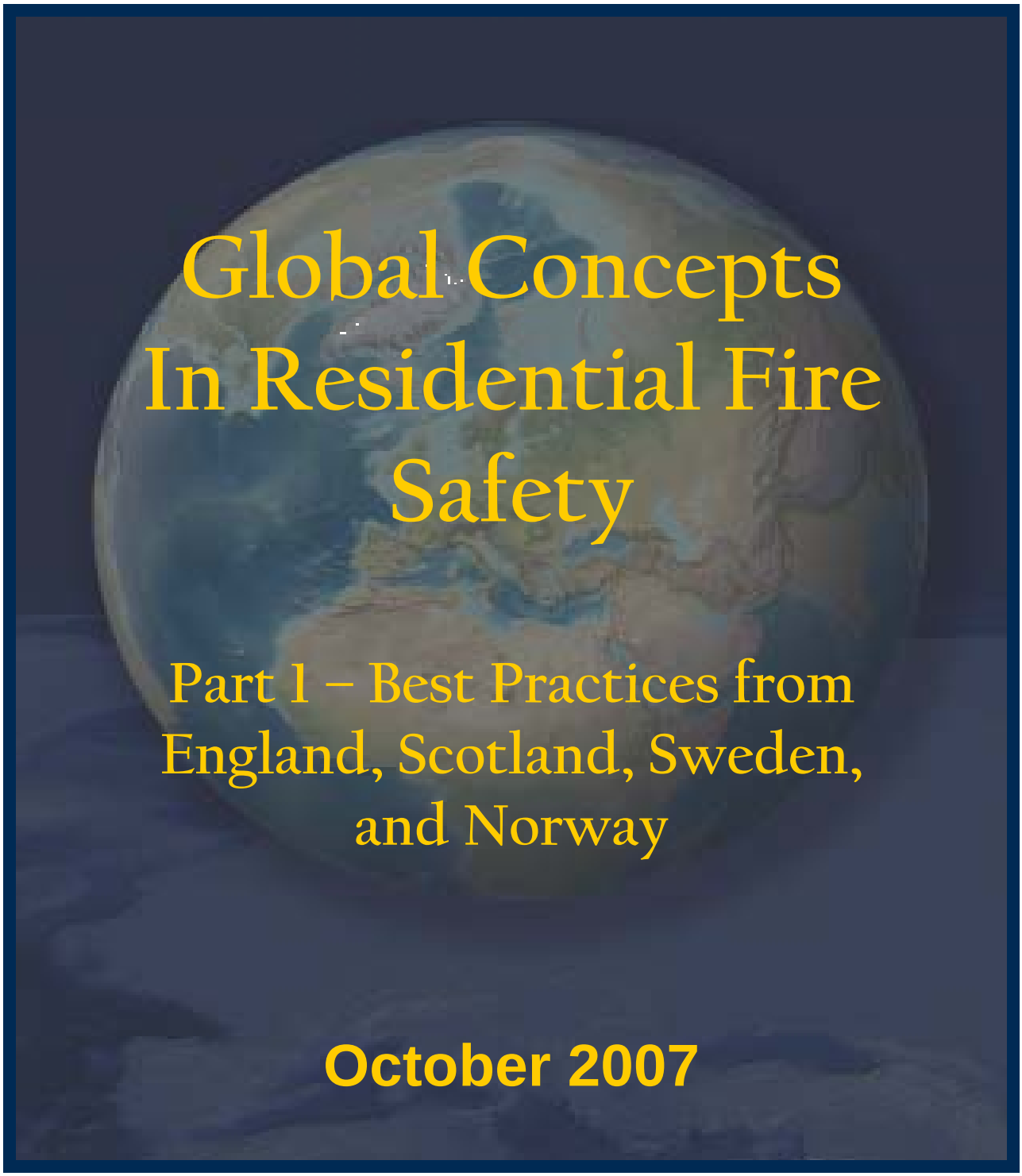

Global Concepts In Residential Fire Safety

Part 1 – Best Practices from England, Scotland, Sweden, and Norway

October 2007

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Part 1 – Best Practices from England, Scotland, Sweden, and Norway

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PREFACE

The TriData Division of System Planning Corporation was selected to undertake this study of best global practices for reducing residential fire injuries by the National Center for Injury Prevention and Control within the Centers for Disease Control and Prevention (CDC). In the United States and in most western industrial nations, the majority of civilian fire deaths and fire injuries occur in the home. As part of its mission to reduce residential injuries, CDC's National Center for Injury Prevention and Control attempts to identify effective global community fire safety programs—best practices—that could be used in the United States. Proven best practices can be used as examples of successes to stimulate improvements in prevention practices in the United States, though they sometimes require adaptation to our culture.

TriData has undertaken research on global concepts in fire protection for over 20 years. In 1982–1993 TriData produced a series of reports entitled International Concepts in Fire Protection. The reports were widely disseminated and led to many articles in fire journals and presentations at fire conferences in the United States and internationally.[1]

In 2003–2004, TriData did a survey for the International Association of Fire Rescue Services (CTIF) of the best programs in community fire safety among its 40 member nations; 20 European nations contributed program descriptions.

This report is the first of a new series of three reports to identify best practices in residential fire prevention. The first report in this series focuses on Europe—more specifically the nations of England, Scotland, Sweden, and Norway. The second study, in 2007–2008, will focus on the Pacific Rim nations of Australia, New Zealand, and Japan. A third study in 2008–2009 will focus on Mexico and South America.

[1] *International Conception in Fire Protection: New Ideas from Europe.* July 1993. TriData Corporation, Arlington, VA.
International Concepts in Fire Protection: Practices from Japan, Hong Kong, Australia and New Zealand. 1985. TriData Corporation, Arlington, VA.
International Concepts in Fire Protection: Ideas from Europe that Could Improve U.S. Fire Safety. 1982. TriData Corporation, Arlington, VA.

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Department for Communities and Local Government (National Government)

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*Goran Schnell, President

Sundsvall Fire Brigade

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SPC/TriData

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SUMMARY OF BEST PRACTICES

This report provides examples of successful best practices in community fire safety programs from England, Scotland, Sweden, and Norway. The programs have helped reduce fire injuries and fatalities in the home.

Of all the best practices identified in this study, one stands out. To reduce fire casualties in the home, the British fire service is visiting large numbers of high-risk households to do fire safety inspections and risk reductions, especially to ensure they have a working smoke detector. This approach has required a major change in the culture and mission of the British fire service. It should be adapted for use in the United States. The approach is thought by the British to be a major factor in the 40 percent drop in fire deaths in the United Kingdom over the last 15 years, and it probably could have a large impact in the United States and other nations as well.

Best Practices from the United Kingdom

In the last decade, there has been a sea change in the prevention strategy used by the British fire service that is just short of being revolutionary. The fire brigades have been required by national legislation since 2004 to engage in strong community safety programs as part of an overall national strategy for improving fire safety. Every British firefighter now is expected to participate in prevention. A national-level Community Fire Safety Center was established in the Department of Communities and Local Government to be the focal point for developing national strategies, campaigns, and materials.

The best practices that have arisen out of the new prevention strategy fall into eight major categories: identification and analysis of high risk households; increased staffing and training of prevention programs; making home safety visits; coordinating national and local fire safety campaign; conducting extensive school and youth programs; directing programs to the high-risk elderly population; developing safer consumer products; and increasing the use of fire stations for community fire safety programs. Highlights of the best practices are given below. Additional practices and more details on these practices are given in the text.

Risk Analysis

- Local fire brigades use nationally developed risk analysis software that links fire data with socioeconomic data to estimate areas of high risk and to target fire safety programs to high-risk groups and households. The nationally developed risk models have been disseminated to all local fire brigades.
- Integrated risk analysis is undertaken by local fire brigades to decide on the best mix of prevention and suppression for their community.

Fire Brigade Staffing and Training for Prevention

- Prevention now is considered a line service, not a support service. The prevention function is often supervised by the deputy fire chief for operations, and makes extensive use of line firefighters.
- More fire department resources (person-hours) are being devoted to prevention than in past years. National standards of cover (response times) have been dropped in favor of local discretion, to allow local tradeoffs between reduced fire coverage and more attention to prevention.
- All firefighters are expected to participate in prevention. Recruits are advised that prevention will be a significant part of their job. Recruit training includes practice delivering community fire safety programs.

Home Safety Visits

- The British fire service is making visits to a large percentage of high-risk homes, using a combination of line firefighters and prevention specialists. The visits include installation and testing of smoke alarms, inspections for hazards, mitigation of hazards, and one-on-one education.
- Community safety specialists called “advocates” join firefighters in visiting ethnic or high-risk households. Their specialties include foreign languages, problems of the elderly, problems of alcoholics, and problems of the hearing or mobility impaired.
- Home visits are scheduled via call centers established in the brigade, not by dispatchers.
- Home visits often scheduled after referrals from social services or other agencies, or by households already visited who suggest others.

Fire Safety Campaigns

- National and local public safety campaigns use paid, prime-time television and radio spots, print media, and the internet. They do not rely on free public service announcements shown late at night.
- Selected local radio stations and newspapers are used to reach ethnic populations who are the prime target audience for these media.
- Television and radio advertisements are run at times that people are implementing the behavior addressed, e.g., cooking safety at dinnertime.
- Fire safety campaigns include getting coverage of the targeted issues on news and talk shows.

- Strategic partnerships between fire and other local government agencies such as health, social services, and police are used to develop, fund, and deliver fire safety programs.
- Besides use and maintenance of smoke detectors, national campaigns call for a bedtime fire safety check of the household by some member of the family.

School and Youth Programs

- School programs reach close to 100 percent of students in selected elementary school grades in many fire brigades. Significant numbers of students in secondary schools are also being reached. The school programs are conducted mostly by firefighters but sometimes by teachers and prevention personnel.
- Special programs are targeted at youths who have demonstrated anti-social behavior such as fire-setting, attacks on firefighters, or vandalism.
- Firefighters receive special training for delivering safety programs to schools. The firefighters take on graduated responsibility for program delivery.

Programs for the Elderly

- Social service caretakers of the elderly are trained on fire safety practices they can implement or advocate during their home visits.
- Homes of high-risk elderly are visited by the fire service.
- Partnerships with various social service agencies increase resources and provide more ways to disseminate safety information to the elderly.

Safer Products for the Home

- 10 year, tamper-proof, battery-powered smoke alarms are being installed by the fire service, and are available for purchase by the general public.
- Hard-wired smoke alarms are required in all new residential premises and major residential refurbishments.
- Flame and cigarette-resistant upholstered furniture and bedding are required by national law.
- Portable home sprinkler systems are used for extreme high-risk households.

Community Fire Stations

- New fire stations are designed to make them community fire safety centers as well as stations from which to respond to calls. The new stations include reception areas from which to obtain safety literature; live fire demonstrations; and viewing areas to observe firefighter training and response.

The residential fire death rates in England and Scotland dropped in the past 15 years by 41 percent and 44 percent, respectively. The residential fire death rate dropped from 9.7 deaths per million population in 1990 to 5.7 deaths per million in 2005-2006. While it is difficult to attribute cause and effect to particular programs, the data suggests the new approaches are working, and the British fire service believes that to be the case.

Best Practices from Sweden and Norway

The current fire protection strategy in Sweden and Norway shares many similarities with the United Kingdom, though arrived at independently. Some of the best practices we found fall into nine categories: shifted responsibility for building fire safety; increased fire department staffing for prevention; expanded home safety visits; increased seasonal and year-round national and local safety campaigns; employee safety education; broad school safety programs; safety programs for the elderly; required use of home fire extinguishers; and improved consumer product safety.

Building Owner Responsibility

- Sweden and Norway emphasize the responsibility of building owners to ensure safety of their buildings, and not to depend on fire service inspections.

Fire Brigade Staffing and Training for Prevention

- Sweden and Norway are developing highly educated “fire engineers” to form the cadre for risk management and resource planning in local fire brigades.
- The proportion of fire department staff to prevention is much higher than in the United States. In Oslo, a city of 540,000, there are 40 fire prevention personnel and another 50 firefighters in stations on a typical weekday.
- Norway requires 1 prevention FTE for every 10,000 population.
- Swedish fire recruit training lasts two years, with 25 percent of the time spent on prevention and risk management.
- Umea takes a group of firefighters off shift duty for 3.5 weeks each year to deliver school programs.

Home Safety Visits

- In Sweden and Norway, homes with chimneys must be inspected by licensed chimney sweeps/fire inspectors from 4 times a year to once per four years, depending on fuel and frequency of use. The home inspectors check heating systems and also do broader home safety inspections.

- The Oslo Fire Brigade annually visits all of its old, high-risk apartment buildings (on 3,000 blocks) to meet with occupants to discuss fire safety. Posters in the buildings advertise when the fire service is coming.
- Oslo condominium associations are given safety checklists to pass on to unit owners.

Fire Safety Campaigns

- The Swedish fire service gives a fire safety calendar to school children and households. The calendar shows two days per month on which every household should take specific safety actions, such as testing smoke alarms, checking fire extinguishers, and practicing escape plans.
- The fire service trains children in schools and then designates the children as the 'fire marshal' for their homes, with specific responsibilities.
- Winter safety advice is tied to the Advent holiday in December; children participate in safety events scheduled for Advent and other winter activities.
- Supermarkets are visited by almost every household. The Umea Fire Brigade stations firefighters in them to show shoppers a short safety film, discuss safety issues, and hand out safety literature.
- Movie theaters in Sweden show a one-minute fire safety spot addressing winter safety hazards.
- A "Safe Home" campaign is aimed at builders. If they comply, they can advertise that "we build homes that are fire safe".

Employee Safety Education

- Some Swedish and Norwegian fire brigades provide instruction to municipal workers and some private industry workers on fire safety at work and at home. There is a multiplier effect from this instruction on the households of the workers.

School Programs

- The Swedish and Norwegian fire service reaches most schoolchildren twice during their school years.

Programs for the Elderly

- Caretakers are trained in fire safety by the fire service.
- Fire resistant "smokers' aprons" are given to elderly who insist on smoking.
- Emergency egress features are promoted for homes of the elderly.
- Safety efforts focus on the shut-in elderly and the "old elderly".

Home Fire Extinguishers

- Norway requires extinguishers or hoselines attached to faucets in every home, in addition to smoke alarms. Home occupants are trained to extinguish small fires because the fire service cannot arrive within the 2–4 minutes it takes for many fires to reach flashover.
- Sweden estimates they have 35 percent of homes equipped with extinguishers.

Safer Products for the Home

- To reduce fires from unattended cooking, timers are being built into stoves in Norway or, less expensively, stoves are plugged into timers. The timers shut the stoves off if the person cooking forgets to do so or falls asleep. The use of timers is advocated especially for households with elderly people.
- Electrical equipment is recommended to be plugged into "power strips" and the strips turned off at night for whatever electrical equipment that does not have to operate all night long.
- Use of safety candles is promoted; the wicks in the candles do not go down to the bottom, and so the candles "self-extinguish" before reaching a flammable surface.

Inflatable Cushions for Jumpers

- Oslo Fire Brigade has deployed large, rapidly-inflatable cushions in all fire units to rescue people trapped in residences (or other buildings) up to the fourth floor. A trapped victim can jump onto the cushion. In the first year deployed, 13 people were saved by the cushions.

Scandinavia has slightly lower residential fire death rates than the United States, achieved with fewer firefighters per capita than in the United States. They get better results with smaller fire departments by emphasizing prevention.

Concluding Remarks

The United Kingdom succeeded in changing its fire service culture over the past decade, and transferring practices from a few innovative brigades to many. The Scandinavian fire service also is changing its culture to focus on risk management. While it is sometimes difficult to transfer good practices from one culture to another, that should not be the end-all excuse for not trying. American fire chiefs and prevention leaders need to figure out how to apply best practices in their own communities. Adapting these best practices may help continue reduction in the fire injury and death rates in American homes, especially those at highest risk.

I. INTRODUCTION

The vast majority of fire deaths and a large proportion of fire injuries occur in the home in the United States and in most western industrial nations. As part of its research program to reduce such deaths and injuries, the National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention (CDC) seeks to identify the best global practices in community fire safety that might be transferred to the United States, or that might stimulate ideas for new approaches. Finding best practices elsewhere can speed up innovation here.

This report provides many examples of successful community fire safety programs in European nations, specifically England and Scotland in the United Kingdom, and Sweden and Norway in Scandinavia. Both of these European areas were known to have innovative community fire safety programs associated with reductions in their residential fire death rates. Prevention programs were sought at both the national and local levels in each nation.

Study Approach

The project started with the selection of nations to visit. Many European nations could have been chosen. We started with the United Kingdom, with whom we have common language and culture that makes acceptability of its ideas easier. We also know that the United Kingdom had a major shift in fire prevention strategy toward undertaking more community fire safety in the last decade. And from our survey for the International Association of Fire Rescue Services (CTIF) of European fire prevention programs, Sweden and Norway were known to have extensive prevention programs affecting residential fire safety.

For each nation visited, we worked with several sources to identify communities conducting innovative programs to reduce fire injuries in the home. We interviewed officials of the national agency in each nation that deals most with fire prevention. We also interviewed officials in selected local fire brigades and national fire protection associations. We did extensive internet research on community safety programs in each nation selected and its candidate cities to be visited. For the United Kingdom, we communicated with the Department of Communities and Local Government, the Chief Fire Officers Association, and various chief fire officers past and present. For Sweden and Norway, we relied heavily on recommendations from the Swedish Rescue Services Agency and the CTIF survey as to which communities to visit. The chief program official of CTIF was the fire chief in Gotenberg, Sweden, and he further assisted in the selections in Scandinavia.

