respectively, all electrical fires between 1986 and 2004 are investigated in order to determine comparative trends. The following analysis examines all electrical fires categorised by heat and arc fires and cross-tabulated by residential property and other[§] fires. Graph one presents the emerging trends of fires occurring in various environments. A correlation coefficient R^2 in the graph is used to measure the relative strength of association between the number of fires with the time.

[§] Other than residential property fires – a combination of vehicle and other non-residential fires

Graph: 1



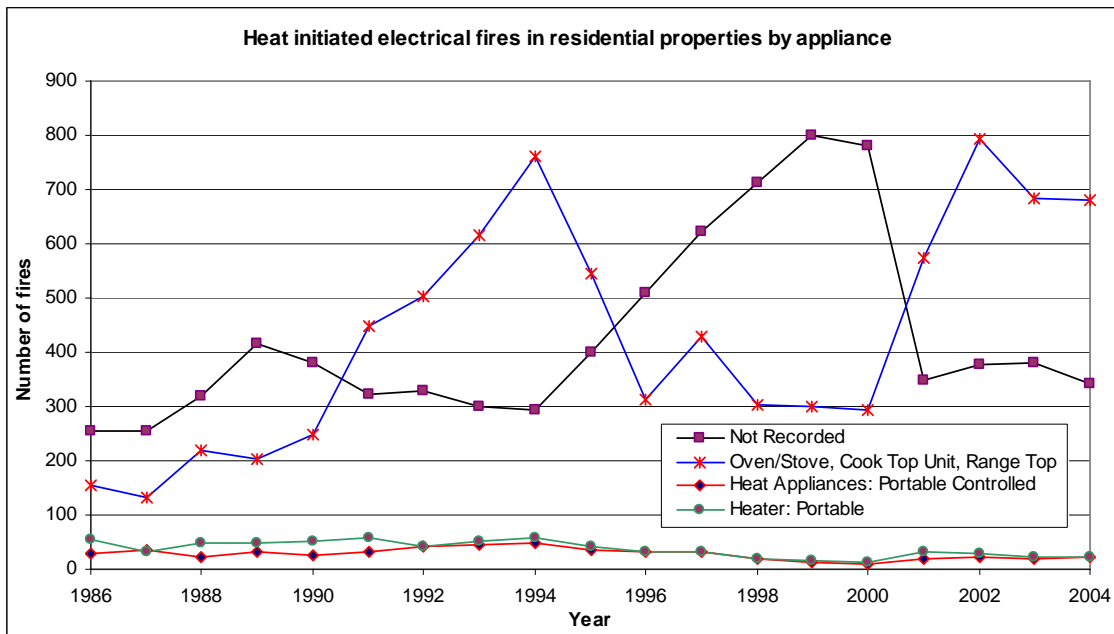
Key findings:

- 62,000 electrical fires occurred during 1986-2004, averaging 3,200 fires per year. About half (31,000) of electrical fires occurred in residential properties. Residential property and other electrical fire trends have comparably increased during the 19 year analytical period. The last five years of analysis (2000-04) has demonstrated a marked 20% escalation in fires when compared with the first five years (1986-1990).
- Since 1986, heat-initiated fires in residential properties increased by more than two and half times - from 500 fires to 1300 fires per year. Conversely, arc-related fires have remained constant with 600 fires occurring per year.
- The heat-initiated fires in motor vehicle and non-residential properties combined have also risen over the 19 year period, but arc-initiated fires have remained reasonably stable, which is similar to the trend found for the residential property fires. The heat-initiated fires in motor vehicle and non-residential properties combined has almost doubled over the 19 year period; from about 250 per year in 1986, to about 450 per year in 2004. However, the number of arc-related fires fluctuate around the 1,200 figure per year (with a larger fluctuation from one year to another), except for 1992-94 periods.
- In brief, heat-initiated fires have risen over 19 years while arc-related fires remained reasonably stable. However, heat initiated fires in residential properties and arc initiated fires in other types of properties dominated in terms of numbers.

Heat-initiated fires in residential properties

Over 31,000 electrical fires occurred in residential properties between 1986 and 2004. About two-thirds (20,000) of these fires were initiated by heat, with the remainder by arc from electrical equipment. Electrical fires in residential properties have steadily increased since 1986 with this increase mainly contributed to by heat-initiated fires. This type of fire has increased from 500 to 1300 fires per year, an increase of 160% between 1986 and 2004. Graph two shows the electrical appliance category involved in heat-initiated electrical fires.

Graph: 2



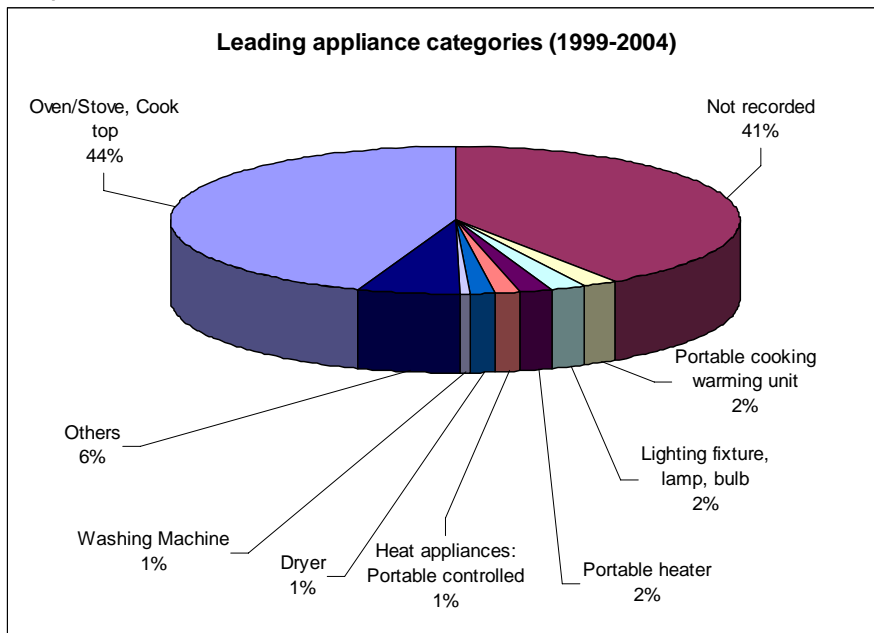
Key findings:

- 40% (8,150) of heat-initiated fires can not be linked to faulty electrical equipment because relevant data is not recorded. This has intensified by over 50% between 1996 and 2000. Variability with the recording of data is signified further in fires associated with cooking.
- A long-term trend is not identifiable over the analytical period given variability in identifying and recording the type of electrical equipment involved in fires.
- Cooking appliances (oven/stove, cook top unit) have contributed toward an estimated 40 percent (about 8100) of heat-initiated fires in residential properties between 1986 and 2004.
- Portable electrical heaters, portable heating equipment (electric blankets), lighting fixtures and washing machines and dryers each contribute minimally (within 1% to 4%) to the heat initiated fires in residential properties.
- Over half (10,200 of 20,000) of heat-initiated fires were caused by negligence (not attending or closely monitoring equipment, and falling asleep while equipment is operating).

