



Forum for European Electrical Domestic Safety

WHITE PAPER

ACCIDENTAL ELECTRICAL DOMESTIC FIRES

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CONTENTS

Prevention of accidental domestic fires.....	2
Reading fire statistics with the aim of prevention	4
Are the numbers of fires from an electrical source that high?	4
Conclusion.....	6
References.....	12



ABOUT FEEDS

The Forum for European Electrical Domestic Safety (FEEDS) is a think-tank and a do-tank that brings together organizations aiming to improve electrical safety in dwellings.

The Forum aims to contribute to a safe, just and ambitious Energy Transition mainly focused on electrification by:



Providing harmonized data on domestic fires from electrical source at European level and contributing to improve data collection in each country,



Promoting proven solutions at European level to reduce electrical fires from electrical source in dwellings,



Putting electrical safety as a pre-requisite to the deep renovation and deployment of decentralized production (eg. PV), energy storage and increased electrical demand of 132 million dwellings across Europe with obsolete electrical installations,



Drawing attention at all policy levels on the close connection between energy poverty and electrical safety for vulnerable communities,



Participating in the achievement of the Green Deal targets.

The results of the work of the FEEDS Forum are available to all stakeholders involved in household electrical safety in Europe. Stakeholders are free to make use of it to support their case and facilitate action in the different Member States of the European Union.

FEEDS MEMBERS



European organizations



European consumer voice in standardization (ANEC)



European Committee of Electrical Installation Equipment Manufacturers (CECAPI)



Europacable



European Association of Electrical Contractors (EuropeOn)



European Copper Institute (ECI)



European Fire Safety Alliance (EFSA)



Federation of the European Union Fire Officer Associations



International Federation for the Safety of Electricity Users



Insurance Europe – Prevention Forum



National organizations



Confédération Nationale du Logement (CNL – France)



Electrical Safety First – The UK's Electrical Safety Experts (ESF – United Kingdom)



Groupe de Réflexion sur la Sécurité Electrique dans le Logement (GRESEL – France)



Dutch Burns Foundation (NBS – Netherlands)

PREVENTION OF ACCIDENTAL DOMESTIC FIRES

“The vast majority of residential fires are preventable”

Elie van Strien - Chairman EuroFSA

Data from Germany, the UK, France and to some extent Poland, demonstrate that approximately half of accidental domestic fires have an electrical source. Periodic inspection and maintenance of electrical installations are effective preventive measures to decrease the number of fires in dwellings.

READING FIRE STATISTICS WITH THE AIM OF PREVENTION

When analysing fire statistics, the number of *accidental fires* is obtained by removing arson from the total number of fires. It is an interesting approach in the sense that it counts **only fires that could have been influenced by preventive actions targeting the dwelling, its installation and its occupants**. This is in contrast to data where arson is included, which falls within the field of crime prevention and is much harder to reduce, if possible, at all.

Applying this concept to recent fire statistics from Germany (see Annex 1) shows that:

50% of all accidental domestic fires were the result of **carelessness** or improper use by the occupants, often involving kitchen stoves, open fires, welding or soldering, cigarettes, or candles. As all these items are entirely safe when used properly, awareness raising campaigns are the usual action for reducing these types of fires,

3% of the accidental domestic fires were caused by **explosions**,

47% have an **electrical** source.

This last category **could be reduced drastically through mandatory periodic inspection and maintenance of electrical installations**, complemented with awareness raising campaigns on the safe use of electricity in the home.

ARE THE NUMBERS OF FIRES FROM AN ELECTRICAL SOURCE THAT HIGH?

The figures mentioned above might come as a surprise to anyone familiar with fire statistics. For example, according to the updated 2020 FEEDS report [1], 25 to 30% of all domestic fires in Europe proved to have an electrical source. While investigating the fire statistics through the angle of accidental domestic fires and the potential impact of preventive actions, FEEDS made a more in-depth analysis: first, fires with unknown origin are usually so characterised because no inspection was carried out (for example because doing so was not requested by the insurance company). Therefore, the distribution of causes for these uninspected fires can be assumed to be the same as that of the inspected fires. Second, the figure for arson was taken out to limit the scope to accidental fires only, as explained above.