For each fire service organization that was a candidate to visit, we communicated with either its chief fire officer or its head of prevention as to their willingness to participate. In some

cases we used a proxy in the national fire organization or chief fire officers organization for making the initial contacts. The result was that all of the fire organizations we approached enthusiastically agreed to participate.

Research Questions – We sent a list of research questions to each organization to be visited, with some variation tuned to each agency and nation. The questions, with some variations from place to place, were basically as follows:

1. What noteworthy community fire safety programs (public education) are being or have been undertaken by your agency or others? What population groups do they target? How are they delivered, how often, and with what content? Is there any evaluation of their results?
2. How do you cope with the diversity of ethnic groups and languages in developing and delivering community safety programs? Do you tailor programs to a group, or just translate the same materials for each?
3. We are aware of many of your past prevention programs, including some discussed in our reports on International Concepts in Fire Protection and for CTIF. What programs have been discontinued because they were not working, too expensive, out of date, or for other reasons? Which approaches are still being continued because they have proven to be cost effective? How is cost effectiveness determined?
4. Regarding smoke alarms, how have you tried to get them installed and maintained, especially in low income and immigrant households?
5. Besides various forms of public safety education, are there other efforts for reducing residential fire injuries, such as home inspection programs, chimney sweeps, increased code requirements for residences, better product safety, and residential sprinkler systems?
6. Cooking, heating, electrical, smoking, children playing, and arson usually are the leading causes of residential fires. Do you target each cause?
7. What role, if any, is given to firefighters for community safety programs?
8. Are your residential prevention programs multi-hazard? That is, do you combine fire prevention information with non-fire injury prevention, resilience for disasters and terrorism, etc.? Or do you have separate programs for each risk?
9. Overall, what do you consider the most cost-effective ways to reduce residential fire injuries?

Providing this list of questions ahead of time helped assure that the agencies visited would invite people with the right knowledge to each interview, and that appropriate background materials would be readied for us. This process had been used in our past international research. The result of this preparation was that every meeting was productive and on target.

Visits Made – We visited the United Kingdom (England and Scotland) in the period January 14-23, 2007. We visited Sweden and Norway in the period March 19-27, 2007. A different agency was visited each week day, either a national-level organization or a local fire brigade. At each meeting, interviews were conducted with senior local or national officials responsible for community fire safety programs. We also met with some people in leadership positions over these programs and some people who were implementing the programs. Table 1 shows the organizations we visited in each nation during our visit.

Table 1: Organizations Visited in European Nations

United Kingdom	Sweden	Norway
• Department of Communities and Local Government (national agency, London) • Scottish Executive (national agency, Edinburgh) • London Fire Brigade • Merseyside Fire and Rescue Service (Liverpool) • West Midlands Fire Service (Birmingham) • Kent Fire and Rescue Service (southeast of London) • Strathclyde Fire and Rescue Service (Glasgow)	• Stockholm Fire Brigade • Nykoping Fire Brigade • Sundsvall Fire Brigade • Umea Fire Brigade • Swedish Rescue Service Agency (Karlstad) • Swedish Fire Protection Association (Stockholm)	• Oslo Fire Brigade • National Directorate for Civil Protection and Emergency Planning (DSB) (Tonsberg)

The officials we interviewed are listed in the Acknowledgments section. Following the visits, several of them sent us follow-up data and information. We also had follow-up dialogues with them by phone and email. We sent the draft report to each agency visited to review the section on their nation and organization; most of them submitted written edits.

We do not present here everything we heard in the visits and research. Rather, we focus on the programs likely to be of most interest. We screened out or treated briefly the ideas that are already in common practice in the United States, unless they had innovative implementation.

Report Organization

The report is organized first by the region of Europe visited and second by the major strategies for community fire safety, roughly in priority of importance. For each nation we start with a brief section discussing its fire service organization at the national and local levels.

We have tried to balance breadth of coverage—the multitude of good ideas found—with adequate detail for adopting them if desired, in order to keep the report of reasonable size. At the end of each regional section we present fire data on the national and local level compared to the United States.

Caveats

The ideas presented here are the best practices in each city or nation, as identified by those we interviewed. We tried to find not necessarily the most typical programs but the best. We could not speak to everyone and undoubtedly left many good ideas undiscovered in each nation.

There is little evaluative data on most of the individual programs presented. Nevertheless, we know that the collection of practices discussed here are associated with major reductions in the residential fire problem. The leading authorities in each nation think these programs made a difference. They do not know for sure which practices contributed the most, because they are implementing multiple approaches simultaneously in order to have immediate real world impact, and are not just conducting social experiments. Where there was evaluative information on intermediate measures such as outreach and acceptability, or data on outcomes, we include it.

Our intent is to stimulate the reader with ideas that may adopted for the United States, or stimulate other ways to achieve the same level of reductions in the residential fire problem found in the nations visited.

It is sometimes difficult to transfer good practices from one culture to another, but that should not be the end-all excuse for not trying. The United Kingdom succeeded in changing its fire service culture over the past decade, and transferring practices from a few innovative brigades to many. One has to be clever in figuring out how to apply good practices to one's own environment. We hope this report provides food for thought in improving community fire safety practices in the United States.

II. UNITED KINGDOM

The United Kingdom has made major changes in its strategy for prevention over the past decade. The strategy focuses on identifying high-risk households and reducing their risk through smoke alarms and a variety of other measures, using the fire service to visit the homes and make hands-on intervention. The British fire service has shifted its resources to emphasize prevention more than ever.

Overview of British Fire Service

The United Kingdom comprises England, Wales, Scotland, and Northern Ireland. England and Wales are under the same governmental laws and regulations for fire safety and fire services. Scotland and Northern Ireland are semi-autonomous. They are similar to England in their fire safety approaches and legislation, but have some differences, too.

England and Wales together have a population of about 50 million. Scotland has about 6 million. England has a large minority and ethnic population, but in Scotland minorities comprise only 2 percent of the population. Scotland has a much higher rate of fires and fire casualties in the home than does England, and higher levels of social deprivation, despite the lower minority population. In fact, the white indigenous majority population is the high-risk group in Scotland. The population living in high-rise housing projects (called "housing estates" in England and "tower blocks" in Scotland) are of fire safety concern, whether minority or not.

National Level Organizations – The United Kingdom national government organizations dealing with the fire service and their role have changed significantly in the past several years. That is a complex story. Suffice it to say here that there is a national-level fire organization for England/Wales and another for Scotland, since Scotland "devolved" into a partly independent nation 5 years ago. They all develop national public fire safety campaigns, national legislation that governs some fire service responsibilities and rules, national legislation on the requirement for safety that must be built into buildings and requirements for maintenance and operation of built-in safety features.

There used to be a Fire Services Inspectorate in the United Kingdom Home Office. Fire was a Home Office function for 50 years. It was then moved under the Office of the Deputy Prime Minister in 2001. At present, the national fire-level organizations are in the Department for Communities and Local Government. The Fire Services Inspectorate was abolished in early 2007, though an office with similar function remains in Scotland. The Audit Commission, somewhat similar to the Office of Management and Budget in the United States, is taking on the

job of fire service evaluation in England. The commission audits the programs of many other agencies as well.

The current organization for fire safety in England at the national level is shown in Figure 1. The Fire and Resilience Directorate is roughly analogous to our Federal Emergency Management Agency FEMA and the U.S. Fire Administration. The term "resilience to disasters" is roughly equivalent to our emergency management. The Directorate has three major functions: policy development; research; and fire control (dispatch and communications).

Figure 1: National Level (England Home Office) Organization for Fire Safety

The private sector Fire Protection Association in the United Kingdom focuses mostly on industrial fire protection, not residential protection, and not standards. We therefore did not visit them.

The Chief Fire Officers Association has a Community Safety Forum chaired by a fire brigade chief. It is highly influential in suggesting national policy and research needs for community fire safety. We coordinated with them in planning our visits.

The Scottish Executive is similar to the Home Office in England. Within it, the Justice Department has responsibility for fire safety issues, including fire safety legislation and the development of fire safety media campaigns and literature. It is based in Edinburgh.

The high fire death rate and high fire incidence in Scotland is in no small part a result of the high level of "deprivation" (social problems) in Scotland. Relative to the rest of the United

Kingdom and much of Western Europe, Scotland has had poorer health, higher poverty, higher unemployment, more people on welfare, a high smoker population, higher levels of alcoholism and drug abuse, lower education, and a high lack of trust in the establishment. The Scottish fire service thinks that the dramatic reduction in Scottish fire deaths in the past decade is partly due to reductions in deprivation levels that resulted from social and economic improvements, which in turn led to improved health and lifestyles. But the fire service also thinks the reduction is due in part to its improved home fire safety programs. Another factor that has helped Scotland is that its building standards are higher than in England, and require full sprinklering for any structure over 18 meters (about 60 feet). The sprinklering threshold in England and Wales is 30 meters, and that just started in 2007, though high-rise public housing is sprinklered in England.

Local Control – The fire service in the United Kingdom is NOT a national service. Rather, it is run by local authorities. The fire service consolidated from over 1000 fire brigades pre-World War II down to the present 47 in England and Wales, 8 in Scotland, and 1 in Northern Ireland. There are also some small volunteer fire departments on small islands. The fire service had been nationalized during World War II but was returned to local authority control afterwards.

Most United Kingdom fire brigades protect multiple cities and towns, suburban areas, and some rural areas. A committee of representatives from the jurisdictions protected comprises the "local fire authority" that governs the fire brigade. Most United Kingdom fire brigades protect about 1.2–2.4 million people. The London and Manchester areas protect larger, city-centered brigades.

Most United Kingdom brigades have both full-time firefighters and part-time firefighters on call: the latter are referred to as "retained firefighters". Retained firefighters are paid to be on call and are paid by the hour for prevention duties as well as responding to calls. Some brigades have a small volunteer cadre. The retained firefighters and volunteers are generally used in rural and suburban areas.

The United Kingdom fire service handles the same range of emergency calls as does the United States fire service with one huge exception: in the United Kingdom, they are not the primary first responders for emergency medical services (EMS). They go to some medical calls if they are closest, but generally provide a lower level of EMS care than does the typical United States fire department. The ambulance service in the United Kingdom is a separate service that has prime responsibility for EMS.

The standard United Kingdom full-time firefighter workweek is currently 42 hours, with alternating pairs of nighttime and daytime shifts. There are four "watches" or shifts. Nighttime

shifts often are used for training, paperwork, and maintenance, while remaining on standby for calls. Most, but not all, prevention work is undertaken by the day shifts.

To give the reader a sense of the United Kingdom fire service organization at the local level, we next provide some brief summaries of the fire brigades visited, starting with London.

London Fire Brigade –The London Fire Brigade protects a population of about 7.4 million, including the City of London and much of the area around it. London has large and varied minority ethnic populations and a large visitor population. Over 300 languages are spoken by London's inhabitants. It has some highly affluent areas and some low- income areas, like most large cities.

The London Fire Brigade is organized into three directorates, each headed by an assistant commissioner:

- Fire and Community Safety Directorate (including prevention)
- Resources Directorate (including HR finance, and training)
- Corporate Services Directorate (including firefighter safety, strategic planning, corporate communications, legal services, IT.)

The Fire and Community Safety Directorate is divided into four units:

- Assistant Commissioner, Service Delivery – Firefighting and the fire safety prevention services that are delivered through the borough commanders.
- Assistant Commissioner, Operational Response – The command and mobilizing center (dispatch and communications), London resilience (emergency management), and policy development.
- Assistant Commissioner, Operational Planning – Strategic planning for the department, equipment specifications, health and safety of firefighters, major event planning, policy for airports and waterways, and some miscellaneous other functions.
- Assistant Commissioner, Community Safety – Fire safety policy, community fire safety resources, arson control, fire investigation, schools liaison, young people's strategies, fire safety engineering, inspections, and internal affairs.

In the field, the London Fire Brigade is divided into 33 boroughs, each with a borough commander who is responsible for all fire service delivery within that borough, including prevention. Many of the field personnel in community safety are assigned to the boroughs. The boroughs are grouped into 6 districts each with a district borough commander to provide another management tier, since a span of control of 33 boroughs is too many for direct reporting to the Assistant Commissioner for Service Delivery.

The London Fire Brigade has 112 fire stations and 7000 staff of whom 5850 are full-time firefighters.[2] They have 168 engines and 72 specialist-operated vehicles including ladder trucks. The London Fire Brigade is one of the largest fire brigades in the world.

Kent Fire and Rescue Service – Kent is in the southeast corner of Britain. It covers an area from the London suburbs to the coast, including the famous white cliffs of Dover. Kent is an area of small towns and villages, with no large cities. Kent protects about 1.6 million people from 22 full-time stations and 44 retained firefighter stations. Kent's population is above average in affluence, including the black, minority, and ethnic (BME) population. The BME population in Kent was said to be not much different from the rest of the population in fire risk.[3] The high risk population in Kent is its increasing number of elderly; 200,000 people are over age 65. The Kent fire brigade focuses more fire safety attention on the elderly and youths than on ethnic groups.

The Audit Commission's compliance performance assessment gave Kent Fire and Rescue Service an "excellent" rating, the only brigade in England besides Merseyside to achieve that rating.

Merseyside Fire and Rescue Service – Merseyside has 42 pumpers operating from 26 stations to cover an area around Liverpool with about 1.4 million population. A few years ago, it had 1600 full-time firefighters, but that now has been reduced to 1,100. Yet there are fewer fire deaths today than there were with an almost 50 percent larger staff. Although Merseyside is considered the most deprived area of England, it has remarkably low fire death rates due to its prevention programs, which will be discussed later in this report.

West Midlands Fire Service – This brigade includes Birmingham, the second largest city in England. It protects about 2.6 million people with 1,700 full-time firefighters from 41 stations.

One area of West Midlands is called the "black country" because of all the soot deposited from industrial establishments in the nineteenth century industrial age. This area was said to have one of the highest deprivation rates in Europe.

West Midlands has a high BME population, including heavy concentrations of Bangladeshis, Pakistanis, African-Caribbeans, and Indians. It has a large Muslim population, and now has some Muslim firefighters. Over 50 languages are spoken in West Midlands. The varied

[2] London Fire Brigade = our plan for improving service in 2007/08.
[3] BME is a common acronym used in the United Kingdom to denote minority populations.

ethnicity, as in London and Merseyside, increases the difficulty of cultural outreach programs, but they have been successful, as will be discussed.

Strathclyde Fire and Rescue Service – The Strathclyde region in Scotland is comprised of 12 local authorities, including the City of Glasgow. Strathclyde has 3,000 full-time firefighters and about 1,000 retained firefighters, plus about 250 volunteers in very rural areas, such as on 23 islands. The brigade protects 2.2 million people out of a total of 5.1 million in Scotland, which makes it the second largest brigade in the United Kingdom. The brigade's mainland region is divided into 10 areas, like the boroughs in London. The brigade is governed by a Joint Fire Board comprised of over 30 elected local officials.

Strategy for Prevention

The British fire service has undergone a sea change in fire protection strategy in the last decade. Much more emphasis is being given to prevention, especially to community fire safety programs. The fire brigades are required by the 2004 Fire and Rescue Service Act and the Scottish Fire Act 2005 to engage in strong community safety programs. England established a (national) Community Fire Safety Center in the Department of Communities and Local Government to be the focal point for developing strategies, campaigns and materials as well as to purchase time in various media for campaigns. Scotland provides a similar set of functions under the Scottish Executive. Every United Kingdom firefighter is expected to participate in prevention if requested. Recruiting for the fire service makes it clear that firefighters can expect to play a major role in community safety programs during their career. Community fire safety is now part of recruit training.

Previously, many brigades had an approach to prevention similar to that found in United States fire departments, and it worked up to a point. They used Learn Not to Burn, preached Stop, Drop, and Roll, had a junior fire inspector program and did some "hot strikes" of prevention in neighborhoods that suffered a fire. This got them to the level that the United States is at now, about 10-11 residential fire deaths per million. To break though that level and get down to 5-6 residential fire deaths per million, they United Kingdom has made some very significant changes in their approach to prevention, especially the weight given to community fire safety programs, even if it meant cutting back on other fire department services. It is no exaggeration to say that the changes have worked fabulously well.

Changing Fire Service Culture – The 1990's national laws governing the fire service required a change in attitude and philosophy regarding prevention. The change was not readily accepted by the rank and file firefighters nor by some chiefs. But the culture of the fire service has changed.

Part of the culture change came about as a result of a mid-1990's report called "In the Line of Fire", which changed thinking about the direction of the fire service and fire safety, just as the 1970's report "America Burning" caused a major change in the United States. In 1998, the Community Fire Service Task Force issued the seminal report "Safe as Houses", which called for larger budgets for prevention campaigns and established the national Community Fire Safety Center.

The culture change and the acceptance of the change by firefighters were accelerated by a firefighter strike in 2002. Firefighters asked for a 40 percent pay increase, were denied, and went on strike nationally. Fires and fire deaths decreased during the strike, possibly by chance but more likely due to heightened public awareness of the need to practice fire safety. The contract that emerged after the strike called for a more professional fire service emphasizing more prevention work in return for higher, more professional wages.

Credit for the British sea change and strengthening of community safety programs goes at least in part to the West Midlands Fire Service in the early-1990s, led by their chief fire officer, Graham Meldrum, who subsequently was knighted and appointed Her Majesty's Chief Fire Inspector). TriData research played a part in lending credence to the proposed strategy. As Sir Graham stated in a letter to us,

> **"**When I first commenced to develop the concept of Community Fire Safety [it] was very difficult to convince professional fire officers and politicians of the value of this work. We started to develop a considerable number of innovative ideas but it was not possible due to the lack of any historical data to prove that community fire safety would work. We were starting to invest considerable sums of money into developing this work but needed to prove that we could deliver results."
>
> It was at this time that I came across the reports produced by TriData…. The data contained in the reports was convincing and proved the value of community fire safety and the fact that it could produce results that could be evaluated. The TriData work was used as the basis of conferences and seminars and proved of great value in convincing chief fire officers and politician that community fire safety saved lives. This work was taken up by our National Government who formed a Community Fire Safety Task Force to develop a national policy for community fire safety."[4]

[4] Letter to Philip Schaenman from Sir Graham Meldrum, February 1, 2007. The reports referred to in the letter were "Overcoming Barriers to Public Education"; Proving Public Education Works"; and Reaching the Hard to Reach. There also was the previously mentioned series of three reports on "International Concepts in Fire Protection" which showed that many nations with fire death rates lower than ours were emphasizing prevention more than we were through a variety of approaches, most notably a great deal more emphasis on community fire safety education.