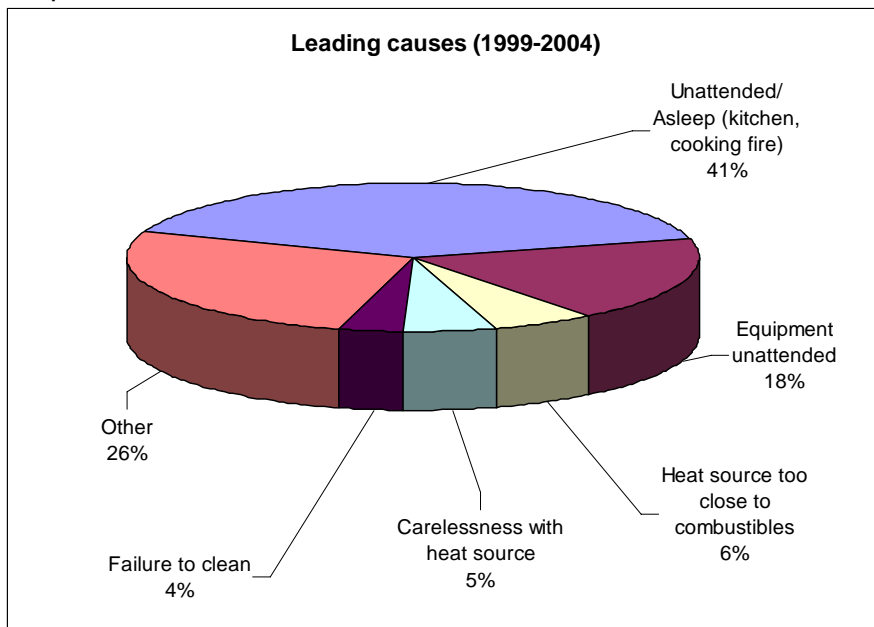
In depth analysis of fires over the last six years in residential properties (1999-2004)

Long term data enables the analysis of general trends to elicit any substantial effect of various historical events, such as change in legislation and industry practices. However, the consistency of long term data gathering can be affected by a number of factors, such as changes in the data recording categories of the data collection system. It can also be influenced by broader changes in the environment, such as changes in electrical technology and equipment population, and changes in usage levels.

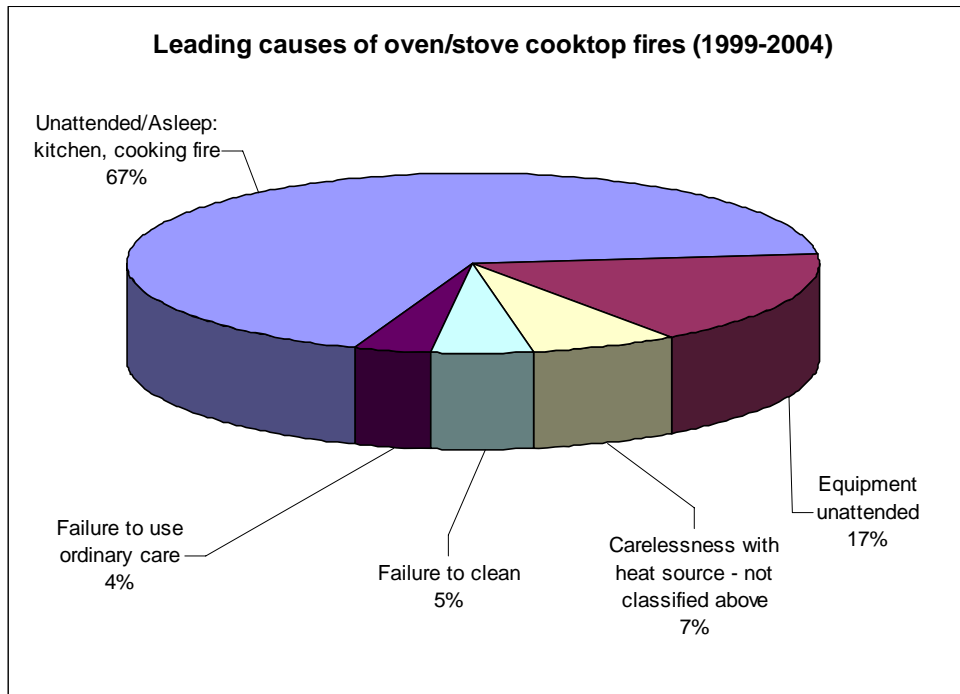
Graph: 3



Graph: 4



Graph: 5



Key findings:

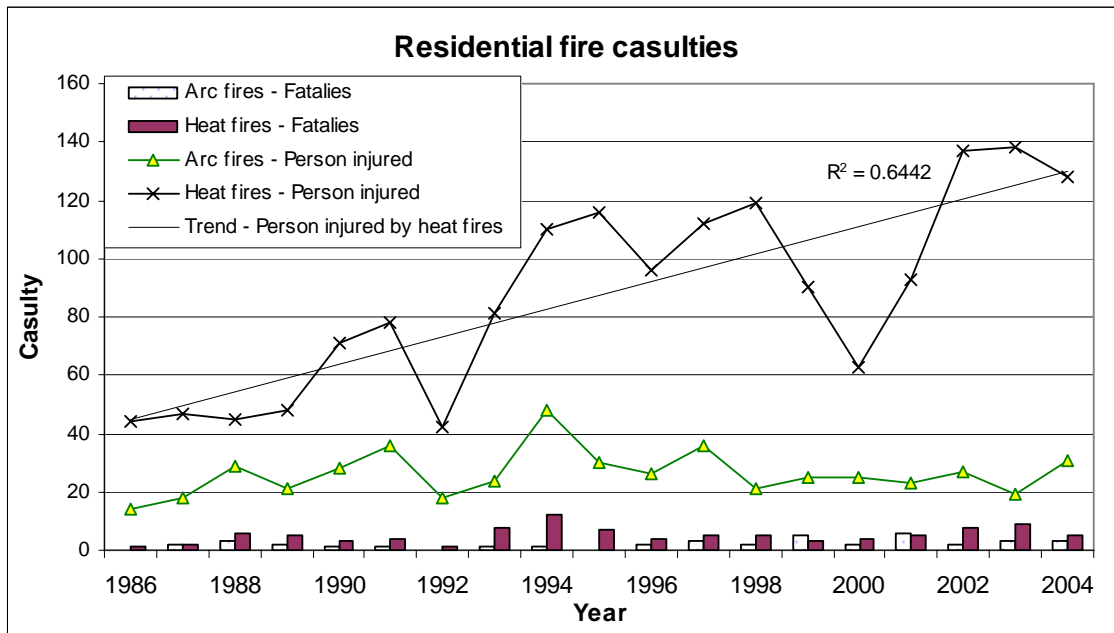
- Of the 11,000 electrical fires in residential properties between 1999 and 2004, 70% (7,500) were initiated by heat.
- 44% (3,300) of the total number of heat-initiated fires in residential properties between 1999 and 2004 involved to cooking appliances (oven/stove, cook top units). In 41% (3,000) of the total heat-initiated fires the equipment involved was not identified in the NZFS database. The last four years (2001-2004) has seen an increase from 25% (300) to over 50% (700). The rise in heat-related fires is due to the improvement in the electrical equipment identification of fires over the last six years (1996-2000).
- The contribution to the total number of fires by portable electrical heaters, portable heating equipment (electric blankets), lighting fixtures, and washing machines and dryers is each within 1% to 2% of heat fires.
- Property damage caused by fires initiated by heat appears to be less destructive today. In 1986 about 70% (400 of 550) of heat initiated fires caused structural damage while only 30% (400 of 1,300) of fires in 2004 caused such damage.
- About 60% of portable radiant bar heaters, incandescent lights and electric blanket fires are likely to cause structural damage to a residential property. This equipment is the most destructive of all. However, in terms of the total number of fires, their contribution remains minimal (less than 20 fires a year caused by each of these types of equipment).