A similar exercise had been carried out earlier by *Electrical Safety First in the UK* (see Annex 2). It established a dataset for the years 2018 and 2019. The UK results were even more startling than the ones from Germany, with an average of 56.7% of all the accidental domestic fires having an electrical source.

The *Laboratoire Lavoué* has published data [2] regarding accidental fires in **France**. The share of fires with an electrical source amounts to 47% (see Annex 3 for detailed figures).

In some countries in **Central and Eastern Europe**, the percentage of accidental fires having an electrical source is lower due to the higher share of fires originating from old solid fuel heating devices. Nevertheless, the reasoning followed for Germany, the UK and France also applies to these countries: the share of accidental fires having an electrical source is higher than shown by conventional fire statistics (see figures from Poland in Annex 4). Moreover, these countries are expected to see a transition towards new types of heating systems in the coming five years, driven among other things by energy efficiency and safety regulations. As a result of this evolution, the share of accidental domestic fires having an electrical source is expected to rise to a similar level to that of Western European countries.

WHAT DIFFERENCE CAN PERIODIC CHECKS OF THE ELECTRICAL INSTALLATION MAKE?

Fire risk is not inherent to electrical installations. It will be absent in new, properly installed and inspected installations and equipment. However, after some years, electrical safety issues may appear in dwellings.

One cause can be wear and tear of the installation itself, including loose connections, aged insulation material, broken parts such as shutters in socket outlets for example, or flying terminal block for luminaires, causing risks of electric shocks, arcs or short circuits.

Another cause is safety issues arising from modification done by the occupants of the dwelling, inappropriate repair, or unapproved additions to the electrical installation.

Finally, due to the energy transition, existing electrical installations can become inadequate or obsolete when integrating new electrical sources of energy such as solar panels, electric storage and new loads like electric vehicles charging equipment.

These kinds of safety issues will easily be detected during a check by a qualified professional, with a report issued to the owner for appropriate remedial action. A periodic safety inspection of the electrical installation is therefore an effective measure for domestic fire prevention. This has been demonstrated in Japan, where an inspection of the electrical installation every 4 years has been made mandatory for all dwellings since the early 1960s. Fire statistics in that country demonstrate the positive effect of this measure: the number of fires has been reduced by close to 90% since inspections became mandatory every 4 years. [1, p.29].

CONCLUSION

For each type of fire, FEEDS propose a rating of existing preventive measures:

Preventive measure →	Awareness raising	Standardisation of technical systems	Periodic maintenance and inspection
Source of fire ↓			
Electrical	Medium importance	Very high importance	Very high importance
Explosion	High importance	Very high importance	Very high importance
Overheating, kitchen	Very high importance	High importance	Medium importance
Carelessness	Very high importance	Not relevant	Not relevant
Open fire	High importance	Medium importance	Very high importance
Cigarettes, candles...	High importance	Medium importance	Not relevant
Welding, soldering	High importance	Very high importance	Not relevant

Table 1

Residential fires with an electrical source account for approximately half of all accidental fires and are highly preventable.

Indeed:

- ✓ A new way of representing fire statistics from the perspective of fire sources that can be influenced by prevention measures leads to the conclusion that electrical sources are responsible for half of all accidental domestic fires in Germany, the UK and France.
- ✓ These fires are preventable. They are usually originating from obsolete equipment, additional equipment and other safety issues that arise in the installation over the years. Through a periodic maintenance, these issues are brought to light and remedial actions, for instance the installation of arc fault detection device (AFDD), XLPE cables, circuit breakers and/or residual current device (RCDs), can be identified to ensure adequate safety.



In some countries in Central and Eastern Europe, the percentage of accidental fires having an electrical source is relatively lower. This is due to the higher share of fires originating from old solid fuel heating devices. As these countries are expected to see a transition towards new types of heating systems and policies (maintenance of boilers and chimney) in the coming years, the share of accidental domestic fires having an electrical source is expected to rise to a similar level to that of Western European countries.

Periodic inspection and maintenance of electrical installations and their upgrading must therefore receive major focus in all national fire prevention plans in Europe and in all EU level recommendations for deep renovation and for deployment of renewable electricity, storage and additional consumption of electricity (*e.g.* Heat pumps, EV charging...)