Local governments adopted different strategies for changing their own fire brigade's culture. For example, in Merseyside, the chief appealed to the firefighters' inherent innovativeness in dealing with safety issues, and asked them to devise strategies for reducing fire deaths like they do for dealing with emergencies.

The history of the change in fire prevention strategy and culture in Scotland was similar to that in England. Fire safety was specifically inserted into the Scottish national priorities. Prevention is required to be provided by local fire brigades under the Scotland Local Government Act. Community well-being, safety, and value for money are the guiding political principles that support taking a cost-effective approach to fire safety, which means do more prevention. Local authorities and partnership organizations are encouraged to work together. Fire and police have been flagged as key mutual partners. An overarching "National Community Fire Safety Development Plan" supported by the Scottish Executive and key stakeholders has provided strategic direction and a framework to deliver effective intervention programs and access to funding sources.[5]

Setting Fire Death Rate Goals – The national fire safety goal in England and Wales is to reduce fire deaths 20 percent by 2010 from the 2001 level. Each fire brigade has been given a target to meet in terms of its maximum annual number of deaths and injuries. The target is stated in terms of a factor "x" times the national averages of deaths and injuries. The factor is greater or less than one depending on the nominal risk of the population. For example, Merseyside, with a higher than average level of social deprivation, is given a target of having less than 1.25 times the national average fire death rate. That is, it would be considered as doing well if it were less than 25 percent above average. (In fact, they are below the national average.)

Planning for Integrated Risk Management – The United Kingdom used to have standards of fire department coverage in terms of response times and numbers of responding fire apparatus for geographic areas of various risk categories. Meeting the standard of cover was the major factor in determining how fire department resources were allocated. A local brigade could not give more weight to prevention and less to suppression response.

Geographic areas were designated as having level A, B, C, or D risk. Each risk category had its own standard for response time and weight of response to an emergency incident. For example, in level A areas, the highest risk level, such as found in city core areas, the fire service had to be able to respond with two pumps in 5 minutes and a third unit in 8 minutes, including

[5] Email from John Russell, Strathclyde Fire Brigade, to Philip Schaenman, May 1, 2007.

turnout and drive time. Areas with lower levels of risk (B, C, and D) were allowed to have slower responses.

The mandatory standard of cover approach has been replaced by "Integrated Risk Management Planning (IRMP)." Now each fire brigade is required to develop an integrated plan for prevention and operations in light of its risk. Each brigade can set its own standards for service delivery. For example, a brigade can remove 4 pumpers from operations, have a somewhat slower response in one area, and use those positions to increase delivery of community fire safety programs. This in fact has been done by more than one brigade. Most "fire brigades" also changed their names to "fire and rescue services" to further reflect their changed mission.

The British also argue that many city centers now require fewer suppression person-hours at night because the city centers are comprised largely of sprinklered buildings or buildings built to modern codes, and the buildings are largely vacant at night. The new legislation allows the brigade to use variable staffing as part of their total risk management strategy, whereas before they had to staff the same response 24x7. The fire service knows when calls are likely to be few in number and can use the saved resources for prevention work.

The integrated risk management approach also includes more focus on partnerships with other agencies, and broadening the fire service role to include injury reduction from various risks in addition to those from fires.

In Scotland, the Fire Scotland Act of 2005 requires all buildings other than single family dwellings to have a risk assessment plan. The 2005 Smoking Health and Social Care Act banned smoking in all buildings except homes. These were some of their steps toward integrated risk management.

Targeting Prevention by Household Risk Level – A key part of the national fire prevention strategy is to target high-risk groups with prevention programs. This translates into visiting the most vulnerable, highest risk households to do fire safety inspections. In addition, the fire service develops special materials tailored to segments of the population that need special materials because of their high-risk, foreign languages, disabilities, or other reasons.

The more self-sufficient, financially-able households are not totally neglected in this strategy. They are given safety literature and access on-line or by mail to fire safety information. They also see many safety messages in the media.

A striking aspect of the United Kingdom prevention strategy is the extent to which it is data driven for targeting and evaluating safety programs at both the national and local level. The national government developed risk analysis models that were given to all fire brigades. Every

fire brigade we visited had a sophisticated data analysis section that was producing maps showing where the high-risk problems were occurring and undertaking a variety of risk analyses. The fire chiefs are asking for this data, and so are their heads of prevention and community safety. (The risk models are described in the data section of this part of the report, for those interested in the details.)

The national data models allow fire brigades to identify the relative risk of areas, blocks and individual households. Some brigades refined the models themselves.

The high-risk groups defined by the fire and rescue service's parent government department, Communities & Local Government are:

- Older people
- Children and young people
- Ethnic minorities and faith groups
- People with learning or physical disabilities
- People with mental illness
- People with alcohol or drug use problems
- People in temporary accommodation or other poor housing

The program for the deaf and hard-of-hearing population provides an example of an integrated risk management program. The deaf are estimated to comprise 1/7 of the population, including many elderly. The national Community Fire Safety Center produced subtitled versions of advertisements and safety videos for the deaf and hearing impaired; produced video tapes using British Sign Language; and worked with the Royal National Institute for the Deaf to develop materials and a fire safety message for the national Deaf Awareness Week. The Community Fire Safety Center emailed a briefing document to each brigade that explained how to institute local campaigns for the hearing impaired, provided a list of contacts in local organizations dealing with the hard-of-hearing, provided statistics for each area on the size of its hard of hearing population, and even provided names of local etiologists and schools for the deaf with whom the fire service might partner.

The Community Fire Safety Center consults with the committee on community safety of the Chief Fire Officers Association (CFOA) and the regional CFOA community fire safety groups in choosing the prevention campaign topics. The campaigns are not viewed as being directed by the national level, but rather the national level facilitating the programs desired by the local level. Partnership between central government and local fire and rescue services is key to the strategy in England. The national level develops materials and concepts centrally so that they do not have to be done 47 times over by the local brigades. The local fire brigades do not

have to think out what to do or how to produce the materials. They can just focus on implementation, and get many more boots on the ground to carry out campaigns that way.

Increasing Use of Smoke Alarms – A national survey found that about 80 percent of United Kingdom homes had at least one smoke alarm. The ownership numbers were lowest for minority groups and for Scotland. A major thrust of the United Kingdom national strategy is to get more smoke alarms into the households that most need them, and either to have them tested and maintained annually or to provide them with long-life, tamper-proof batteries. The fire service will install one or more smoke alarms for free if the household does not have one and agrees to the assistance.

Hard-wired smoke alarms are required in all United Kingdom homes built since 1991 There is no requirement on houses built prior to 1991.

United Kingdom research undertaken in 2004 ("Evidence Base for Evaluation of Community Fire Safety") confirmed that the government's smoke alarm campaigns from 1987 to the mid 1990's contributed to a major increase in their use, and a fall in dwelling fire deaths of about 50 per year averaged across 1994–2002. The sales rate of smoke alarms increased by 73 percent after one of the national advertising "bursts" encouraging their use. Battery sales also increased. This was strong evidence that the advertising had the desired effect.

In addition to the national and local media campaigns promoting smoke alarms, retail stores put up point of sales displays for smoke alarms at checkout counters. The government encouraged smoke alarm manufacturers to run sales (e.g., "buy one smoke alarm, get one free"). The smoke alarm industry has given fire brigades substantial quantities of alarms to install in low income, high-risk households.

The Fire and Resilience Division of the government had a budget of about $23 million for a "Home Fire Risk Check" initiative that included purchasing and installing smoke alarms over a four-year program. They targeted 1.25 million elderly and minority ethnic households, did 800,000 home checks, and fitted 1,600,000 alarms (most with 10-year batteries) in 750,000 homes. There was spectacularly good acceptance of the program, and it had a major impact on household safety. The budget for this program was $50 million, including payment to the brigades for performing home fire safety checks over a 4-year period. In very high-risk households the program money also could be used to install automatic fire suppression systems in the highest risk households.

Research on the cost effectiveness of local arson control programs found that for each dollar expended by government, about $4 was attracted from other agencies, and about $16 in fire loss prevented. The Research section of the Fire and Resilience Division believes that there

is a similar effect of the programs aimed at increasing use of smoke alarms and reducing accidental residential fires–there is a multiplier effect on the government's investment that makes it highly cost effective.

Instituting Bedtime Fire Safety Checks of Households – A safety concept being promoted as part of the national United Kingdom strategy is to have a designated family member check the home for fire dangers before going to sleep. The dangers include candles left burning, cigarettes not extinguished, cooking left on, and electrical appliances that can be turned off. Since most fatal fires occur at night, this seems to make eminent sense. As will be discussed, children are being taught to be the family fire marshal to help make sure this bedtime check is made. In Scotland, children aged 9–10 are taught to do this check themselves, even if their parents do not.

Organizing Fire Brigades for Prevention – In the 21st century United Kingdom fire brigade, fire prevention is prominent in its mission statement and organization chart.

For example, the West Midlands brigade is divided into three divisions: service delivery; training and support services; and administration/financial services. Prevention is under the assistant chief for service delivery, who is also responsible for operations. Prevention is not considered a support service, but rather a primary service. The chief officer of operations is viewed as responsible for all services that are delivered directly to the public (except call taking.) He has three sections under him: community safety, legislative fire safety (inspections and plans review) and emergency response. The same troops that put out fires are expected to do prevention; in fact, prevention is viewed as their primary mission, and emergency response is for situations they did not prevent. A second deputy chief of the brigade is responsible for giving the operations deputy chief well-trained recruits and the equipment he needs. The third deputy chief is for budget and personnel administration.

In London, the Deputy Commissioner for Fire and Community Safety is responsible for front-line response to incidents as well as the delivery of prevention programs. All front-line crews are required to participate in community safety work. They help implement a broad range of safety initiatives to reduce road traffic accidents, attacks on firefighters and malicious calls to fires. The London Fire Brigade partners with many other agencies on a range of social agendas. This work with other agencies and services enables the brigade to have a significant impact on community safety that it could never achieve alone, they said.

In Merseyside, too, the deputy chief for service delivery is responsible for prevention as well as emergency operations. Considering prevention activities, such as home fire safety, to be part of operations is a key aspect of the sea change in the fire service culture. This organization

change is one way to get the point across that prevention is to be regarded as a major line service, not a backwater.

Besides devoting part of line firefighter-days to doing community safety work, the leading United Kingdom fire brigades have cadres of full-time prevention personnel to help plan, deliver and evaluate community safety programs. In Strathclyde, for example, 12 people are assigned to community safety at the HQ level. Another 50-60 are in the field, spread across the 10 administrative areas of the brigade, for 2.2 million population protected.

Linking Fire Investigations to Prevention – The results of fire investigations can provide critical information to targeting prevention programs. In some United Kingdom fire brigades, the fire investigation process for fatal accidental fires now goes a step further than the traditional cause and origin investigation. There is attention to the behavioral details of each fire fatality, almost like in a murder investigation, to better understand the behaviors that led to starting the fire and then to the injury or death.

In Scotland, all fire fatalities receive an autopsy that includes blood alcohol level and drug toxicology, to see if alcohol or drugs were contributing factors. In Strathclyde, the fire investigation report is not complete until the fire brigade documents what is going to be done to avert the same situation in the future. The follow-up will usually include a "case conference" of agencies that could have made a difference in breaking the chain of events or behaviors that led to the fatality.

In early 2007 an 82-year old woman died in a small fire in Strathclyde that started when she disposed of a cigarette butt in a plastic trash basket under her kitchen sink. Her clothes ignited when she tried to extinguish the fire. Over 100 cigarette burn marks were found throughout her apartment on rugs, furniture and even blouses hanging in her closet. (They appeared in photographs of the fire scene.) There was also an unburned logbook in which her social service care providers logged each visit, often three times a day, right up to and including the day of her death, without ever mentioning the high fire risk to the fire brigade or installing smoke alarms for this exceptionally high-risk household. This was considered an example of the gap between agencies that is the very essence of what is trying to be prevented by mandatory joint planning for safety. The fire investigation report for a fatal fire now includes a section on contacts made by the fire brigade to agencies that had been visiting the woman, and documenting an agreement from the agencies they will report such cases to the fire brigade in the future.

A recent landmark United Kingdom government report, "Learning Lessons from Fatal Fires,"[6] found that the households with fire fatalities tended to have one or more of the following high-risk factors present:

- At least one smoker
- Single parent with children
- At least one person with a disability
- Renter
- Dwelling in poor physical condition
- Elderly, especially elderly living alone

The report also found that the leading causes of fatal fires were (not in order):

- Careless use of smoking materials
- Cooking- unattended or misused chip pans (deep frying with oil)
- Electrical items
- "Naked flames" (open flames like candles)
- Electrical appliance malfunction
- Children playing with matches
- Gas leak

These risk factors and fire causes serve as the basis for targeting national fire safety programs. While they have been long known by the fire service, the new report provides firmer data on which to take action.

Alcohol impairment was found to be a factor in at least 33 percent of the fatal fires, prescribed drug use in 12 percent, and illicit drugs in 1 percent. Sometimes more than one factor was present. In Scotland, alcohol is even more of a problem than in England; higher levels of alcohol drinking is a major reason why Scotland has a much higher fire death rate than England, according to the Scottish Executive.

In England a smoke alarm was present and functioning correctly in 23 percent of fatal fires. This shows there is a limit to the effectiveness of alarms. However, it also shows that programs to increase use of alarms might still affect much of the other three-quarters of fire deaths where there was no alarm or it did not work.

[6] Learning Lessons from Real Fires, Research Bulletin No. 9, Arson Control Forum, July 2006, Dept for Communities and Local Government.

Freeing Firefighter Time for Prevention – As part of the new strategy, actions have been taken to free firefighter time for doing more community safety work. For example, firefighters do not have to clean vehicles or check water supply as often as they were doing. In some brigades (e.g. Kent and Merseyside) that work is now done in the evening shifts, freeing the daytime shift for home visits. Many brigades have reduced the number of firefighters sent when building fire alarms go off, and the number sent to small fires in cars, rubbish, and vacant lots. Merseyside reduced the response to a building fire alarm to just one firefighter on a motorcycle unless there is clear indication of a fire on the call received.

Shifting Responsibility to Building Owners – The new national United Kingdom fire safety legislation puts the onus on building owners to maintain and inspect their premises. After the fire service approves new construction plans, the owner has the primary obligation thereafter to maintain the premises to code, and not wait for the fire brigade inspectors to inspect them periodically. The fire service role switches more to enforcer than inspector. In practice, the fire service still does regular inspections, but the mindset is changing to encourage residents and owners to take more responsibility for their safety.

Providing Grant Incentives for Reduced Fire Deaths – The national government gives grants to local fire brigades for reduction of residential fires. If a brigade reaches the fire death reduction goal specified in their grant application, the grant is extended for an additional three years, which is a powerful incentive to meet it. The goal might be met because of factors other than what the fire brigade does under the grant, but it is awarded nevertheless. If the death reduction goal specified in the grant application is set too low, then the grant may be denied, so the local brigades must propose realistic but challenging goals in their proposals.

In West Midlands, winning a grant allowed them to try a prevention strategy they might not have attempted otherwise: use of a consortium of people from different local government services to visit homes. The strategy was to combine energy use reduction and fire safety. The idea was to install at least two energy-saving light bulbs and two smoke alarms in every household visited. The target was a 10 percent reduction in accidental dwelling fires. The energy-saving light bulbs appealed to households that might not have been interested in fire safety. This project was conducted for a period of 18 months, and the home fire incident rate decreased. A contributing factor was the availability of social service funds for needy households to replace furniture and appliances that were unsafe.

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The United Kingdom has had a dramatic drop in its fire death rates in the past decade since concentrating more on community fire safety programs. While it is difficult to attribute cause and effect, there is no question that the fire problem has been reduced. The sections below

will elaborate on specific best practices. Many of them can be adopted for use in the United States.

Fire Safety Visits to Households

Perhaps the most innovative, most effective prevention practice we found in the United Kingdom is fire safety visits to high-risk households on a large scale. The national and local fire authorities feel this is a key to their success in the past decades in reducing fire deaths by 40 percent. Fire brigades take different implementation approaches for implementing the home visits programs, but the result everywhere is that they are reaching many high-risk households, physically changing their safety environment with smoke alarms and other measures, and making progress on changing safety-related behaviors.

Targeting Households – Even with increased firefighter time available for prevention, the brigades cannot get to all households every year. So virtually all brigades do some form of risk analysis to identify the areas, blocks or individual households at greatest risk. The fire brigades give highest priority to visiting these households. The fire brigades also get referrals from other agencies (e.g. health, police, and social services) as to high-risk households to visit.

For equity, most fire brigades also will visit low-risk households if they request a visit, though these households tend to have the highest safety consciousness and are in least need of a visit. Some brigades just give the low-risk households information by phone or via email, and do not visit them unless the household insists.