- 20% of the cooking fires caused structural damage. A smaller percentage of cooking appliance fires appear to cause structural damage to buildings, however, the number of cooking equipment fires remains high with nearly 550 fires per year (approximately 50% of the heat-initiated fires). Therefore the actual number of structural damage causing fires by cooking appliances is relatively high (over 100 per year).
- Kitchen areas in residential properties are among the most hazardous environments for the occurrence heat-initiated electrical fires. Approximately 85% of heat fires (over 1,000 per year) originated in kitchen areas.
- Close to 60% of heat-initiated fires (over 700 per year) were caused by negligence (non-attendance or falling asleep while operating equipment). The categories of 'heat source too close to combustible', 'carelessness' and 'failure to clean' accounted for between 4% and 6% (between 50 and 70 per year) of total fires.

Fire casualties in residential property

A large portion of residential electrical fires cause property or structural damage only. However, a small number of fires cause casualties or multiple casualties. In this section, information pertaining to injuries (minor to severe) and fatalities caused by electrical fires in residential properties will be separately analysed for arc and heat-initiated fires. The findings are presented in Graph six.

Graph: 6



Key findings:

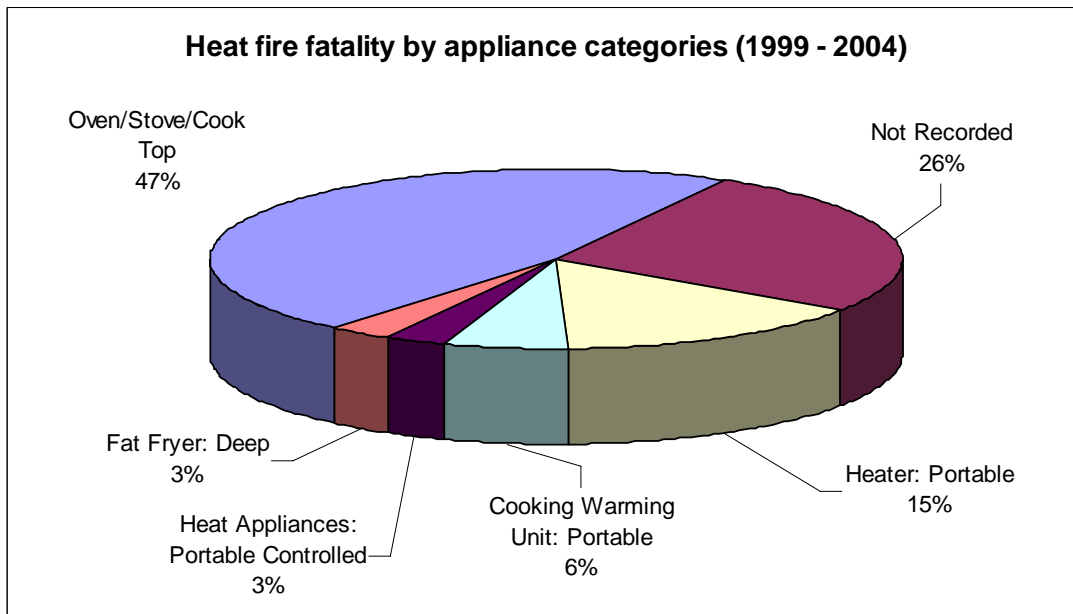
- 136 people were killed and 2,150 people were injured by electrical fires in residential properties between 1986 and 2004. Over 70% of these fatalities and injuries were caused by fires initiated by heat, the remainder were contributable to arc fires.

- The relative risk of a fatality or injury occurring by heat-initiated fires is greater than electrical arc-initiated fires. It is estimated that one death occurs per every 200 heat-initiated fires (which averages to six fatalities per year). This compares with one death per every 300 arc fires (an average of 3.5 fatalities per year). It is further estimated that one person is injured per every 13 heat-initiated fires while one person is injured for every 23 arc-initiated fires.
- The number of people injured as a result of heat-initiated fires has risen from 45 in 1986 to 130 in 2004. A similar trend is found for the occurrence of heat-initiated fires which increased from 550 in 1986 to 1,270 in 2004. The current injury rate, however, has fallen (one person injured per every 10 heat initiated fires) markedly when compared to the injury rate of 1986 (one person injured per every 12 fires).