ANNEX 1: DATA FROM GERMANY

In 2019, the German Institute for Damage Prevention and Damage Research IFS [3] investigated the causes of more than 2,000 domestic fires over the years 2002 to 2019, which is a representative sample for the country. The relative distribution of fire sources was fairly stable over those years, with the averages shown in the following graph [3]:

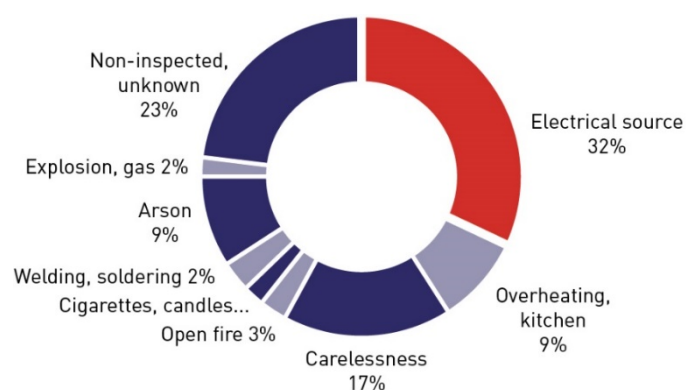


Figure 1 – Distribution of fire sources in Germany 2002-2019

Starting from these figures, we redistributed the fires of unknown origin or non-inspected fires across the other categories according to their original share. Secondly, the figure for arson was taken out to obtain the number of accidental fires. This resulted in the following final distribution:

Source of fires	IFS data 2019 (%)	After distributing non-inspected fires over the other categories (%)	Accidental fires only (arson taken out) (%)
Electrical source	32	41.6	47
Explosion, gas	2	2.6	2.9
Overheating, kitchen	9	11.7	13.2
Carelessness	17	22	24.9
Open fire	3	3.9	4.4
Cigarettes, candles...	2	2.6	2.9
Welding, soldering	3	3.9	4.4
Arson	9	11.6	
Non-inspected, unknown	23		

Table 2

In the last column, we see that fires with an **electrical source constituted 47%** of the total number of accidental fires in Germany.

ANNEX 2: DATA FROM THE UK

Electrical Safety First in the UK [4] established an accidental domestic fire dataset for the years 2018 and 2019. Full results are summarised in the following table:

Country	Accidental domestic fires of electrical source	% of all accidental domestic fires
England	14,186	53.4
Wales	895	62
Scotland	3,429	74.1
Northern Ireland	435	58

Table 3

The disparities between the four nations of the UK can be explained through the facts that they record fires differently and have different measures in place. On average, **56.7% of all accidental domestic fires in the UK have an electrical source.**

ANNEX 3: DATA FROM FRANCE

Laboratoire Lavoué [2] established the following data for accidental fires in France:

Source of accidental fires	%
Electrical	47
Heating	14
Carelessness	34
Vehicles	3
Lightning	1
Gas, explosion	1

Table 4

ANNEX 4: DATA FROM POLAND

Applying the concept of accidental fires to the *Polish State Fire Service* data [5], the results are presented into the following table:

Source of fires	Data from Polish National Fire Service (%)	After distributing non-inspected fires over the other categories (%)	Accidental fires only (arson taken out) (%)
Electrical	4.6	6.1	11.6
Fossil fuel heating	11	14.6	27.6
Carelessness: open	24.2	32.1	60.8
Arson	35.6	47.2	
Non-inspected and unknown	24.6		

Table 5

The 27.6% of accidental fires from fossil fuel heating systems is expected to decrease over the coming years to reach around 10%.

REFERENCES

[1] FEEDS, White paper *Residential electrical safety / How to ensure progress?* – March 2020

[2] Laboratoire Lavoué, fiche n°11: « [Les incendies d'habitations](#) »

[3] [Institut für Schadenverhütung und Schadenforschung](#)

[4] [Electrical Safety First](#) is the leading charity on electrical safety in the UK

[5] [Polish State Fire Service](#), data collection regulated by the Minister of Interior and Administration (regulation of 3 July 2017 *on the detailed organization of the national fire-fighting and rescue system*)