In the process of implementing their home fire safety visit program, Merseyside brigade asked its firefighters which types of households had the highest risks. As part of changing the culture of their fire service, they then appealed to the creativity of their personnel to suggest how to prevent fire deaths in those households. They reviewed case studies of recent fire deaths, and found that most fatal fires had good response times and that the fatality could not have been averted by a faster or larger response. So they asked their firefighters, “How could we have stopped this person from dying?” Not surprisingly, the responses included installing smoke alarms, maintaining alarms, providing safer appliances, and better informing the public. So the brigade then asked, “Where are the people at highest risk in your station area?” The firefighters responded knowledgably, and those areas were the first to be targeted for home visits. Merseyside felt that they knew where most of the highest risk households were located. Rather than wait for national risk analysis models to be perfected and then to undertake local analysis with them, they took an aggressive, common sense approach to reaching the neediest households. “Rather than wait for theory, we got out there and did it,” said Fire Chief Tony McGuirk. The fire service knocked on doors, installed smoke alarms, and handed out advice. The Merseyside

risk analysis data has since caught up with their program, and they now are using it to further target and evaluate their household visits.

At the other extreme from Merseyside is the Kent Fire and Rescue Service. Home safety checks in Kent are used sparingly, and are more carefully targeted to individual households than in any other brigade visited. Kent has a huge elderly population of 200,000, and feels they cannot visit all of them. So they spend considerable efforts to identify the neediest households.

Kent has changed strategies. They previously went to about 8,000 targeted households a year, of which only about 600 were found to be truly high-risk. (Recall that Kent is well below average in the percent of households considered to be deprived). The visits were in response to requests, and were not targeted proactively by the brigade. More recently, the brigade is targeting the higher risk households to visit.

Kent divides its community safety program into three levels: universal, targeted, and specialist. The "universal" level of prevention is for low-risk areas, the majority of households protected. They receive safety advice through the media and literature, but not door to door visits. The "targeted" group are the households with higher than average risk. They get safety information that is targeted to a small area of the community, and receive door-to-door visits by firefighters. The "specialist" group includes the very highest risk households, such as those with elderly smokers living alone. These households are individually targeted, with frequent visits by fire safety specialists and a sustained relationship with the brigade.

If a low-risk household contacts the brigade, Kent may send them a letter explaining how they can make themselves safer, or may give them information over the phone, and not visit them as they once would have done. If a household is identified as high-risk, they not only visit it but try to maintain a relationship with it over time. They visit the household again to see if the risk has abated, such as by still having a working smoke alarm, or by a lack of further child firesetting behavior, or by a change in unsafe smoking behavior evidenced by no more ashtrays in the bedroom, lack of additional burn marks, and lack of a smell of smoking in the bedroom.

Kent generally does not visit whole blocks of households. However, because a typical visit to a household involves two firefighters and there are usually five on a fire vehicle, a second pair of firefighters goes door-to-door to households on the same block as the scheduled household, while one firefighter stays with the vehicle. Often people of similar socioeconomic and risk levels live near each other, and they are more receptive to a visit if told that a neighbor is receiving one right now, and wouldn't you like one, too?

In London, the fire brigade started out targeting households with people 65 and older, and then broadened their scope. Another strategy is to assign a segment of the first due area to each

shift at a fire station, and have them systematically go through the neighborhoods with home safety visits.

Some brigades make cold calls to households and others do not. Kent and London have found that some unscrupulous people make cold calls pretending to be there for home fire safety visits but actually planning to rob them, and so it is better for the visits to be scheduled, or other means found for reaching the household. Other areas have not had this problem.

Each fire station in Strathclyde is given an estimation of risk for each household in its first-due area, based on the nationally identified risk factors. Crews are encouraged to blitz the high-risk areas with home safety checks. Before the statistical tools were available, about 70 percent of the homes visited by the brigade were to what are called "worried safe" households, ones that worry about safety but really are low-risk. Now, a much larger percentage of the home visits are to high-risk households, including those where there is known alcohol or smoking addiction (based on reports from social workers), households where there has been a need for an occupational therapist (i.e., a household with at least one person with a disability), and households visited by social workers, indicating households with shut-in elderly or people with other problems. Social workers have been asked to call the fire brigade while still in the household to schedule a future visit by the fire brigade, which gains the trust of the household for the fire safety visit.

When a fire occurs, the Strathclyde brigade attempts to free up a fire unit at the scene after the fire is under control to go door to door to nearby households asking if they would like a safety check now or in the future to avoid something similar happening to them. Strathclyde brigade used to have no further contact with the fire household once the fire was out. Now, the brigade returns at a later time to discuss fire safety with that household.

Another interesting group being approached by the Strathclyde brigade are people who recently have changed homes. They are identified through the post office, which knows when someone changes addresses. The theory is that interest in home safety is likely to be higher when people have just spent money making a change in residence.

Call Center for Scheduling – Special call centers within fire brigades are used to schedule the home visits in London, Merseyside, Kent, and West Midlands. Each center uses a group of phone operators or schedulers dedicated to scheduling home visits. From listening to some calls, it was apparent that the schedulers are excellent phone communicators who enthusiastically deal with the households, and present a very good "voice of the fire brigade" to the public.

Some of the call centers (e.g., in Merseyside) are staffed by people with marketing backgrounds who have the personality to deal well with people on the phone and win them over. The call center staff are less expensive and take less time to train than dispatchers or firefighters. (Their pay is about $40K per year compared to $50K for firefighters or dispatchers.) The call center operators are charged with "managing the customer relationship", very different words than one used to hear in connection with fire safety delivery. West Midlands used to have firefighters doing the bookings but now uses a specialized call center, too.

There are typically three entry points for scheduling a home visit. A household may contact the call center to request a visit after seeing information advertising the availability of visits, or hearing about them from friends, neighbors or relatives. Second, a referral to schedule a visit may be made to the fire brigade or household from a social service agency, which also may send someone along on the scheduled visit with the fire brigade. Third is simply knocking on doors and asking people if they want a safety check, which they may agree to on the spot or schedule for a later time.

Visits to high-risk households often result in referrals by the household to other households that could benefit from a visit. Referrals are also a form of customer satisfaction indicator. Referrals have been especially common from visits to BME households.

Who Conducts Safety Visits – Every fire brigade we visited does home safety visits at least in part with uniformed firefighters. Several use employees assigned full-time to the community safety education program. Merseyside uses a team of 40 "advocates" each of whom specializes in addressing certain at-risk populations. West Midlands does the same. If line firefighters visiting a household find it requires the special expertise of an advocate, they schedule a visit by one with the appropriate background for the household. Sometimes it is known ahead of time that the household requires an advocate, and they are sent on the first visit. Visits are conducted by two firefighters or a firefighter and an advocate.

Some advocates specialize in certain languages and ethnic groups, such as Chinese, Arabic, Bengali, Somali, Yemeni or "Asians" (the term used in the United Kingdom to denote Indians, Pakistanis, Bangladeshis and others from the Indian subcontinent). There are advocates who specialize in dealing with people with certain disabilities, such as deaf advocates who know sign language, and advocates who specialize in dealing with people with mobility or mental impairments. There are advocates to deal with people with drug or alcohol problems. Merseyside also has five older advocates for home visits to the elderly. Many of the advocates have personal histories relevant to their specialties. One advocate was a nurse and social worker who had provided care to the elderly. One Chinese advocate was the daughter of a mid-level officer in the

Hong Kong fire brigade; she wanted to be part of the fire service. Although the advocates specialize, most also visit households outside their specialty.

Merseyside has found that male firefighters are not going to be welcomed into some high-risk Muslim homes. Most of their 10,000 Somali population are Muslim, and they will not let a man into the household when the women are alone. The brigade sends a female Somali advocate to these households.

The mobility advocates consider issues such as the heights of kitchen counter tops for cooking safety, door clearances for escaping in a wheelchair, and establishment of a room of refuge. Advocates for people with learning disabilities may spend extra time with them demonstrating safety behaviors. The elderly advocate may recommend or provide fire retardant bedding or a fire retardant throw for a sofa if the household has smokers.

The Merseyside advocates wear the same uniforms as the firefighters. Though the firefighters objected to that at first, the practice continued and is now more accepted. The chief felt that "people think in pictures". Seeing someone who looked like a firefighter would help them get in the door, especially if the advocate looked like or spoke like the people in the household.

The advocates have a more subtle role than just what is accomplished during a visit. They befriend and get known by a section of the community that is often hard to reach (e.g. Chinese immigrant or Muslim neighborhoods). Once they prove themselves valuable and trustworthy, the households visited often recommend further visits to friends or suggest other households that have problems and should be contacted. The advocates become representatives for a segment of the community to the fire brigade, and vice versa—advocates of the fire brigade to the community. The advocates have become a major factor in winning the trust of the community.

The advocates also play a critical role in market research and tailoring materials for the group they are targeting. The Chinese advocate in Merseyside, for example, advised the brigade that it would not go over well to distribute fire safety brochures during the Chinese New Year with the national "Fire Kills" message and logo. The message would be considered bad luck, and the material ignored. So the fire brigade developed an edited version of the brochure.

In West Midlands each station commander requests advocates for household visits where they are thought necessary to assist the firefighters. Advocates also generate lists of homes to visit based on their knowledge of the community. The station personnel help decide on the households to be targeted, and are given a quota to visit. West Midlands typically will have 13 of its 60 fire apparatus out making house calls during the day. Their first choice for this duty is crews from stations that have multiple apparatus, so there can still be a rapid response by the first

arriving vehicle if a call comes in while doing inspections. West Midlands also has established small, diverse teams comprised of firefighters similar in ethnicity to the area being visited.

Kent has six full-time home visit specialists and four part-time specialists who do nothing but home safety checks. They receive training in dealing with the elderly, disabilities, and BME households. The specialists include people with skills in nine languages. They are civilians but include some retired firefighters. Some West Midlands firefighters are being taught sign language to communicate with the deaf.

The London Fire Brigade primarily uses front-line crews to undertake home fire safety visits, but has an increasing number of specialists who undertake home visits to people with disabilities, language barriers or other needs such as the very elderly. If necessary, the London Fire Brigade will provide an interpreter to ensure that safety messages are fully understood.

Timing of Visits – The brigades make home visits in selected morning, afternoon, and evening periods. Merseyside generally does its home visits 11:00am–1:00pm, 2:00pm–4:00pm, and 6:30pm–8:30pm. West Midlands chooses 8:00am–1:00pm and 6:00pm–9:30pm The times are based on a combination of considering when emergency calls are relatively low and when someone is likely to be home. The visits take 50–60 minutes each.

What is Done on the Visit – All home safety visits include checking the number and location of smoke alarms, and then testing them. If no alarm exists, most brigades will install one or more on the spot, often an alarm with a 10-year sealed-in battery that is oddly shaped so it cannot be used for other purposes. The fire service used to give away free smoke alarms for households to install themselves, but stopped because a significant number were never installed or not installed properly.

Besides smoke alarms, the home visit will check for visible fire dangers such as unsafe deep fat fryers, electrical problems, or matches left out where children are present. The visit may assess whether the people in the household need some type of social aid they are not getting. The household may be asked about drinking or drug problems, and whether they would like a referral to a treatment program. As follow-up to the visit the firefighters might contact a treatment program or other aid that appears necessary.

The community safety programs are continually trying to find innovative ways to deal with the increasing range of behavioral and physical safety problems they encounter. Some brigades are going so far as to provide a free new deep fat fryer if the one being used is dangerous. Some brigades offer a fire resistant mat for a mattress for people who smoke in bed. Yes, this all costs money, but a lot less money than extinguishing a fire, especially a fire that causes major property damage or injury.

If firefighters see evidence of a crime during a home visit, they are obliged to report it despite the potential loss of trust. For example, if they see an abused child or battered wife, they will call the police or other appropriate agency.

On most visits, the firefighters leave appropriate safety literature with the household. Most brigades have prevention materials in several languages, and have materials aimed at the elderly and hard of hearing (e.g. information on vibrating smoke alarms). The translated materials have English on one page and the foreign language on the facing page. They can be used in English as a Second Language ESL courses, and by members of a household who prefer English.

Home inspections in Strathclyde include an injury hazard assessment as well as a fire risk assessment. The fire service looks for hazards that might cause any type of injuries, and other agencies that visit a household look for fire hazards.

Data Collected on the Visit – During the home visit, most brigades follow a checklist that also is a data collection form to record what was done and the dangers found. The data may include some or all of the following information, depending on the brigade:

- Smoke Alarms – the presence and condition of smoke alarms, whether one was installed, whether batteries were replaced, the date this was done, and the type of alarms or batteries provided. If an alarm is installed, the fire service will set a date to check on whether it is still working.
- Circuit breakers (mains) – are they working properly?
- Smokers –the number of smokers in the home, and whether there is evidence of careless smoking (e.g. burns on rugs, clothing, and furniture)
- Cooking – whether the household uses a chip pan (deep fryer)
- Agency Aid Needed – whether any other agency should be referred to the household. (If so, some brigades automatically send the report to it.)
- Electrical problems – any found (e.g., overloaded circuits, frayed wires)
- Other potential fire dangers (e.g. electric blanket use)
- Fire loading – whether high, medium, or low
- Medications – whether being taken
- Children fire setting behavior – based on interviews and observation
- Number of people in the household – especially the number who are over 60, under 10, and 10–16 years old

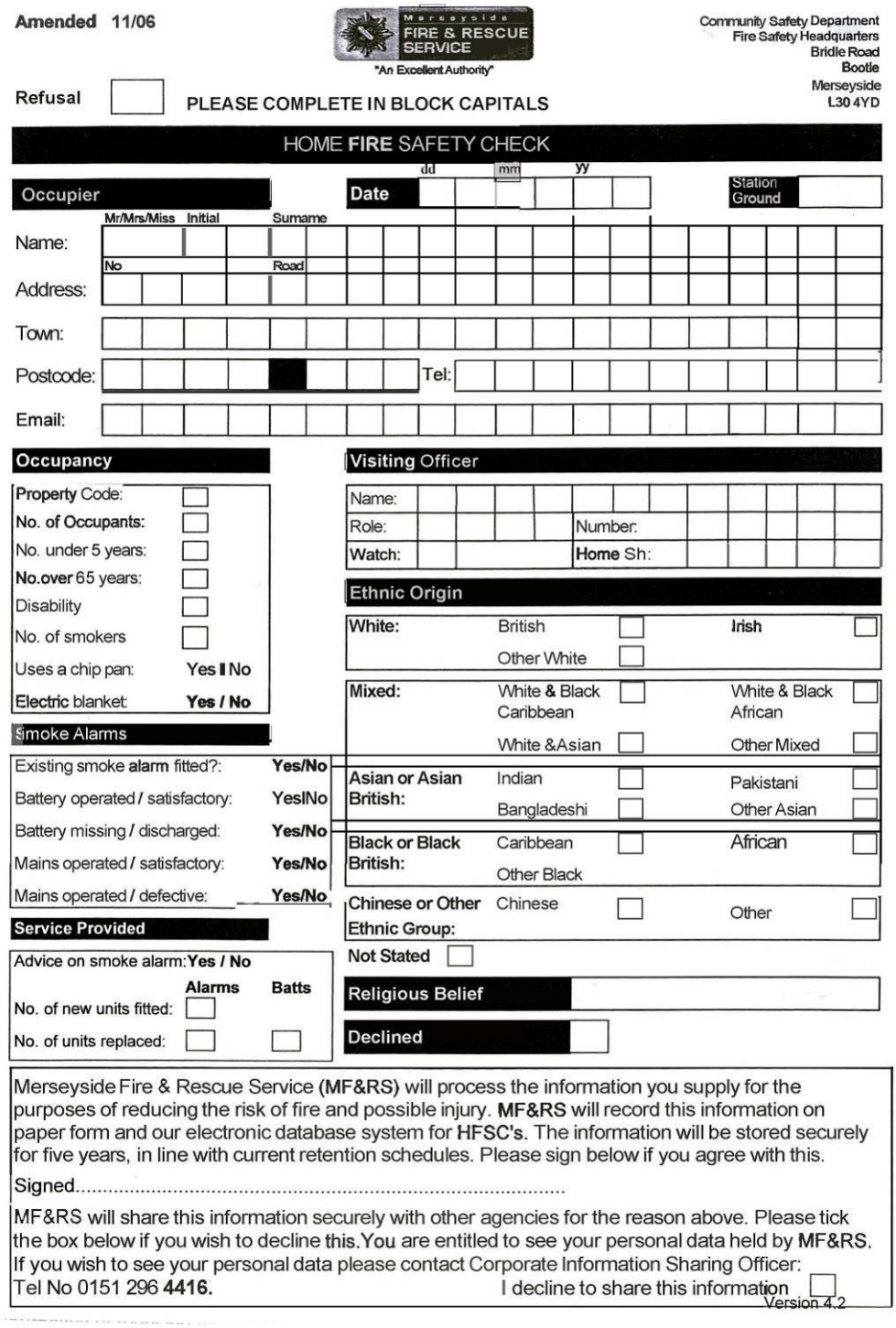
- Fire risk rating – before and after the visit
- Life safety rating – overall sum of risk to life, including escape paths
- Religion and ethnicity – if they can be identified sensitively

Once entered into the database, the data recorded on a visit can be called up by household, with information on when the previous visit was made, the actions taken, and the safety rating of the household. The home visit form used in Merseyside is shown in Figure 2. Some brigades (e.g. Kent) conduct room by room inspections with a separate checklist for each room.

An overall risk score and score by type of risk is computed for the household after the visit. The data is available for comparison on subsequent visits, and is used to decide on the time interval needed for a next visit. The data on the visits is being linked to fire experience to determine the effectiveness of the visits overall and by type of risk. The data may be used to change the targeting of the visits or the approach taken during a visit.

The data on the household visits in each brigade can be analyzed in a variety of ways to determine patterns of problems by area, block, or even household. All of this can be shown graphically using the GIS software provided nationally. One can draw a polygon around any part of the community on a map and get data on the risk of households in that area.