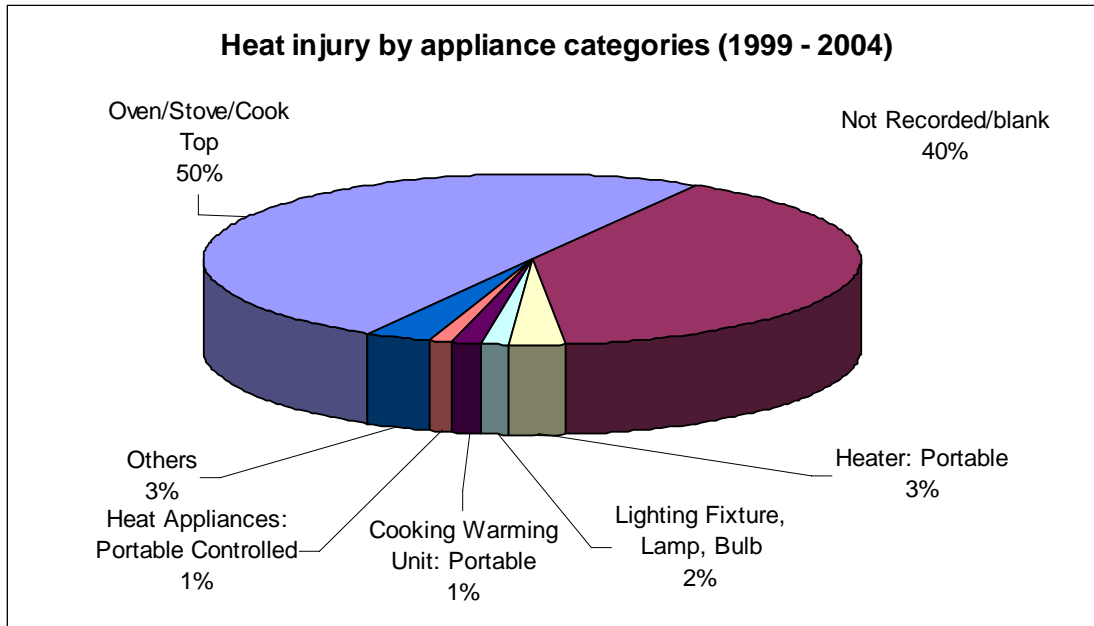
In depth analysis of last six years heat fire casualties (1999-2004)

The last six years of heat-initiated fire casualty data in residential properties has been analysed to determine recent trends.

Graph: 7



Graph: 8



Key findings:

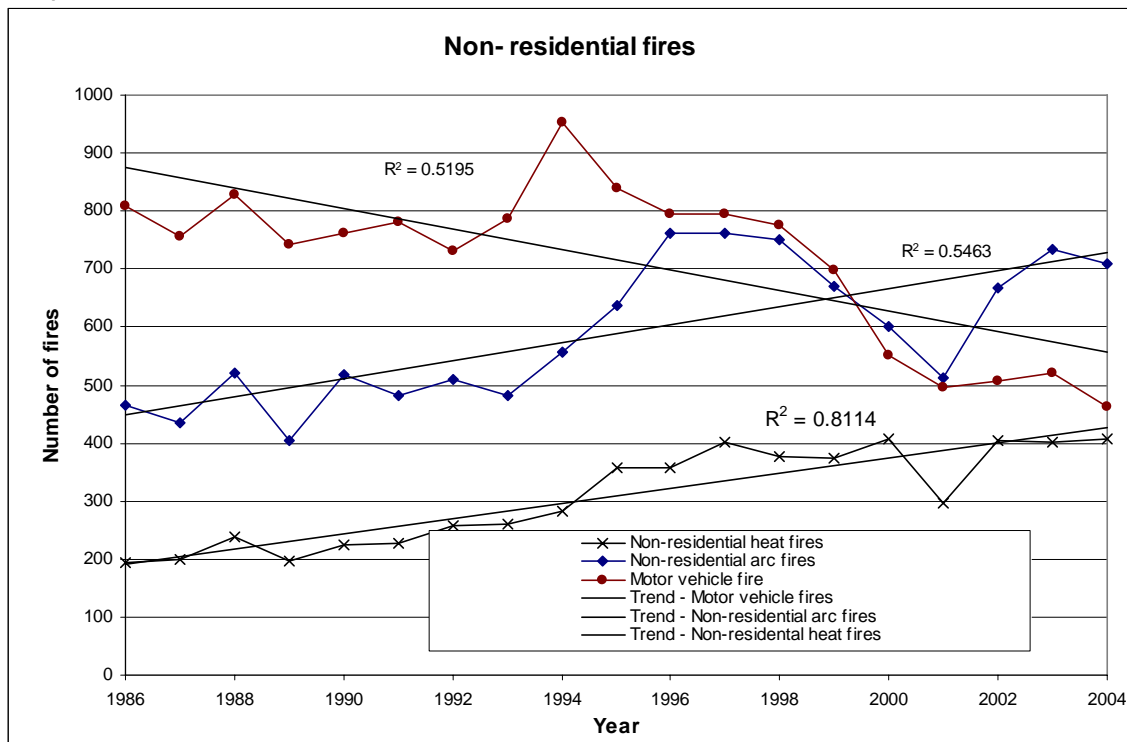
- During the 1999-2004 period, there has been an average of four heat-initiated fires causing on average six fatalities occurring per year. Furthermore, an average of 100 heat-initiated fires per year injured 110 people.
- Cooking equipment (oven/stove/cook top) was found to be the most hazardous appliance in residential properties (see graphs seven and eight). 40% (10 of 26 fires) of the total number of heat-initiated fatal fires were responsible for over half the total (16 of 34) of fatalities and about 40% of the total number of injuries (285 of a total of 650).
- Negligence (non-attendance or falling asleep) during the operation of a cooking appliance in kitchen areas accounted for 75% of (25 of 34) of the total fatalities and over 50% (347 of 636) of the total number of injuries during the past six years by fires initiated by heat.
- In brief, heat initiated residential fire is more dangerous than arc initiated fires. More people died or were injured by heat initiated fires.

Arc-initiated fires in non-residential properties

From 1984 to 2004, electrical fires in motor vehicle and non-residential properties combined were responsible for nearly half the total number (30,600 of total 62,000) of electrical fires. Furthermore, it is estimated nearly 75% (24,000) of all of these fires are the result of an electrical arc.