Figure 2: Merseyside Data Collection Form Used During Home Visits



Amended 11/06

Merseyside FIRE & RESCUE SERVICE
"An Excellent Authority"

Community Safety Department
Fire Safety Headquarters
Bridle Road
Bootle
Merseyside
L30 4YD

Refusal ☐ PLEASE COMPLETE IN BLOCK CAPITALS

HOME FIRE SAFETY CHECK

Occupier — Date (dd mm yy) — Station Ground

Name: (Mr/Mrs/Miss Initial Surname)
Address: (No Road)
Town:
Postcode: Tel:
Email:

Occupancy

Property Code: ☐
No. of Occupants: ☐
No. under 5 years: ☐
No. over 65 years: ☐
Disability ☐
No. of smokers ☐
Uses a chip pan: Yes / No
Electric blanket: Yes / No

Smoke Alarms

Existing smoke alarm fitted?:	Yes/No
Battery operated / satisfactory:	Yes/No
Battery missing / discharged:	Yes/No
Mains operated / satisfactory:	Yes/No
Mains operated / defective:	Yes/No

Service Provided

Advice on smoke alarm: Yes / No

	Alarms	Batts
No. of new units fitted:	☐	
No. of units replaced:	☐	☐

Visiting Officer

Name:
Role: Number:
Watch: Home Sh:

Ethnic Origin

White:	British	☐	Irish	☐
	Other White	☐		
Mixed:	White & Black Caribbean	☐	White & Black African	☐
	White & Asian	☐	Other Mixed	☐
Asian or Asian British:	Indian	☐	Pakistani	☐
	Bangladeshi	☐	Other Asian	☐
Black or Black British:	Caribbean	☐	African	☐
	Other Black			
Chinese or Other Ethnic Group:	Chinese	☐	Other	☐

Not Stated ☐

Religious Belief

Declined ☐

Merseyside Fire & Rescue Service (MF&RS) will process the information you supply for the purposes of reducing the risk of fire and possible injury. MF&RS will record this information on paper form and our electronic database system for HFSC's. The information will be stored securely for five years, in line with current retention schedules. Please sign below if you agree with this.

Signed.....

MF&RS will share this information securely with other agencies for the reason above. Please tick the box below if you wish to decline this. You are entitled to see your personal data held by MF&RS. If you wish to see your personal data please contact Corporate Information Sharing Officer: Tel No 0151 296 4416.

I decline to share this information ☐

Version 4.2

Section 1: Occupancy		Tick appropriate score
1	Are any occupants dependant upon assistance in the event of a fire?	8
2	Elderly occupant(s) or lone parent family.	7
3	3 or more children under 10 years, or 6 or more occupants.	7
4	None of the above.	6

Section 2: Circumstances		Tick appropriate score
1	History of fires in the home. Children currently playing with fire.	7
2	Is there anything that would affect the occupants awareness of fire, or impair their reaction to a fire situation?	8
3	Evidence of careless use of smoking materials or inappropriate cooking methods.	7
4	Inappropriate use of electrics.	5
5	Excessive fire loading.	4
6	Smokers live in household, or use of candles.	3
7	None of the above.	2
	Risk Rating = Section 1 x Section 2	

Section 3: Smoke Alarms		Before	After
1	None.	0	0
2	Yes - but inadequate or inappropriately sited.	2	2
3	Yes - satisfactory.	6	6

Section 4: Fire Safety Advice		Before	After
1	No apparent fire safety awareness	0	0
2	Limited fire safety awareness	2	2
3	Good fire safety awareness	6	6
	Safety Rating = Section3 + Section 4		

Final Points Rating = Risk Rating - Safety Rating	

Has F.A.C.E. card been issued at this address?	Yes	No

Section 5: Final Points Rating		Tick appropriate score
Over 48	Identify sources of risk to occupier and ways to minimise that risk. Inform occupier of their referral to CFS and it's purpose. Install smoke detectors on each floor level.	**Refer to CFS**
30 to 48	Concentrate fire safety advice on areas of concern. Install smoke detectors on each floor level Revisit	**2 yrs**
0 to 29	Confirm knowledge of 'Fire Safety in the Home'. Emphasise importance of smoke alarm maintenance.	**5 yrs**

Further Information

Scheduled Return Visit – Most brigades plan to return to the households visited to test the installed alarms, see if the risks have abated, and provide more information. The time of the follow-up visit may vary from days for acute risk cases to 8 years for just a battery check. Merseyside typically plans to revisit a visited household in 2–3 years. If the risk is considered benign, they may just call the household instead of physically revisiting it.

Supervision of Program – In London, responsibility for the delivery of community safety initiatives had been delegated to the borough commanders, who use a combination of local knowledge and data analysis to prioritize areas for prevention activities. Likewise, in Merseyside, each of the five district watch managers coordinates the program for his district, and makes sure that all of his stations are doing their home visits. Other brigades run the home visit programs centrally, but use the fire brigade regional staff for implementing visits and supervising the field component of the program.

Outreach Goals and Evaluation – In most brigades, the home safety visit program has involved tens of thousands to hundreds of thousands of households. A significant percentage of high-risk households have been reached and more are planned.

London's goal is to conduct about 100,000 household visits per year, with 35,000 conducted by fire station staff and 65,000 by partner agencies. In 2005/2006, the brigade conducted 28,650 visits. This increased to over 36, 600 in 2006/2007.

Merseyside has about 540,000 households. By the end of 2006, they had visited 300,000 and installed 400,000 smoke alarms. Their goal is to visit 250,000 households in the next 5 years. Approximately 50,000 of their inspections to date have come from knocking on doors, and about 500 per month from their youth program (to be discussed). The rest have been scheduled visits. The home safety checks are divided up among 42 fire units. Each station has 100 home inspections assigned per month. With four shifts, this breaks down to 25 inspections per shift per month, a manageable number. That totals to about 50,000 visits per year, without counting advocates' visits, so the goal of 250,000 in 5 years is feasible. Even the busiest stations find time to participate in the household visits.

The West Midlands goal is to conduct about 80,000 home visits and install 40,000 smoke alarms per year among their approximately 1 million households. They have been achieving 50,000 per year, focusing like the other brigades on the areas with highest fire risk.

In addition to outreach, and the reduction in fire deaths, an evaluation of the success of the United Kingdom home safety program may be illustrated by a housing project in the Inkston Drive area of Glasgow. It has 4 buildings each with 19 floors, with 4–6 families per floor, or 400 families in total. It had been a fire hot spot. The nature of the fires was identified, and almost every household in the housing project was visited. Fires dropped to almost zero after the intensive door-to-door campaign. The local firefighters are now known by first name to that community and more trusted than before. One of the research objectives now is to determine how often the firefighters have to return, and to which households, in order to maintain the

effect. It is more effective to return for brush-ups on safety lessons and to check alarms than to come back repeatedly to fight fires.

The United Kingdom visits to large numbers of high-risk homes is probably the most important new idea we found. They are aggressively promoting the campaign among high-risk households and the fire service, and implementing the program with hundreds of thousands of visits a year, not just a pilot program with a few visits here and there. The home safety visits are thought to be a major reason and possibly the largest reason for the sharp reduction in fire deaths in the past decade, according to virtually all United Kingdom fire agencies with whom we met. Other important elements in the reduction have been the impact of regulations (e.g. for furniture standards and smoke alarms), improved economy and better housing, and other community safety activities including school-based education.

Media Campaigns

The British government and local jurisdictions conduct intensive, carefully targeted fire safety media campaigns. The national government has a multimillion dollar budget for buying spots at desirable times in various media. They do not rely on public service announcements, which generally run late at night when few are watching. The media campaigns are based on market research. The campaigns are intended to raise awareness of the fire problem, increase smoke alarm ownership, and change fire safety behaviors.

Media Used – A wide variety of media are used in campaigns both at the national and local levels. The choice of media is determined by whether the target group is the general population or specific subgroups. For the latter, they obtain information from the advertising industry as to which television and radio shows are favored by various groups, e.g., Asians, elderly, young people, and working class men.

People are wary of advertisements that ask them to call a telephone number or send an email (e.g. to request safety information or a home visit) because of the fear that when they do so someone will try to sell them something, or put them on a sales mailing list. The ads have to clearly indicate that they are from the fire service, and that responding to a request for a home visit will not result in someone trying to sell something. On the contrary, the households can get something free.

Television is used for reaching the largest number of people, generally an “umbrella attack” on the general population. There are fewer channels available on British television than in the United States and so it is easier to target safety messages on them. Paid safety spots are included in daytime soap operas and evening prime time shows favored by the higher risk groups.

Besides passive television viewing, there is now interactive digital television which allows the viewer to respond to messages on the television. "Red Button Teddy" on the Sky TV channels can be used to view a screen with scheduling information and then schedule a home visit by entering one's address.

Radio is used to reach more specific groups than television, through programs or stations listened to by particular ethnic groups. Radio stations that specialize in "rock and dance" are used for messages aimed at young people. Stations have been paid to develop spots as well as to run them. The radio stations are literally and figuratively better attuned to young people than are the national government publicity specialists.

Scotland is using radio messages that address that actions that people are likely to be doing at the times they are listening. For example, at 6:00pm they run cooking safety ads. In the late evening, messages are run that recommend doing a house safety check before going to bed.

National and local fire agencies run safety messages in both general and specialized newspapers. One campaign to promote working smoke alarms used 34 paid advertisements in ethnic newspapers over a 3-week period. Some of the publications and their circulations are shown in Table 2. An estimated 1.5 million ethnic readers were reached through these ads and another 1.4 million through ethnic radio advertisements in 3 languages (English, Hindi, and Urdu).

Table 2: Examples of Ethnic Newspapers Targeted for the Smoke Alarms Campaign

Title	Language	Audience	Circulation
Eastern Eye	English	All Asian	27,000
Asian Times	English	All Asian	27,000
Garavi Gujarat	Gujarati	Indian Gujarati (Hindu)	40,000
Gujarat Samachar	Gujarati	Indian Gujarati (Hindu)	30,000
Asian Voice	English	Indian Gujarati (Hindu)	26,000
Sikh Times	English	Indian Punjabi (Sikh)	60,000
Des Pardes	Punjabi	Indian Punjabi (Sikh)	25,000
Asian Leader	English	Pakistani	22,000

Besides direct advertisements, the fire service tries to get stories into newspapers for fire safety awareness. In Scotland, a particularly clever idea is using real estate newspapers. The fire service placed pictures of partially destroyed homes among the pictures of beautiful homes for sale, which raised the readers' curiosity, and then delivered a message.

Posters are placed in shops in ethnic neighborhoods on topics such as cooking and fire safety. In conjunction with the radio and newspaper advertisements targeted to the ethnic community, 3,200 posters were displayed in one 3-month period.

London has found that fire safety posters placed at eye level above urinals in mens' restrooms draw attention and take advantage of a 15–30 second uninterrupted opportunity. Strathclyde does the same in mens' restrooms in pubs. While this may strike some as humorous or even offensive, the sites were carefully selected by the Strathclyde and London fire brigades. Strathclyde found that male drinkers will visit the restroom about three times during an evening at a pub, and they spend 5–15 seconds each time looking at the message.

London also uses street signs to inform the public about the availability of home fire safety inspections.

Internet pop-up safety advertisements are being used to reach young people aged 16–24 years. The pop-ups show Internet sites where safety information is available. Pop-up internet ads have been run on Yahoo, AOL and YouTube. Strathclyde also has a prevention website for 5–11 year olds and is paying for safety advertisements on internet game sites.

The backs of bus tickets were used to advertise the availability of home fire safety visits in some high-risk areas in Scotland. The tickets had telephone numbers to call to arrange a home visit. The advertising dwell time for bus tickets (the time spent looking at the message) was observed to be about 20 seconds compared to 4–5 seconds for a billboard. The initial 2-week trial of the bus ticket messages generated only 110 immediate requests for home visits, but requests continued to be received for quite sometime thereafter.

Cell phones are used by the fire service to send out safety text messages, mainly to young people who frequently use text messaging. In some places home visits can be requested by text messaging as well as by a cell phone call. In London, the fire service uses text messaging to arrange home fire safety visits for people who are deaf.

Pamphlets and brochures on fire safety are ubiquitous and of excellent quality in the United Kingdom. All of the fire brigades we visited had extensive fire safety literature available for the public, often in several languages. Much of the brochure information also was accessible via brigade websites.

London has a particularly interesting "publication scheme" in which they use their website to list the fire safety publications available to the public and how to obtain them. London makes the extraordinary offer to provide any item in their safety publication catalog in almost any language, on request. If a desired material has not already been translated, they get it done.

The London Fire Brigade also works closely with ethnic community leaders to ensure that safety messages are communicated to their constituencies by word of mouth or other means.

The United Kingdom fire safety pamphlets and brochures are outstanding examples of clarity. They are easy to read, in color with excellent illustrations. The print is larger than average, which helps the elderly and those for whom English is a second language. The messages are directed at specific safety behaviors. The same materials are used all over the nation. They are produced by one central source—the Community Fire Safety Center.

National Level Programs – In 1998 the Home Office set up the Community Fire Safety Task Force. It was comprised of marketing people drawn from private industry, plus one fire officer, Graham Meldrum, who had been chief of West Midlands and a major proponent of increasing community fire safety programs. A major premise was that the programs developed by the task force would be guided by market research.

The establishment of the task force was one of the recommendations of a late 1990's landmark report called "Safe as Houses"[7] The government had been spending $1.5 million on direct fire safety advertising. This was viewed as a waste of money by many for being too small an amount to have impact. The "Safe as Houses" report called for a budget of at least $10 million. That not only came to pass but was increased beyond that. The report also called for prime time television advertisements on evening soap opera-type programs to reach the largest and most appropriate audience, and that, too, was realized.

The government decided to fund the Community Fire Safety Center at $38 million per year, of which about $12 million was for television advertising. The advertising was coordinated with the Central Office of Information, the national government agency charged with helping to develop and place public campaigns on various topics across all government agencies; it is like the government's own public relations firm. The Central Office of Information is a large purchaser of television time, and is able to get about double the time per dollar that an individual agency could.

The Community Fire Safety Center continued to exist in 2007, but with a reduced work force. It is still the developer and propagator of excellent written materials and media campaigns for fire safety, especially those targeted at the home. Its budget for television advertising in 2006 was $8 million, down from its peak but still substantial. One reason for the decrease was the tremendous success of the community safety programs and advertising, which dramatically

[7] This report referenced the TriData report "Proving Public Fire Prevention Works, and adopted our approach to evaluating the effectiveness of public education programs.

reduced the fire death rate. Another reason was that higher funding was needed to start the center than to sustain it.

The national fire safety slogan is “Fire Kills—You Can Prevent It." Advertisements are run at the national level to raise awareness that there is still a severe fire problem, despite all the other problems people have to worry about, and despite progress made in reducing fires and fire deaths. These national awareness campaigns are intended to soften the ground for local campaigns aimed at achieving specific behavioral change. There is a website at FireKills.gov.uk with safety materials that can be downloaded by the fire service or general public.

The national campaigns are run in two intensive “bursts” of advertising each year, rather than spreading them throughout the year. A typical burst runs over a 4-week period twice a day during prime time evening and popular daytime television shows. Each message is 30 seconds long. The intensive bursts are designed to increase impact. Running the ads twice in a year helps to reduce fall off in fire awareness, and allows two different messages to be taught. Previously the Community Fire Safety Center had funds for doing three bursts a year.

In 2007 the targets for the national campaigns were smoke alarms and disposal of smoking materials. A past theme was the danger of a cigarette dropped on furniture—how that can turn into a fatal house fire. Topics for other campaigns have included kitchen fire safety (especially safe use of chip pans), fire escape plans (e.g. dealing with window locks and locating keys for opening doors), general fire awareness, and the fire prevention catalog of safety information.

Part of the United Kingdom national fire safety media budget goes to do market research before and after a safety campaign to target and evaluate it. One evaluation survey asked respondents to describe their nighttime routine, to see if it included making fire safety checks before going to sleep, which was a safety campaign theme. The market research found that there was excellent recall of the national advertisements and their messages.

Some national campaigns have been aimed at BME groups. Faith-related events of various religions are considered good opportunities for reaching their constituencies. The Community Fire Safety Center developed campaigns for Diwali (Hindu festival of lights), Chinese New Year, and Eid (end of the Muslim Ramadan holiday.) People celebrating these occasions tend do a lot of cooking for family affairs, and are relaxed, which lowers their fire safety awareness. Radio advertising campaigns are run just before these holidays on independent and ethnic radio stations. A BME media agency was hired by the government to advise on where to advertise and to help write the scripts. The government bought ads in BME newspapers, and used local fire brigades and ethnic street teams to hand out literature in the targeted BME

community. They also developed BME holiday greeting cards with safety messages in various languages and English. The Chinese version is shown in Appendix A.

The British have a sustained, sophisticated national campaign approach that includes:

- Conducting data analysis and market research up front
- Repeating key themes frequently, in a variety of interesting ways
- Evaluating results—they are not afraid to declare a particular approach a failure, and then take a different tack

The national Community Fire Safety Center has a Fire Resource Catalog that lists the resources available to fire brigades, other agencies, and the public. The center provides a "toolbox of guidance", including materials and web-based information on good practices and how to develop a local strategy for prevention. They leave it to local government to choose the strategy.

The Community Fire Safety Center leadership attends regional and national fire safety conferences of representatives to keep in touch with local needs and to provide information on new national programs. There is usually a twelve-month lead time on the national campaigns, so fire brigades know what is coming and can prepare to coordinate their own local campaign with the national campaign.

Smoking is the leading cause of fire deaths in the United Kingdom as in the United States. The national smoking materials campaign ran in March 2002 and March 2004 and again in January and February 2007. The slogan was "Put it out, right out", focusing on proper extinguishment. Although drinking and "going out" were identified as the two main occasions that lead to smoking in the United Kingdom. After an evening of drinking, the smoker comes home to smoke and enjoy more drinks, and often exercises careless behaviors, said the national report describing the campaign.[8] The campaign tries to shock smokers to remind them of the danger. The prime media used in the campaign is daytime television, but spots also run in the 10:00pm–4:00am period, the after-pub viewing time. Television spots of 10 and 30 seconds demonstrate the danger of lit cigarettes by showing a raging fire started by a cigarette that endangers a sleeping couple. The spots in the 2002 and 2004 campaigns were evaluated as effective in changing attitudes and behaviors. The spots are run on television on three general channels and three BME channels. The smoking safety campaigns also use internet advertising from 10:00pm–4:00am; radio, especially late night; and press, targeted at the 60+ male audience.

[8] 2007 Campaign to Reduce the Number of Fires Started by Smoking, January 15, 2007, Community Fire Safety Center, London.

Scottish Campaigns – In 2003 Scotland launched a multi-media campaign against accidental fires in the home with the slogan was "Don't Give Fire a Home". It was directed at public complacency about fire safety. Market research surveys showed that 80 percent of the population did not consider fire a significant risk in their homes—it was "the other guy's problem" or "It's not going to happen to me" was the attitude especially of those who did not smoke or cook much with deep fryers, nor use candles, and thus felt that they did not have much to worry about fire safety. The survey also found that people did not understand how fast a fire could spread in a home and how destructive it could be, because most had not seen it happen. The survey further found that the number of fire deaths did not make much impression because they were too few compared to other causes of death.

Research on driving safety found that people were more likely to change behavior from seeing pictures of near-miss accidents than from the accidents themselves. People remembered "horror advertisements" but do not change behaviors as often as when they saw near-misses.

Based on the above findings, the Scottish Executive decided to develop a campaign involving all eight Scottish fire brigades that focused on the touchstones of people's lives and the near-misses for destroying them. The campaign was coordinated by a "social marketeer" under the auspices of the Government Information Communication Network, which is like the unified publicity office of the English government. The campaign target was to reduce the 8,000 fires in dwellings each year rather than the fire deaths directly, since the number of fire deaths was too low when broken down by local authority.

The objectives of the campaign were to shake off complacency, tell people what to do to reduce risk, and encourage people to request community home safety visits. The Scottish Executive felt that Scots typically are resistant to government messages, being independent minded if not outright belligerent toward government rules, and do not want a "nanny state" trying to protect them from everything.

The campaign plan was to reach the public through television, newspapers, and radio talk shows rather than ads. The hosts of the programs would present the safety message rather than the government. Research showed that messages from government ministers would be rejected as political, so politicians were not involved. Rather, an appeal was made to Scottish "brands" (patriotic national symbols).

It was necessary to "Scotify" the English prevention materials, such as by showing people suffering from hard weather conditions, and showing Scottish emblems. The Scots receive television and radio programs from England that include English fire safety messages, so it was thought that the Scottish people "would get two bites from the cherry," the United Kingdom campaign and the Scottish campaign, said their national campaign designer. The

generic Scottish fire safety campaign focused on electrical safety in the home, because everyone is at some risk from electrical hazards. It also focused on changing attitudes about fire risk, and on asylum seekers from Eastern Europe, one of the high-risk groups.

Another aim of the Scottish campaign was "reaching the hard to reach", playing off the TriData report of that name from the 1990's.[9] The target audience was males between the ages of 30 and 59, the age bracket most likely to have an alcohol-related fire. Men coming home from the pub often will cook a snack such as sausages in a frying pan, and then fall asleep, leaving the food burning. Or they will smoke a cigarette, fall asleep, and drop it onto their upholstered chair. A 30 second television advertisement with the punchline 'don't fuel fire with alcohol' highlighted putting your children's lives at risk by cooking while intoxicated. Television safety advertisements were run on television sports channels, the overwhelming favorite type of program of this group. The ad had powerful imagery of children being trapped in a fire caused by a boozy, blacking-out man disregarding of his children's safety. Market research found that while their men do not care much about their own safety, they do react to the potential that they may kill their own children with careless behavior.

Scottish campaigns targeted to young people also were based on market research. Youths do not react much to messages about risks to their lives, because they feel invincible and far from death. But they do care about how they look, so campaigns that focus on the possibility of being scarred or disfigured by an auto accident or fire did break through their indifference to safety messages.

Local Level Campaigns –Local brigades often build upon the national campaigns, and sometimes run their own. For example, Kent uses the national prevention literature but in addition pays for local fire safety advertising with an annual budget of $80,000. Some local campaigns focused on particular areas within Kent, others are area-wide. Campaigns on topics such as kitchen fires may last 2–3 weeks.

The West Midlands fire service has worked to get local media to report the causes of fires as part of the coverage of incidents. They also tell the media how a business or residence could have been made safer to prevent or reduce the losses from a fire that occurred.

The London Fire Brigade developed a comprehensive publicity campaign to increase smoke alarm ownership, in addition to testing and installing smoke alarms during home fire safety visits. The prime targets of this campaign are the elderly, youths, people in low socio-economic accommodations, people with alcohol or drug problems, and people with mental

[9] *Reaching the Hard to Reach: Techniques from Fire Prevention Programs and other Disciplines.* 1994. TriData Corporation.

or physical disabilities. Media strategies include use of videos aimed at particular sections of the community; press releases; and the targeting of areas around houses where a fire has occurred.

School Programs

Most British school children are reached with a fire safety program at least once in their elementary school years. Many students are reached multiple times over their school years. Where resources are limited the programs focus on schools in high-risk areas.

There is a national school curriculum and it is difficult to get fire safety material added to it. Nevertheless, all of the brigades visited but Merseyside had an intense school campaign they use annually.

The brigades with school programs typically reach a minimum of 90 percent of the children in the third grade, either with an assembly program or meeting with a few classes at a time. Some add a pre-school or nursery level program. Some add a program for another grade level in primary school, and a few add a program in secondary school. The Community Fire Safety Center developed school programs for both primary and secondary schools that are widely used.

Local School Programs – In London, school fire safety programs are conducted by the brigade's "school team," which is comprised of about 15 "school officers" who are not firefighters. Most of them have experience in sales, not teaching, which the brigade has found to be a more suitable background for delivering safety messages. The sales-oriented officers have a style of reaching out to children that is less preachy and less parental than from educators. Each school officer works five days a week on nothing but school fire safety instruction. Their assignments to schools are centrally coordinated, so all their time is available for service delivery. Each school officer reaches about 10,000–12,000 students a year.

The school team members are deployed to the boroughs and report to the Service Delivery Directorate day-to-day, the same organization that supervises fire operations. Several school officers may be placed in one borough and none in another, depending on the perceived need or risk level, and the number of schools. "Not all London is the same", said the head of community safety, and deployment of resources is not equal across the board.

The London school program is conducted in two stages, the first aimed at year 2 of primary school, ages 6–7. This program fits with the national curriculum. It includes how to prevent common causes of fires like playing with matches, candles, smoking, cooking, and electrical. It also includes fire detection and escape. The second stage of the program is aimed at year 6, 10–11 year olds. The second stage builds on the material of the first stage. Videotapes are

shown to illustrate that fire is fast and deadly. They appeal to emotions, not just intellect, in getting across that fire is dangerous. This implanting is meant to last a lifetime.

The London school program reaches about half of all primary schools. Over 150,000 London school children go through the program in 600–800 schools each year out of about 1,300 schools in the brigade's area. The program is not mandatory, and the brigade asks schools to participate through a direct mailing. They classify schools as being in areas with five different levels of fire risk, very high to very low, and try hardest to get schools in the high and very high-risk areas to accept the programs. If the brigade cannot cover all the schools, they do the ones in the high-risk areas first.

The secondary schools have been much harder for the London fire service to get into. The fire brigade is revamping its education package to better fit the national secondary school curriculum, with the hope of getting into more schools at this level.

In Kent, too, the primary school fire education program is linked to the national curriculum. Its outreach has increased significantly over the past decade, a bit at a time. Back in 1995–1997, local fire stations went to some schools to deliver safety programs. In 1998 they started using 6 part-time fire officers on overtime to implement the school program. In 2001–2002 this increased to 6 fire officers full-time. They tried to get into every primary school and succeeded in reaching about 50 percent. By 2007, they were delivering programs to an astonishing 90 percent of schools in every grade 1–6, every year, using 10 firefighters full-time. The brigade found they can halve the resources needed by speaking to two-year groupings of children in a 40-minute assembly. They speak to grades 1 and 2 together, then 3 and 4, and later 5 and 6.

Kent views its program as an educational "spiral", building on previous concepts as they move up in grades. Grades 1 and 2 are taught basics; grades 3 and 4 receive more details including how to plan escape routes. For grades 5 and 6 they add discussion of arson. They feel that the program not only makes the children safer for the present and later in their adult life, but also has a carryover effect to parents through the "pester power" of the kids, who nag their parents about safety issues they learned in school.

Kent is now reaching into the secondary schools. They focus on grades 8 and 10, reaching about 90 percent of the children, another astonishing figure for a secondary school fire safety program. They limit class size in their secondary school program to 30 students, and do not lecture but rather discuss fire safety issues with the students, which takes more time.

Teachers' guides are provided for all schools on the fire safety lesson and how they fit into the national curriculum. Firefighters teach the Kent school programs and not teachers

because the firefighters have authority on the subject, are respected for it, and are someone different in the classroom, which generates interest. They also have personal experiences on which they can draw in presenting safety information. The firefighters who participate in the program are given one week of training that includes practicing their delivery. They then shadow firefighters who give the instruction, then get to give part of it and receive feedback from teachers on their presentation, and finally are allowed to solo.

A key to sustaining the school programs has been maintenance of personal contacts with officials in each school.

The Merseyside fire brigade has gone counter-trend and largely stopped prevention programs in the schools. They found it hard to get school time and were not convinced that this approach is effective. Instead they focus more on their home visit campaigns.

In West Midlands the school program focuses on 10–11 year olds. They are reaching close to 100 percent of them. The school programs are taught by specially trained firefighters. They now are also reaching 13–16 year olds in secondary schools on the subjects of fire safety, arson awareness and road safety. The have just started a nursery program for ages 3–5, and have a new safety program for children and people with special educational and physical needs.

In Strathclyde, teachers are shown how the fire safety education program relates to the national school curriculum in order to increase its acceptance. Virtually every 10 year old receives the fire safety program. They particularly try to reach all children in South Glasgow and other high-risk areas. The school programs are delivered by the community safety staff, not the line firefighters.

In addition to the elementary school program, all secondary schoolchildren (13 year olds) are taken to the brigade's fire safety center for fire safety training. Between the secondary school program and other visiting classes, about 14,000 children go through the safety center each year. The training for the secondary students includes a workshop on developing a family fire safety plan. The 13-year olds are asked to be fire safety "ambassadors" to their families, and to discuss escape planning and other fire safety issues with them. Even the younger schoolchildren 7–11 years old are taught the basics of checking on fire safety of the home before going to sleep, because they may be the last person awake in their households.

To evaluate the primary school program, the secondary school children are given a 6-question test on what they were taught in primary school about fire safety. Voting machines are given to each child like those used on the quiz show "So You Want to Be a Millionaire". Each child's vote is registered and the collective score for each answer is displayed for the "class".

The retention rate is about 85–90 percent on the basics, very good indeed. The lessons are refreshed in secondary school along with additional safety information.

Programs for Troubled Youth

A widespread feature of community safety programs in the United Kingdom is the involvement of the fire service in programs aimed at anti-social behavior of youths, such as starting fires and hostility to firefighters. The youth programs are aimed at affecting the causes of the anti-social behaviors. Youths from high crime areas and disadvantaged families, and youths known to be fire setters are especially targeted.

The fire service got involved in the youth issue primarily because of the incidence of attacks on firefighters by youths. Youths have thrown rocks at fire engines going through their neighborhoods and stolen equipment from the trucks. This has been understood as attacks on faceless government, not so much a grievance against the fire service itself. A premise of the youth program is that a child would be less likely to throw stones at someone they know, and at a service doing so much for the community, if they knew about it.

Besides attacks on firefighters, the fire service is concerned about youths setting "secondary fires" in trash bins, empty lots, etc., and their unsafe behavior in the home. The root causes of this behavior are often feelings of alienation against society in general, abusive or non-loving parents, absent parents, deprivation (poverty), discrimination and other factors.

The fire service joined with other agencies in trying to do something about the problem both at the national level and locally. While not affecting fire injuries in the home immediately, the youth programs are thought to help straighten out the youths and make them safer members of the community in the longer run.

Referrals of Youths – Youths are referred to fire department youth programs by schools, police, social agencies, parents and the fire service. Often the youth has committed a criminal act, and the subsequent plea bargain includes an agreement to enter the youth in a fire department program. The youths usually are reluctant to go to the fire program but consider it better than jail. Once completed, the youths have been very positive about the programs, and often encourage their peers to do it, too.

Local Program Approaches – London's youth program is called Local Intervention through Fire Education (LIFE). The program was developed by the London Borough of Tower Hamlets and its Youth Offending Team. This program is comprised of courses for youths aged 13–18 and is delivered primarily by operational firefighters or fire officers. It is a five-day program, Monday–Friday. It is funded by the local borough because the program cuts across many social problems involving youth, not just fires.

The course includes team building, basic health and safety information, first aid, the consequences of setting fires deliberately, and basic fire fighting skills. The middle day of the course is spent at an outside venue, the Mile End Climbing and Canoeing Center, to improve confidence and team building skills in a less formal environment. To complement the classroom work, the participants get individual mentoring. The course ends with a plan to help them develop further after the program is over, including their prospects for employment.

The graduation drill is attended by families and friends of the participants. Each participant is presented with a certificate and a portfolio that details the skills acquired, for use in seeking employment.

The LIFE trainers are firefighters selected from those who wish to participate. They are drawn primarily from local crews in order to retain the links with the local community. The selected firefighters attend a training course to prepare them for their role.

The initial trial of this program was based at the Shadwell Fire Station, the local training center for the London Fire Brigade. An expert with experience in similar projects outside London assisted in developing the syllabus, training the trainers and evaluation of the results.

For many youths attending the course it is the most responsibility and recognition they have ever received. Most of the graduates have responded positively. A number of graduates subsequently secured summer jobs as youth workers and several applied to join the fire brigade. The firefighters who participated in delivering the course felt they themselves benefited, too.

Where previously firefighters had been subjected to verbal or physical abuse, they are now seen as allies, not adversaries. The outside expert who evaluated the course concluded, "There was very little unacceptable behavior [following the course]. This was due… to the positive role models set by the instructors and station staff alike."

London has run over 1,500 youths through this program in recent years. They also try to visit the homes of the youth participants to conduct a home fire safety check. The two activities reinforce each other. The outcome has been a change in youth behavior for the better in the vast majority of cases. Approximately 80 courses are being run each year, reaching a total of 1,000 youths.

In Kent, the Youth Diversion Program is headed by a firefighter with 26 years on the job in suppression and 2 years in diversion. The youth diversion team has 7 firefighters. Their objective is to raise fire safety awareness among youths who have been in prison or otherwise gotten in trouble, and to reduce fires, especially those intentionally set. These youths are among the hardest to reach. The fire brigade program promotes thinking about the consequences of one's actions on family, peers, and oneself, especially the consequences of fires. They try to raise

awareness about the impact of actions on the victims and the youths themselves. They aim to encourage good citizenship and reduce anti-social behavior. The program has largely succeeded among the youths it has processed, despite the expected difficulty of getting through to them.

The Kent program involves one 2 ½ hour session a week for 6 weeks. Each session includes 12–16 youths. They process about 100 youths per month. The classes are conducted at a fire station. The program consists of discussions with the youths and a variety of diversionary activities that include the basics of firefighting with extinguishers and hoselines, and wearing firefighter protective gear.

The sessions are flexible, and engage the youth in discussion and activity. They deal with young people's issues. They try in the process to inculcate fire service values. The program uses fire apparatus, fire simulation equipment, laptops, and projectors.

Kent has been able to get graduates of the program to attest to its value among their peers. The recidivism rates are low—only 10 percent have been found to exhibit anti-social behavior that brings then to the attention of the authorities or social services again, though the evaluation period is still limited.

In Scotland, anti-social behavior by youths creates much unnecessary demand for emergency services. Out of 60,000 emergency calls one year (excluding medical), two-thirds were attributed to youths. This included the majority of minor fires (e.g. trash bin and outside fires) but also many home fire. The problem has led to the formation of a "Youth Development Plan" under which fire crews improve their communications and relationship with youths in the community, and lend them support.

Strathclyde has a full-time youth development officer. They proactively engage youth referred to their program as well as present a more human side of the fire brigade. One youth program is built around NFPA's multi-hazard "Risk Watch" materials converted to a Scottish context. The program includes performance of a safety project by each class of youths. A series of modules has been to address specific antisocial behaviors such as malicious fire calls, hydrant vandalism, or interference with road traffic. The program also reinforces home fire safety concepts.

Youths are entered into the Strathclyde program only if they attacked firefighters, set a fire deliberately, or made a false alarm. The program deals with the youths one on one. Their parents are involved, too, because often there is a problem in the household such as abusive parents, divorce, high poverty, or alcoholism. The youth are asked why they did what they did, and then have the consequences of their actions discussed. As in Kent the brigade tries to show the youths the consequences or "ripple effect" their actions have on their parents, schools,

friends, victims, and themselves. A video titled "The Ripple Effect" starring youths like themselves, not professional actors, was developed by the fire brigade. Out of 28 youths who have gone through this program, there were no re-offenders in 18 months.

Juvenile Fire-Setter Programs – There are programs in the United Kingdom similar to those in the United States targeted at junior fire-setters. The London Fire Brigade said they had low recidivism from children who went through these programs. Because these programs have had much success in the United States, we did not pursue their details.