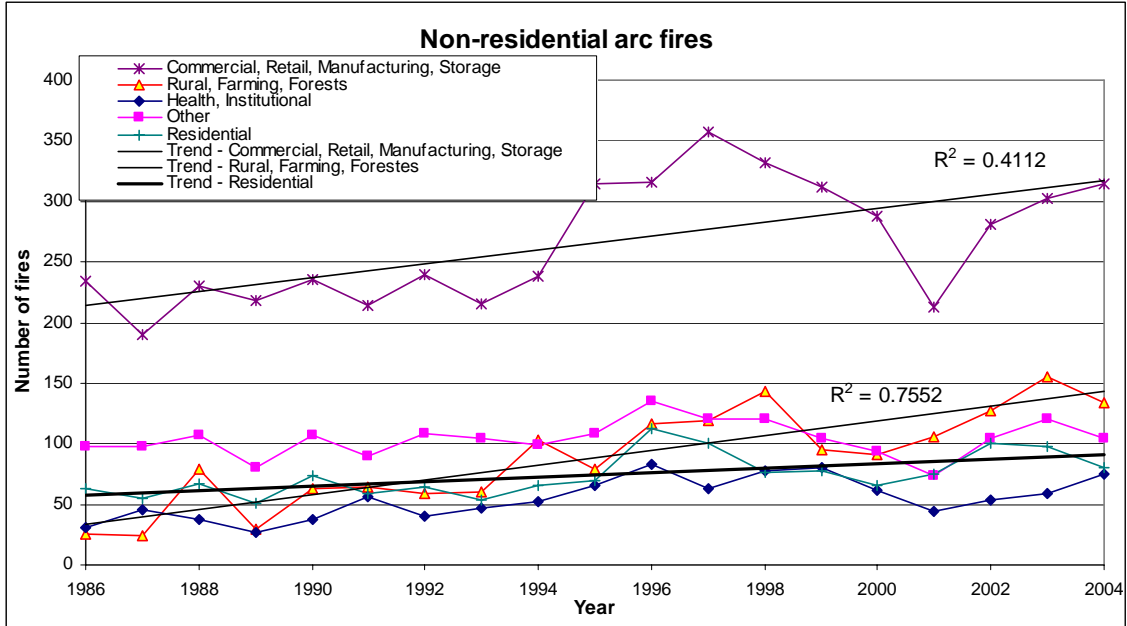
These fires divide into two categories: motor vehicle fires and non-residential fires. Non-residential property fires cover all the fires that occurred in commercial and industrial buildings, and in public places. The category of motor vehicle fires comprises of vehicles such as cars and trucks. Vehicle-related fires are currently not covered by the current legislation, which ESS administers, and therefore those fires are not included in the analysis**.

Graph: 9

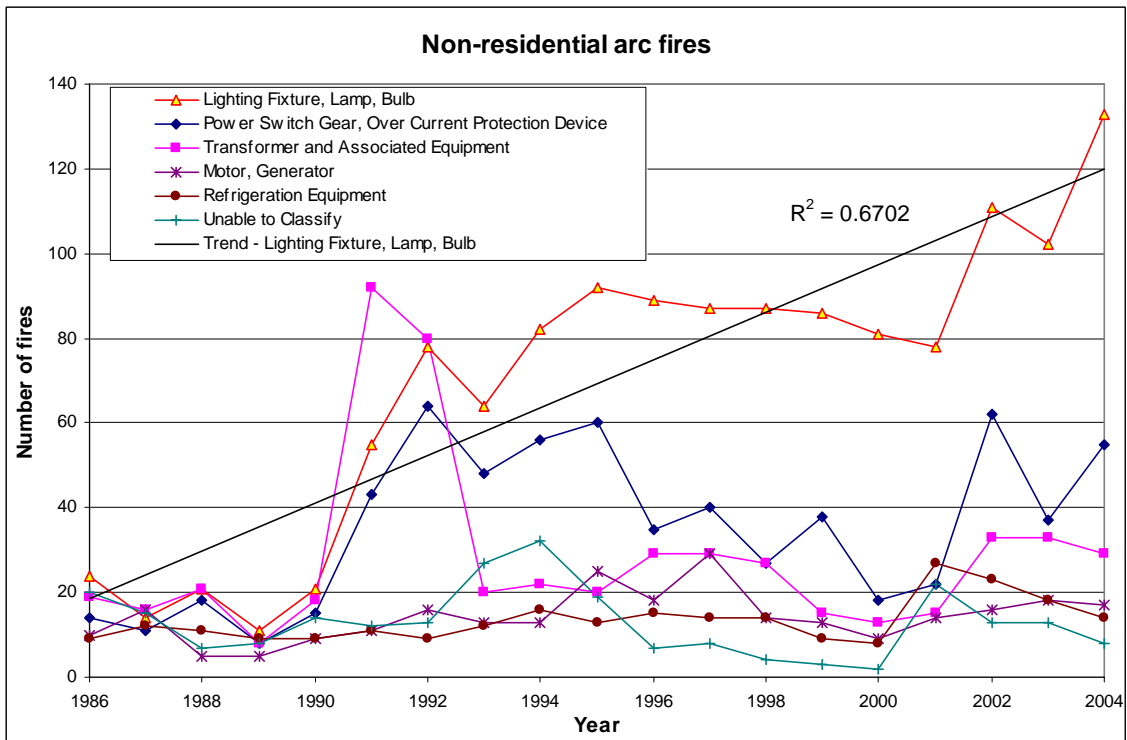


** Vehicle (transport) fires were identified using existing data provided by the NZFS in two categories for each fire, 'transportation code' in the general property use designation and 'mobile property code' in the incident type category. The 'general property use' category identifies the usage type by the occupier and 'incident type' identifies the final outcome of the emergency call – location and type of emergency.

Graph: 10



Graph: 11



Key findings:

- 62,000 electrical fires occurred during 1986-2004, averaging about 3,200 fires per year. About 31,000 of these fires occurred in residential properties, 14,000 occurred in motor vehicles and 17,000 occurred in non-residential properties.
- About two-thirds (11,200) of non-residential fires were initiated by the electrical arc and the other remaining fires were initiated by the heat.

- Motor vehicle fires are falling by a significant rate while the residential arc and heat-initiated fires are increasing, see Graph nine. However, the overall effect of these changes is nil.
- Non-residential heat initiated fires have increased from 200 to 400 per year and arc fires have also increased, from 450 to 700 per year. Both heat and arc initiated fires have increased at a constant rate over the last 19 years, with the relative difference between both trends remaining consistent over the 19 year analytical period.
- The risk of an arc initiated fire occurring is higher than that of a heat initiated fire in a non-residential property. The risk of an arc related fire occurrence in a non-residential property is over 225% more than that of a heat initiated fire.
- A significant number of non-residential arc fires (about 300 per year) occurred in commercial, retail, manufacturing and storage properties. These fires have continued to slowly increase since 1986.
- Rural, farming and forestry areas have contributed towards the second highest number of non-residential arc fires, with an estimated 140 fires per year. All remaining groups have contributed towards 100 or less fires per year, see Graph 10.
- Culpable electrical equipment is not identifiable for over 45% (5,000) of the total number (11,200) of non-residential arc fires. The equipment group comprising of lighting fixtures and lamps and bulbs, is the largest group of equipment involved in arc fires. In 1986, 20 fires were associated with this group and this has increased by over five-fold to an estimated 100 fires a year. Given the population size, lighting fixtures are relative to other types of electrical equipment, the increase is not unexpected. However, it is difficult to ascertain reasoning behind the five fold increase in the rate of fires.