Programs For and By University Students – The Community Fire Safety Center developed a program for university students and other young people 18–24 years old. The program targeted 20 universities initially, aiming at safety in student residences, both dormitories and off-campus.

The program is delivered by the students themselves. "Student brand ambassadors" are appointed for each campus. It recruits students majoring in radio communications who are then brought to London for a day of training on fire safety principles and how to conduct the program. The student ambassadors conduct the program for 5 days each October. A firm specializing in marketing to university students was brought in to determine how best to market the program. The program uses university media. The program materials include a case study of a young woman who died from careless smoking. The program advises students to extinguish cigarettes carefully, have a working smoke alarm, be careful with candles, and be aware that smoking-related fires are often linked to alcohol drinking. The program includes a chip pan fire demonstration to show the volatility and flammability of cooking oils when heated. The students are made aware of the availability of the fire service to conduct a fire safety check of their residence.

A key task of the student ambassadors is to identify high-risk student residences. They also distribute safety materials and identify areas on campus with high student traffic, e.g., popular bars and group study rooms, at which to advertise the program. The ambassadors identify where student renters live, and encourage students and landlords to accept a home fire safety visit.

Programs for the Elderly

The elderly are at the highest risk of dying in a fire in the United Kingdom, and thus are the subject of much attention in the fire safety programs.

National Level Campaigns – The national level programs try to reach the elderly by radio. The programs also try to get fire safety discussed by the hosts of nationally heard talk shows and DJ's listened to by mature audiences. Fire safety stories are placed in local and

regional radio. Local fire brigades phone into talk shows and news shows to discuss fire safety issues for the elderly.

The national government has a "Better Government for Older People" partnership across many agencies including health, housing, local authorities, and others. Attached to this program is the Older People Advisory Group, which meets on a regional basis and influences national and regional safety policy, including fire safety programs.

Local Level Campaigns – At the local level a key approach is to visit homes of the elderly, especially high-risk elderly, as discussed in previous sections. In addition are various local media campaigns aimed at the elderly.

In Kent, an adaptation of a multi-hazard "House Safe" program is used for the elderly. Also, a charity- run "Heady Van" visits homes of the elderly to improve their safety, and fire is one of the issues addressed. The van personnel may install smoke alarms if there are too few alarms or they are not working. Particularly vulnerable elderly households are referred back to the fire brigade for tracking and further visits.

Merseyside has a variety of innovative ways to reach the elderly, with a special focus on elderly living alone. Their approaches include:

- Use of 5 elderly advocates to visit homes of older people
- Use of 3 bilingual advocates to work with elderly who do not speak English
- Presentations by fire officers and advocates for older people at the Glaxo Center in Liverpool on "Dementia Awareness Day"
- Use of "Friends of the Fire Service" charity; over 30 percent of its volunteers are over 60
- Use of deaf advocates working in a drop-in center
- Training of caregivers of the elderly on fire safety awareness
- Presentations by fire officers from the "60+ team", an innovative program that trains young people to increase the level of safety in their own homes and those of their grandparents. They ask the youth to get elderly parents or grandparents to request a home fire safety check. There is a competition to see which"60+ team" generates the most home visit requests.

Seventy-five percent of fire deaths occurring in Merseyside are to elderly persons. Merseyside considers the elderly in two groups that require different approaches. The fire brigade reaches the 'fit elderly' by visiting places where they go, such as supermarkets, bingo halls, clubs, flu clinics, and events arranged by organizations working with the elderly. The more vulnerable elderly are often housebound, are more difficult to contact, and are harder to

influence. The fire service must work with the caregivers and organizations who are often the only contacts of housebound elderly, and who have built relationships with them.

The elderly sometimes feel safe if they have a working smoke alarm. So another focus has been to instruct them on the need to have an escape plan as well as an alarm, since an alarm does not extinguish a fire.

In West Midlands, the primary problem with elderly are those who smoke, are heavy drinkers, have disabilities, take medication, or who are ill. More advocates are needed who specialize in elderly home visits. More involvement of social services to reach the rest of the elderly is also said to be needed.

Strategic Partnerships

Partnerships provide access to more resources and provide more ways to get safety information disseminated. The fire services have long realized that the fire problem is linked to many other social problems—alcoholism, infirmities from aging, disabilities, anti-social behavior of youths, public attitudes about government, discrimination, language problems of immigrants and asylum seekers, etc. One-third of fire death victims in the United Kingdom were found to have come to the attention of social services prior to their demise, so the prospect of reaching more of the hard to reach through partnerships is potentially of great importance.

Besides helping with implementation of prevention programs, another purpose in using partnerships is to get funding from private industry and foundations for doing more community safety education than can be afforded by just municipal fire budgets.

The trend in the United Kingdom is to not only encourage fire service partnerships with other agencies, but to require them. In Scotland there are laws that virtually force joint planning and strategic partnerships among local government agencies. In London, strategic partnerships have been decentralized; its boroughs are encouraged to form strategic public and private partnerships for community safety on their own.

West Midlands too, emphasizes partnerships. The fire service has 200 partnerships with various organizations, including special needs groups and churches.

A key aspect of partnerships is sharing data across agencies on problem households. While there seems to be less concern over privacy issues in the United Kingdom than United States, it still is an issue. Nevertheless, police and local social service agencies now often share data with the fire/rescue services. Data is shared on specific high-risk households, specific individuals to include in youth programs, and areas with the highest risk.

Required Partnerships in Scotland – The 2003 Local Governments Scotland Act requires the fire service and other agencies to meet on a regular basis to address various social problems, including fire. The fire services participate in an injury prevention partnership, an antisocial behavior partnership and a health partnership.

Strathclyde has a full time "community partnership officer" who does nothing but tend to the partnerships. Meetings are held at least every two to three months to plan strategy with a group of agencies that includes health, police, fire, Scottish Enterprise (economic development), and passenger transport. Social work agencies and land ownership trusts also participate at times. Each has designated staff members who regularly coordinate with the others to develop common strategy. Priorities for accident prevention are established for each of the 10 areas that comprise Strathclyde.

Partnerships with Health Agencies – Scottish Executive officials said, not totally tongue in cheek, that the Scots were considered by some to be the unhealthiest people in Western Europe. Contributing factors are the high rates of smoking and alcohol consumption, especially of hard liquor, and a diet high in fatty foods like sausages and chips (French fries). The majority of fire deaths in Scotland have alcohol involved in the cause of the fire or the lack of escape. Careless smoking is the leading cause of fire deaths in Scotland as it is elsewhere, but they have a higher proportion of smokers than does England.

Chip pan fires are a major cause of fires in the home and one of the leading causes of fire deaths, often when people have been cooking and drinking. Scottish health agencies have been conducting campaigns to encourage healthier diets, and eating less fried food. The fire service thinks this is reducing the number of cooking fires that involve chip pans or deep fat fryers.

Child Safety Week – The Community Fire Safety Center negotiated a partnership with the Child Accident Prevention Trust to have the June 2005 campaign focus on fire safety of children. The campaign included large scale broadcasts, and 35 radio news bulletins on 20 radio stations. It reached an average weekly audience of 30 million people, including talk shows. Discussions or coverage on individual programs ran from 30 seconds to 6 minutes.[10]

In-Station Safety Centers

A relatively new prevention approach in England is to design fire stations as community fire safety centers, especially stations in high risk areas or areas with populations that have been hard to reach. The concept is to entice people to visit their local fire station to interact with the

[10] "Child Safety Week – Fire Safety Media Analysis 20-26 June 2005." National Community Fire Safety Center. Undated.

fire service and receive fire safety information. The fire station gets known as the place to obtain fire safety literature on a variety of subjects and in a variety of languages. The station also serves as a place for meetings of groups that can be given fire safety information while there for another purpose.

Previously, most fire stations had their doors closed day and night. Now they are kept open, at least in daytime. By mingling with firefighters at the station and observing their activities, the community sees them more as people and not just helmeted figures. Scottish brigades have also been starting to use this concept.

West Midlands has an outstanding example of the new generation of fire stations. Its fire station clocked over 95,000 visitors since it opened. Innovative features of the West Midlands station are as follows.

Public Viewing Areas – The fire station was built with areas from which the visiting public can watch firefighters train and respond to calls. The viewing area is a small, glass-walled hallway bordering the main apparatus hall. Firefighters were uncomfortable at first about the public watching them, but got used to it.

Live Fire Demonstration Room – Embedded in the fire station is a fire safety house with unique features. The most startling innovation is a glass-walled observation area from which the firefighters can lecture on fire safety in the home and illustrate the lecture with a live fire demonstration. They show a pot cooking on the stove, then flames shooting up from the pot as if left unattended, then fire spread to the surrounding flat areas and cabinets around the stove, and finally—the most striking part of the demonstration—flashover of the room. This is done with controllable propane jets. Seeing the live fire and feeling its heat through the glass viewing window make a huge impression. You can feel the blast of heat when flashover occurs, something few outside the fire service experience and live to tell about it. The corridors of the station lead to rooms with fire safety video displays and interactive computers. These demonstrations are especially effective with kids, but work for virtually all audiences.

Reception Area Information – The reception area is open to the public and displays fire safety literature in several languages. A receptionist provides literature, guides people to events, and records requests for presentations or home visits. The public knows that they can get this type of assistance at the station, and it was busy at the mid-day time of our visit. Some areas of the station are off-limits or require an escort; it is not an environment where people just wander around into private areas.

Accommodations for Meetings –The station has public rooms for holding classes and meetings not necessarily related to fire. A group of elderly African women were attending a

course on the use of computers at the time of our visit. Sikh men meet there. A firefighter might speak to such groups about fire safety, or give them safety literature. The attendees may observe safety information on the walls, and pick up fire literature themselves. The fire brigade sometimes solicits people attending the meetings to volunteer or identify volunteers to pass out safety information in their community.

English is taught at the station for Eastern Europeans, a relatively new high risk group. Some interesting cultural cross-fertilizations take place. For example, Sikh women teach English as a Second Language (ESL) to Polish students, and use fire safety examples in the classes.

Improved Consumer Products

Fire safety in the home is affected by the safety built into home furnishings, appliances and other consumer products. The United Kingdom has worked to require or encourage consumer products that are less likely to start or spread fires.

Upholstered Furniture and Mattress Regulations – The Combustion Modified Furniture Regulation of 1987–1988 directed that all domestic upholstered furniture be fire resistant. The act built on California upholstered furniture legislation and United States national legislation on mattress fire resistance. It went further than the United States standard to include furniture sold second-hand. Because upholstered furniture and mattresses are the objects most often ignited by careless smoking, making furniture safer has a growing effect on reducing fire deaths.

Reduced Ignition Propensity Cigarettes – The United Kingdom has been considering legislation to require ignition propensity testing of cigarettes, but is waiting for the results from New York and other states that were the first to have the requirement. The European Fire Safety Network is involved in the discussion of reduced ignition propensity (RIP) cigarette standards for Europe. The EU nations are trying to coordinate standards for all products that flow across borders. Attempts to regulate cigarettes will be pursued through the EU Product Safety Committee.

Electrical Products – Electrical safety has long been a concern in Europe because of the higher voltages used, and the associated shock hazard. Many electrical safeguards such as universal use of 3-prong plugs and better grounding have contributed to fire safety as well as reducing shock hazards.

Residential Sprinkler Systems – Since 2007, all new residential structures in the United Kingdom that are over 30 meters high must be sprinklered. Residential sprinkler systems for lower height buildings are almost non-existent because of their costs and the effectiveness of other approaches. However, the national Fire and Resilience Office research section has been developing a mist sprinkler system that could sell for about $1,000 and be retrofit to work off domestic water systems in one or more rooms**.**

Fire Data and Risk Models

The United Kingdom has the data to show that its evolving strategy for prevention is working. It also developed the national fire risk models being used by local fire brigades for local planning.

National Fire Data – The residential fire death rate in the United Kingdom has dropped by 41 percent from 1990 to 2005, from 9.7 to 5.7 deaths per million population. There were 555 residential fire deaths in 1990 and 342 in 2005. Fire deaths dropped further to 325 in 2006.

The fire death rate in England during this period went from 8.9 to 5.1 per million. (425 deaths in 1990, 259 in 2005).

Scotland, which usually has the highest fire death rate in the United Kingdom, dropped from 200 deaths a year in the early 1970's to 100 in 1990 and then to 56 in 2005. The fire death rate dropped from 19.7 per million population in 1990 to under 11 per million in 2005. The year 2006/7 was running even lower at the time of our visit. Accidental dwelling fires have dropped from 3 per 10,000 dwellings in 2000/01 to 1.4 per 10,000 dwellings in 2006/07, over 50 percent in only six years. However, even with the numbers down, Scotland still has double the fire death rate of the United Kingdom. A principal reason is the higher alcohol consumption rate in Scotland. About 90 percent of Scottish residential fire fatalities involve consumption of alcohol by the victims or persons causing the fire.

Table 3 shows the statistical comparisons between nations and for some local fire brigades. Figure 3 graphically compares the United Kingdom and United States fire death rates. The United Kingdom in 1990 had 9.7 deaths per million population, close to the United State's rate in 2005. however, the United Kingdom is now 40 percent below the United States rate.

Table 3: Residential Fire Deaths (with Fire Deaths per Million Population in Parenthesis)

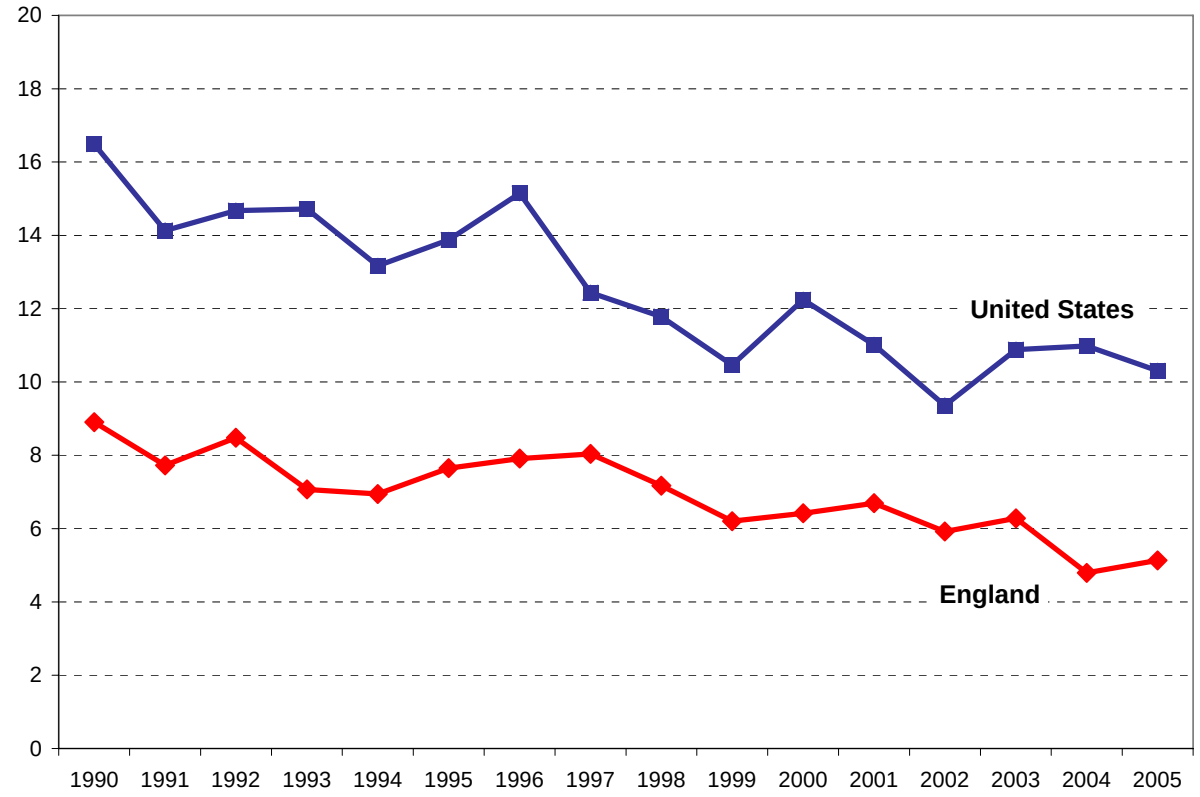
Region	2006 Population (millions)	Deaths (and Death Rates)				
		1990	1995	2000	2005	2006
Kent	1.6				10 (6.3)*	
Merseyside	1.4		17** (12.3)			6 (4.3)
West Midlands	2.4		(10.5)			11 (7.9)
London	7.4				50 (6.8)	
Strathclyde	2.2	73 (29.2)*	45 (18.6)*	45 (25.3)*	32 (16.7)*	
England	50.4	425 (8.4)	370 (7.6)	316 (6.1)	259 (5.1)	
Scotland	5.1	100 (19.7)	69 (13.5)	62 (12.2)	56 (11.0)	
United Kingdom	60.6	555 (9.7)	485 (8.4)	414 (7.0)	342 (5.7)	
United States	298.4	4115 (17.7)	3,695 (14.1)	3,445 (12.2)	3,055 (10.3)	

Rates computed with estimated population for the appropriate year. Numbers in parenthesis are rate per million.

* Total fire deaths, not just residential

** Average for late 1990s

Figure 3: Residential Fire Deaths per Million Population, United States vs. England, 1990–2005



Local Fire Data – Data from the local fire brigades we visited demonstrate the extent to which the fire problem has been reduced using the best practices described here. Strathclyde has the highest fire death rate in the comparison, at 16.7 deaths per million, but reduced proportionately the same as did England and Scotland overall. Merseyside had the lowest fire death rate of any brigade we visited (4.3 per million) and 15 percent below the average for England, quite remarkable in light of their high ethnic population.