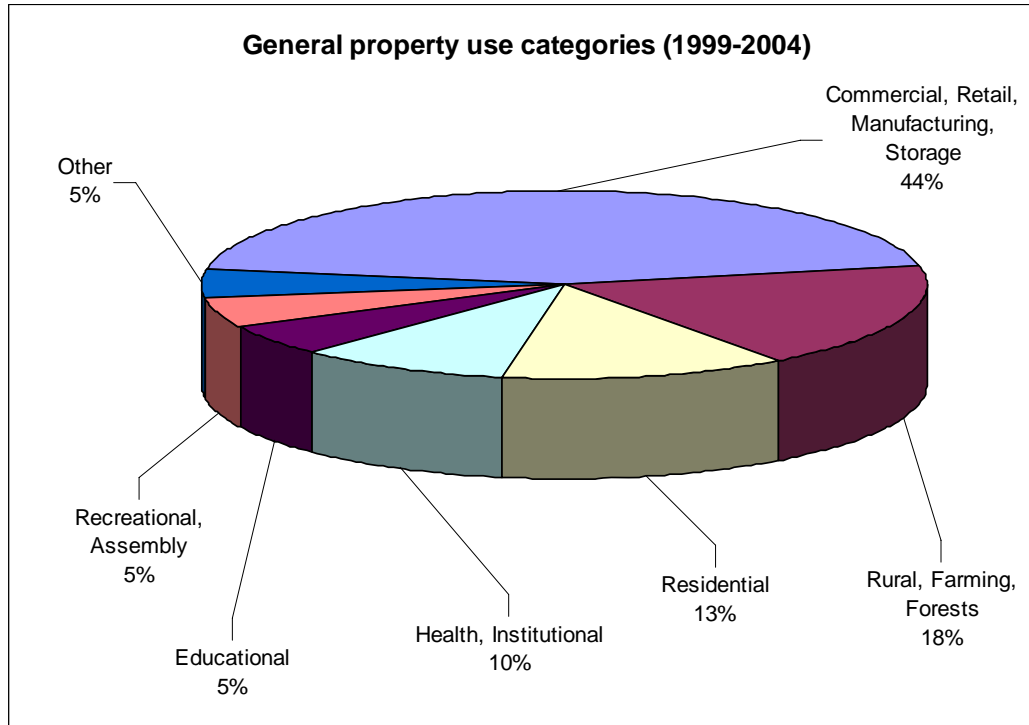
In depth analysis over the last six years of non-residential arc fires (1999-2004)

There has been no considerable change in the total number (motor vehicle and non-residential combined) of arc fires during the 1985-2004 period. However, the motor vehicle related fires show a significant reduction and a rise in non-residential arc fires. The findings for 1999-2004 period can be summarised as follows:

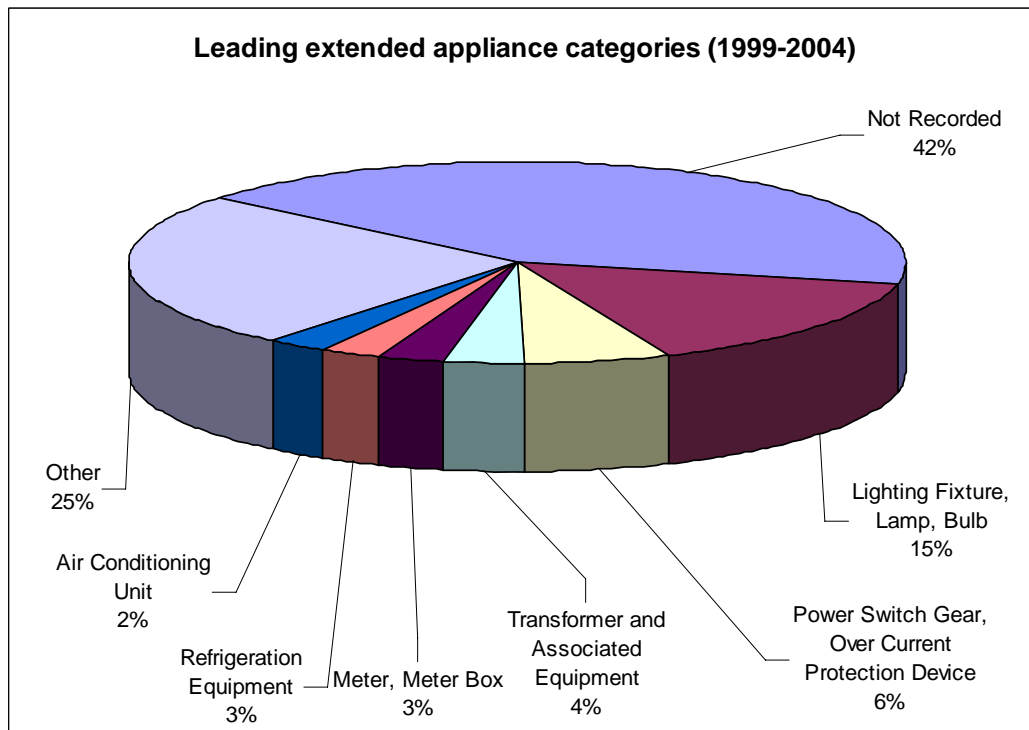
Key findings:

- Electrical equipment accountable for initiating a fire is not identifiable in almost 42% (1,650 of 3,900) of non-residential arc related fires. A relative inadequacy in identification has weakened the overall accuracy in measuring and identifying the most culpable equipment.
- 44% (1,700) of non-residential arc fires occurred within commercial, retail, manufacturing and storage localities. 18% (700) occurred in rural, farming and forestry localities, 10% (400) in health institutions and approximately 5% (200) in education institutions (see Graph 12).
- The largest identifiable category of electrical equipment was lighting fixtures. It is estimated that approximately 15% (600) of arc fires were the result of lighting fixtures. Contribution from all other equipment groups is marginal (all below 10%), see Graph 13.

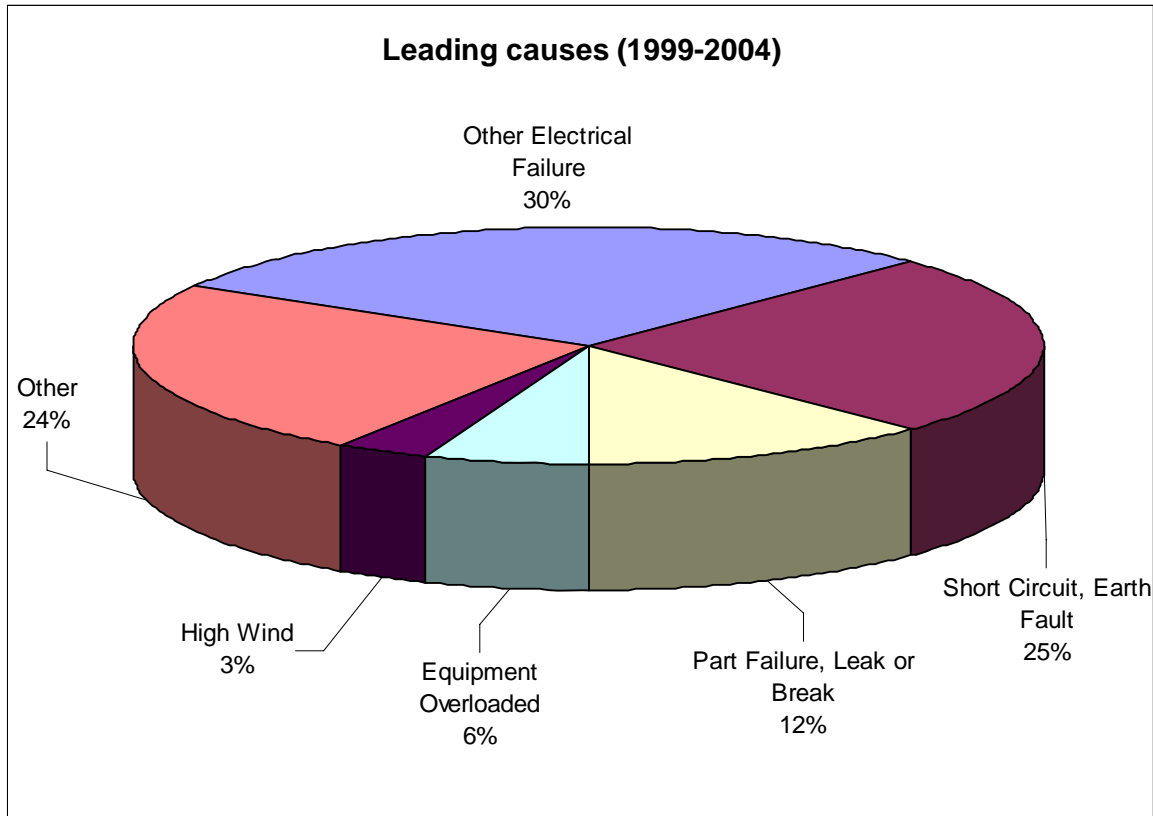
Graph: 12



Graph: 13



Graph: 14

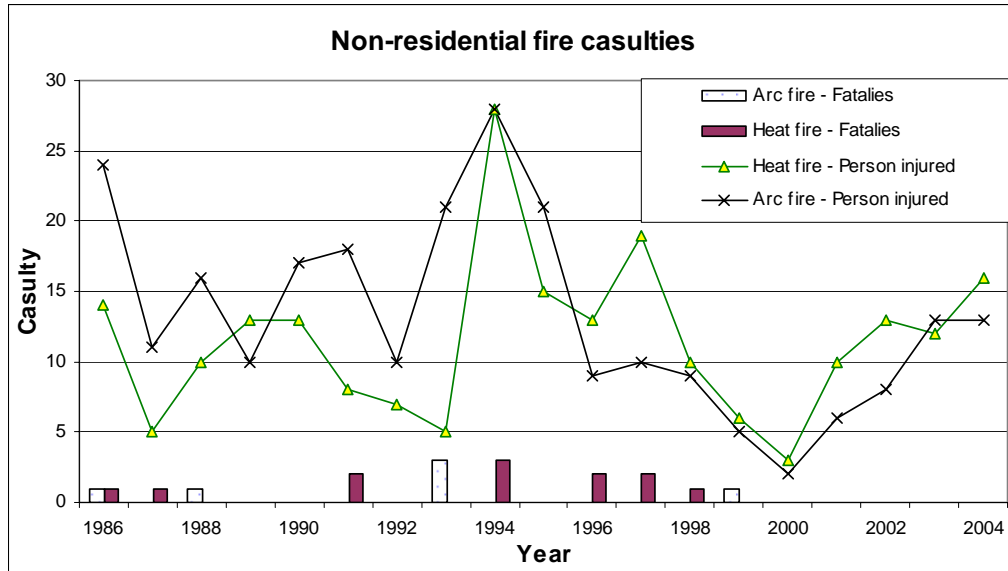


- Short circuit/earth faults and 'other' electrical failures combined caused about 55% (2,100 of 3,900) of non-residential arc fires, while 'part failure' contributed more than 10% (500). All remaining causes of non-residential arc fires each attributed 6% or less, see Graph 14.
- 30% (1,200) of all residential arc fires caused building structural damage. Over 50% (2,000) did not cause damage, despite the fact that the arc fire occurred within the building.

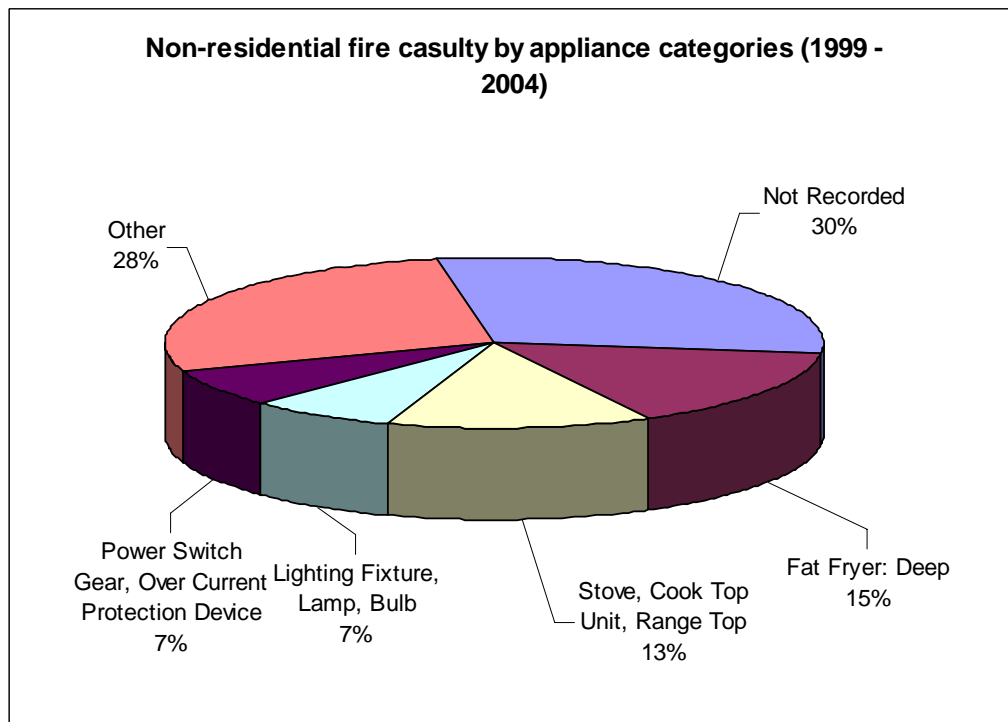
Fire casualties in non-residential properties

Less than 1.8% (530) of the total 31,000 motor vehicle and non-residential electrical fires combined resulted in a casualty between 1986 and 2004. Less than 2.2% (366) of the 17,000 non-residential electrical fires (heat and arc combined) resulted in a casualty (18 fatalities and 470 injuries).

Graph: 15



Graph: 16



Key findings:

- Non-residential property fires are causing fewer casualties relative to residential fires. It is estimated there is one casualty per 35 non-residential fires (489 casualties among 17,000 fires) while one casualty per 14 residential fires (2,200 casualties among 31,000 fires).
- There were 18 fatalities and 470 people injured by approximately 370 (arc and heat initiated) non-residential fires, see Graph 15. A third (six fatalities) of fatalities

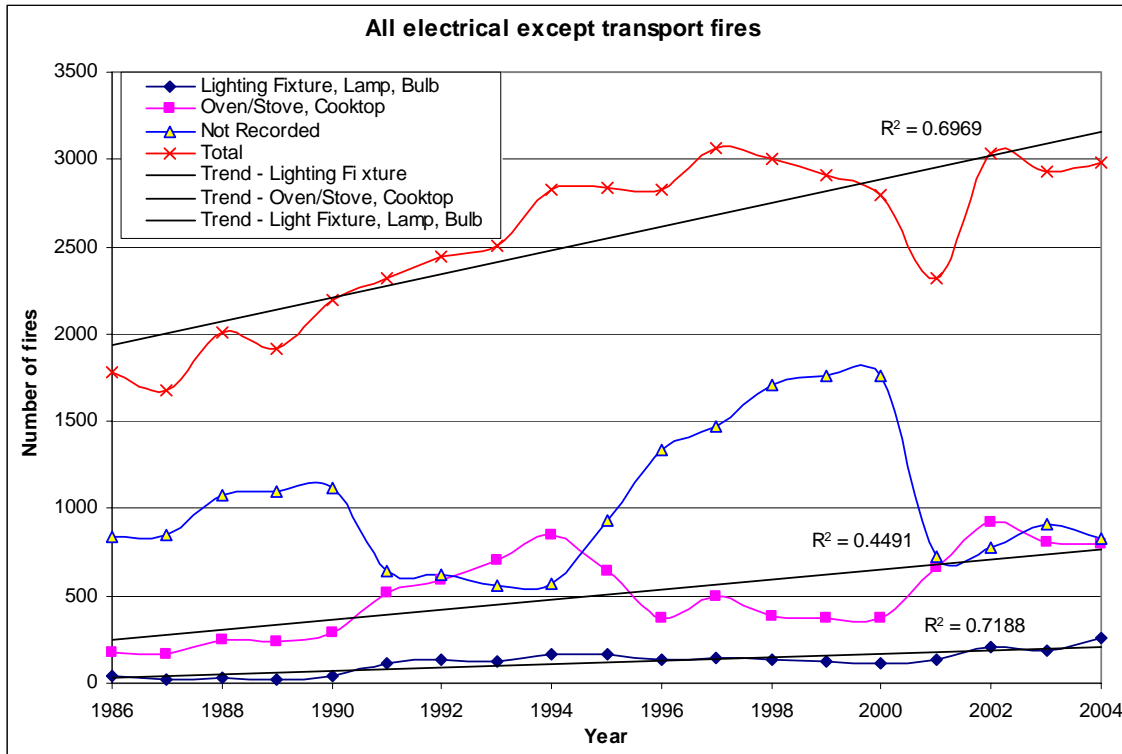
and over half (220 injuries) of injuries were caused as a result of an arc related fire.

- About 110 non-residential fire casualties occurred in the 1999 to 2004 period, with the number of arc-initiated fires remaining proportionally smaller than heat-initiated fires. As a result of the small number of fires in the non-residential category, arc and heat fires have not been separated by equipment type. Of the total arc and heat-initiated fires combined, 25% (28) of all non-residential casualties were caused by cooking equipment (cooker/over/cook top and fat fires). Light fixtures and power switch gear/over current protection devices accounted for 7% (7) of non-residential casualties. See Graph 16.

Electrical equipment – cooking equipment and light fixtures

Cooking equipment (oven/stove/cook top) was identified for having the greatest accountability of fires initiated by heat in residential localities. By comparison, lighting fixtures were largely accountable for arc initiated fires in non residential localities.

Graph: 17



Key findings:

- Of the 62,000 total electrical fires between 1986 and 2004, about 48,000 fires of those are relevant to ESS operations. Two-thirds (31,000 fires) are estimated to have occurred in residential localities and the remainder (17,000) occurred in non-residential properties. These electrical fires have markedly increased each year, with an increase of 50% over the past 19 years. See Graph 17.

- 40% of total fires were not identifiable with faulty electrical equipment. This percentage appears cyclic, occurring every four to six years. At favourable periods 25% of fires were not identified with faulty electrical equipment and during the worst periods 60% were not identifiable.
- Cooking equipment is primarily responsible for electrical fires and accounted for almost one fifth of electrical fires (10,000 of 48,000 fires). These fires have increased since 1986, from 200 fires to over 800 fires per year.
- Lighting fixtures were involved in almost 5% of the total electrical fires. Lighting fixture fires have increased from less than 50 in 1986 to over 250 per year.

Conclusion:

The following conclusions may be drawn from the data analysed in this report.

Heat initiated fires in residential properties

Heat-initiated fires in residential properties are increasing at a steady rate and have more than doubled (from 500 to 1300 per year) between 1986 and 2004. Cooking appliances (oven/stove, cook top unit) contributed a significant number (40%) of heat-initiated fires. A large portion (60%) of heat-initiated fires are caused by not attending or keeping an eye on equipment and falling asleep while equipment is operating.

Cooking equipment (oven/stove/cook top) is one of the most dangerous appliances in terms of the fatality and injury rate. About 40% of the total (10 of 26) heat-initiated fatal fires caused about half of the total (16 of 34) fatalities and over 40% of the total (260 of 600) injury causing accidents caused by cooking equipment over the last six years (1999-2004).

Arc initiated fires in non-residential properties

About 75% of vehicle and non-residential combined fires (24,000) are initiated by electrical arc. About half (12,000) of these are non-residential related arc fires relevant to the Electricity Act. Close to half (about 300 per year) of non-residential arc fires occurred in commercial, retail, manufacturing, storage property and rural, farming and forest areas. They contribute close to 20% (about 140 fires per year) of the non-residential arc fires. Short circuit/earth fault and other electrical failure was the cause of over half of the arc fires.

Lighting fixtures stand out as a major cause in arc fires in non-residential properties and have been increasing since 1986. There were about 20 fires a year in 1986 which at present has increased to over 100 fires a year, an increase of over five-fold during the 1986 to 2004 period.

Non-residential property fires caused 18 fatalities and injured about 470 people by 360 fires during 1986-2004.

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