LONDON: London is down to approximately 50 residential fire deaths a year, about 6.8 per million population protected. This is about the same rate as the national average, which is very good for a large urban area with 300 languages spoken.

KENT: Kent has 10 fire fatalities per year for a population protected of about 1.6 million, or 6.3 deaths per million population. The fatalities tend to be single males over 65 who smoke, drink, and live alone. Kent felt that more data was needed than available from the standard United Kingdom fire incident report for targeting their community safety program, because it is difficult to identify the neediest households when fire incidence is low and most households are not needy. So Kent added data elements to the standard incident report to provide more details on the use of smoke alarms by the elderly, such as whether the smoke alarm gave the first

warning that there was a fire and how the people in the household reacted to the alarm. These data elements also provide information on the placement of alarms and their effectiveness.

MERSEYSIDE: Merseyside had 17 fire deaths a year in the late 1990's, despite responding to 90 percent of calls in 6 minutes or less from dispatch to arrival. They felt they could not do any better than that with suppression. Many of the fatal fires had well under 6 minute response time. Most involved households of the elderly.

Merseyside fire officials believe that their strategy shift toward greater use of community safety programs has helped reduce the fire problem sharply, down to only six fire fatalities in 2006. This is extraordinary for a population of 1.4 million, the equivalent of 4.3 deaths per million, down from over 12 per million 10 years ago. Merseyside's rate of accidental dwelling fires was 1.1–1.3 fires per 1000 population in 2001–2004. The dwelling fire death rate in the same period was 6–10 per million population. In comparison, England had 0.8 fires per 1000 households and 5–6 deaths per million in the same period. Their record is all the more extraordinary when one recalls that Merseyside protects Liverpool and a high BME population. However, Merseyside found that only 50 percent of the homes having fires have working smoke alarms, so there is still room for improvement.

WEST MIDLANDS: In the late 1970's–early 1980's, West Midlands had about 65–70 fire deaths a year. In 2005/2006 they had 11 deaths, which for 2.4 million population equates to 7.9 deaths per million, down from 10.5 per million in 1995, despite having a high BME population and areas with very high deprivation rates.

STRATHCLYDE: Strathclyde had over 100 fire deaths per year in the mid 1980s, and reduced that to 30–40 deaths per year. The number of fatalities had not changed much for a decade despite the best operations efforts, and did not come down until they changed strategies and started doing more prevention in the form of home safety visits.

The brigade estimates that at least 70–80 percent of its fire deaths are related to alcohol. In 40 percent of the deaths the victim was found to be intoxicated based on blood alcohol level tests. In other cases the fire was started by someone in the household who was intoxicated and survived, but killed a child or someone else.

About 40 percent of residential fire fatalities are attributed to cigarette smoking, usually by people who also were drinking or on drugs. Households with smokers also were more likely to have non-working smoke alarms. This information led Strathclyde to focus on home visits to drinker/smoker households, installing working alarms that do not require maintenance, and giving advice on smoking/drinking behavior itself.

The second leading cause of fire deaths in the home in Strathclyde is cooking, especially cooking with chip pans and grill pans. Many people fry fatty, greasy foods like sausages in oil. These foods are selected because they are cheap, and there is little concern about their health impact. When left unattended oil cooking is prone to start a fire. The fire service feels that the fire problem is directly linked to the health problem, and that it is necessary to work in partnership with health agencies to reduce the fire problem.

The majority of households having fires in Strathclyde had been visited in the past by a social service or health agency, or known to have problems. A social worker may see burn marks from cigarettes on furniture or bedding while visiting an elderly shut-in. It is important for agencies to collaborate in identifying the highest risk households.

Perhaps surprisingly, Strathclyde reported that heating was not a major cause of fire deaths despite its colder climate than England. The likely reason is that the highest risk, poorest population lives in multifamily housing run by the local housing authority, which maintains the heating systems.

Strathclyde has about 3,200 dwelling fires a year of which about 2,500 are accidental, for a population of 2.2 million. The fire death rate *per fire* in Strathclyde is average for the United Kingdom. It is the fact of having more fires than the national average, not the deadliness of the fires that makes the fire death rate higher in Strathclyde than elsewhere in the United Kingdom.

Another interesting finding from household surveys in Strathclyde was that households with incomes over 50,000 British pounds had more fires than the lowest income households, those under 5,000 pounds, but most of the fires in the higher income households were not reported because they took care of the damage themselves.

Risk Models – Part of the nationally developed software tool kit is the Fire Service Emergency Cover (FSEC) Toolkit. It identifies high fire risk areas based on historical fire data. Every brigade we visited was using this tool to target their prevention program, and praised its benefits. It can display the location of fires for any particular occupancy, cause, or other data element found in the fire incident reports.

The London Fire Brigade developed the Incident Response Analysis Toolkit (IRAT). Its advantage over FSEC is that it predicts fire risk in any geographic area based on 76 socioeconomic factors as well as historical fire data. Variables in the model include social deprivation; number of elderly; single-parent families; historical fire incident levels; and many others. IRAT produces a variety of graphics including risk maps by type of fire, so one can target a campaign to areas where it would do the most good. The IRAT computer program can produce colored maps showing relative risk levels by area of the community or by block or individual

household. It can do this for a particular type of fire or fires as a whole. Risk is stated as well above average, above average, average, below average, or well below average. The Kent Fire and Rescue Service ran this model and then mailed offers of safety visits to all households that came out high-risk.

A curious finding from the IRAT analysis is that the households with high risk of having a fire are among those less likely to have a fatal fire; their frequent fires are from carelessness in cooking and other hazards that are not usually fatal. The households with low-risk of fire have high-risk of fire deaths: they are mostly the elderly, who generally are more careful but also are more likely to die when fire occurs, often from the extra factors such as intoxication, medications, mobility limitations, or mental disability, all of which make it more difficult to escape a fire and increase vulnerability to smoke and burns.

A third statistical tool used by London Fire Brigade is Mosaic, a software package for marketing products and services of all kinds. Mosaic classifies households into 61 types, and aggregates them into 11 groups, based on 400 data variables, half from the census.

The eleven major Mosaic grouping have colorful names:

- Rural Isolation
- Grey Perspectives
- Twilight Subsistence
- Blue Collar Enterprise
- Municipal Dependency
- Welfare Borderline
- Urban Intelligence
- Ties of Community
- Suburban Comfort
- Happy Families
- Symbols of Success

The Mosaic system allows one to drill down into the data in a variety of ways. For example, the following are group descriptors that combine type of dwelling, age, and affluence of the household:

- High income families
- Suburban semis
- Blue collar workers
- Low rise council
- Council flats
- Victorian low status
- Town houses and flats
- Stylish singles
- Independent elders
- Mortgaged families
- Country dwellers
- Institutional areas

The Mosaic data is overlaid with FSEC data to portray high fire risk areas for similar marketing groups. One high fire risk group may best be influenced by appealing to the risk to family members, whereas for another group the appeal is to loss of life of the head of household when trying to persuade a household to accept the offer of a free, installed smoke alarm.

Appendix B gives one example of how the Mosaic results are used: a ranking of lifestyle types that account for the most dwelling fires. Knowing that allows safety campaigns to focus on the ways to address people with those lifestyles to be most effective.

In summary, the United Kingdom and many of its individual fire brigades have been using a variety of effective practices that have driven down its rate of household fires and fire deaths.

III. SCANDINAVIA

Scandinavia refers to the Nordic nations of Sweden, Norway, Finland, and Denmark. They all have paid much attention to fire safety over the years, especially because of their heavy use of wood construction for homes and the intensive heating in the long, cold winters. This contrasts to other areas of the continent where stone, concrete, and other less flammable materials are used more in home construction, and the climate is more temperate.

We selected Sweden and Norway to examine not only because of their many community safety programs but also their extensive fire research and evaluation of fire safety approaches.

Overview of Swedish Fire Service

The Swedish fire service serves 9 million people with 234 fire and rescue brigades that are locally administered. There are 4,000–5,000 full-time firefighters, 11,000 part-time firefighters, and 3,000 volunteers. The part-time firefighters are paid a small amount to be on call within 5 minutes of their station when on standby; they are paid more when they respond.

National Level Organizations – The Swedish Rescue Services Agency, a government organization somewhat similar to FEMA, develops strategy and tools for fire and emergency services nationally, including fire prevention programs. The Swedish Fire Protection Association (SFPA), a private organization, is somewhat similar to NFPA, with the exception that SFPA does not develop consensus standards but rather makes recommendations. All Swedish fire safety standards are developed by the government and apply nationally. Local governments can suggest higher levels of protection, but their suggested standards and the SFPA suggested practices are not enforced as law.

Training – To be a chief officer or "rescue commander" in all but the smallest communities in Sweden requires a 4-year degree in civil engineering or fire engineering, plus one year of practical training at a fire school. The National Fire Academy at Lund University and the fire academy at Lulea provide this 4-year education curriculum, and the Swedish Rescue Services Agency college in Revinge provides the 1-year practical training. Firefighters do not have to work their way up the ranks; there is lateral entry into the officer ranks, as in the military.[11] One result is that senior fire officers tend to have much more interest in prevention and quantitative approaches to risk management than in bottom-entry systems, where one starts as essentially a blue-collar worker.

[11] In the United States, the military allows lateral entry of lieutenants after graduation from West Point, for example, but the fire service has nothing comparable.

Construction – About 90 percent of single family homes in Sweden are built of wood. Since 1994 wooden houses can no longer be more than two stories high unless the designers can prove they meet performance safety standards for fire spread and evacuation (e.g., by being sprinklered). Otherwise the houses have to be made of concrete, brick, or stone.

Houses with rental apartments can be built using wooden frames if they meet performance-based codes. But concrete still is the main material used for their walls. Outer roofs have "unburnable" coverings.

High-Risk Groups – As in the United Kingdom, there has been a major push to help the elderly and people with disabilities live independently in their own homes with the aid of social services. Mental hospitals are being closed and their patients moved to independent living apartments. These patients are generally functional if they take their medications, but some stop because of side effects or forgetfulness. The burden of responsibility for these patients has transferred from the hospitals to the patients' families and the fire service is concerned for the patients' fire safety. A similar change has taken place with elderly, who are being moved from nursing homes to individual apartments. The Stockholm Fire Brigade thinks this has contributed to an increase in elderly fire deaths. Special prevention efforts are targeted at both of these high-risk groups.

As in most nations, another high-risk group is alcohol drinkers. Sweden estimated that 40–60 percent of fire deaths are associated with alcoholic beverage consumption by either the person who caused the fire or the victim who tried to escape. The fire service said that is the combination of smoking and drinking by those living alone or who have "social problems" that raises risk the most.

Immigrants are less of a problem in Scandinavia than the United Kingdom, but there are growing concentrations of them in some areas. Iraqis, Iranians, and Turks are increasing populations in southern Sweden, and are appearing further north, too. They were described as somewhat suspicious of social services agencies, but they often live in apartments owned by a municipality, which means there is some control of the fire safety of their residences.

Local Communities – Across the cities visited, it was striking to see how few staff are used for firefighting and how many are used for prevention relative to United States staffing levels. Key characteristics of the fire services we visited are given below.

Stockholm, the capital, is the largest city in Sweden, with 780,000 population. Its fire brigade also protects several nearby small cities, for a total population protected of 900,000. The fire brigade has 10 fire stations with 410 staff assigned to operations, and 15–20 to prevention. Most of the prevention staff are assigned to stations. Inner city fire stations typically have 2–4

fire inspectors; outlying 1–2 inspectors. The fire brigade operations personnel, too, engage in campaigns for educating the public in their district, organized through the brigade's education central department.

Nykoping, a small city of 35,000, lies 60 miles southwest of Stockholm. Its fire brigade also protects a rural area of 15,000 population and two other small towns, for a total population protected of 82,000. About half of the population lives in private homes and half in apartment buildings. The latter are typically 3–4 stories high.

Nykoping has 2 fire stations in the central city and 6 in the area protected outside of the city, of which 2 are staffed by volunteers and 4 staffed by part-time firefighters. During the day there are only 6 firefighters and a chief on duty in the central city, plus 4 part-time firefighters who may be called in. The total fire suppression staff numbers 35 full-time firefighters and 95 part-time firefighters. Nykoping has 16 full-time prevention staff, some of whom are former firefighters.

More prevention personnel are on duty than suppression firefighters on a weekday. There was a shift in strategy and resource allocation 10 years ago, when prevention was given greater emphasis. In addition to the full-time prevention staff, the suppression firefighters are asked to volunteer for prevention assignments. If not enough volunteer, someone is assigned.

The 16 prevention staffers include 4–5 full-time inspectors who also do some public education, 1 firefighter/educator position filled in 6-month shifts by two firefighters, 1 staffer dedicated to safety of city-owned property, 1 emergency planner, 5 public educators, and 3 administrative and logistical support staff. The prevention staff also has a half-time nurse and a quarter-time schoolteacher. Nykoping fire officials believe that having the nurse and schoolteacher broadens the perspective of risk analysis and program delivery.

Sundsvall is 180 miles north of Stockholm, on the east coast of Sweden. Its fire brigade protects the city and a larger surrounding area, for a total population protected of 115,000. About half the population (typically younger adults, the elderly and immigrants) live in apartments. The other half, mostly families, live in private homes, usually of wood frame construction. Much of the city is built of stone and concrete buildings following a fire in the late 1800's that burned down most of the city.

The Sundsvall Fire Brigade has 100 full-time firefighters, and 100 part-time. Ten full-time staff are devoted to prevention, versus only 16 full-time firefighters on duty daily for the whole area protected with another 31 available on call. There are 9 full-time firefighters at Station 1 in Sundsvall, 5 at Station 2 in Timra, and 2 headquarter officers. There also are 31 on call.

Umea is north of Sundvall on the east coast of Sweden. It is a university town with 30,000 students. The total population protected is 111,000, with 85,000 in the city and the rest in towns or suburbs nearby.

The fire brigade is led by a trio of senior fire officers who work closely together on the strategy and leadership of the department. They include the chief, a manager for operations, and a manager for prevention.

One full-time firefighter station and 5 part-time firefighter stations protect the area. About 77 percent of the population can be reached within the 10 minute response time goal. Nine full-time firefighters are on duty in the fire station in Umea. The 5 outlying stations have 5, 5, 5, 2, and 3 part-time firefighters per shift, respectively. Of the 9 full-time firefighters, 2 are assigned to a ladder, 1 to a tanker, 5 to an engine, and the ninth stays in the station. The part-timers are on call within 5 minutes of the station when on duty, not actually in the stations. There are 5 full-time prevention employees who do inspections and education, and 5 other support personnel. In total there are 48 firefighters plus 20 day-workers, or 68 full-time personnel plus 81 part-timers on call.

Overview of Norwegian Fire Service

Norway has a population of 4.6 million, about half that of Sweden. Culture and practices in Norway are generally similar to those in Sweden. They have similar languages, similar Viking history, and similar climates. They collaborate on fire protection practices. But Norway has its own good prevention ideas, as well.

National Agency – The Norwegian national emergency services organization, the Directorate for Civil Protection and Emergency Planning (DSB), develops strategies to prevent or mitigate natural and manmade disasters and fires. Their responsibility includes accident prevention and planning for natural and manmade disasters. They also do planning, electrical inspections and analysis for fire safety. They report to the Ministry of Justice and Police. They have 670 employees of whom about 20 work primarily on fire safety. They are governed by four laws that have consolidated responsibility from many laws in the past:

- Prevention of Fire and Explosions
- Inspection and Control of Electric Plants and Electrical Distribution
- Consumer Products and Services
- Civil Defense

The Norwegian Fire Protection Association produces safety education materials but not standards.

Oslo – As in Sweden, the Norwegian fire service is locally autonomous. It does not provide EMS, which is run by the hospitals. There are over 300 independent fire brigades; consolidation is going slowly. Oslo, the capital, is the largest city in Norway, with an estimated population of 540,000.

The Oslo Fire Brigade staffs engines with 3 or 4 firefighters, ladders with 2, and a "smoke diver" unit (equipped with SCBAs) with 4 or 5 firefighters. (The smoke diver unit is similar to a manpower squad in large United States fire departments.) Oslo has 8 fire stations with a total of 50–55 firefighters on each of four shifts. The brigade has a total of 430 personnel. The average workweek is 39 hours, down from 42. The chief and office workers have a 37.5 hour work week.

There are 40 personnel in the prevention section, augmented annually by an average of 9 line firefighter-years from full-time firefighters who are temporarily assigned to prevention for special campaigns or other prevention tasks. Thus almost half of the force on duty each weekday (40/40+50) is devoted to prevention, and (49/430) = 11 percent of the total staff time is assigned to prevention. Generally the line firefighters in prevention do simple inspections using checklists, or provide information to the public as part of prevention campaigns. In addition, 25 chimney sweep/inspectors are part of the fire brigade (as discussed below).

Fire recruits train for a total of one year, including 6–7 weeks in a fire academy and the rest on the job, including more courses. Part of the curriculum is on fire prevention.

Strategy for Prevention

In both Sweden and Norway the overriding strategy for fire safety in the home is to encourage people to take more responsibility for their personal safety and property, and not wait for the fire service to do it. About 94 percent of fire deaths occur in the home in Sweden, a higher percentage than in the United Kingdom or United States. Reductions in fire deaths are largely dependent on success in dealing with home fires.

Smoke alarms are required for all homes in Sweden since 2001. Norway not only requires smoke alarms in all homes, but also either fire extinguishers or hoses for fighting fires. The Norwegian fire service tells its citizens that flashover may occur in 2–4 minutes and the fire vehicles cannot get there that fast, so it is up to the citizens to extinguish small fires or better yet prevent them in the first place.

In Sweden, apartment building owners are responsible for systematic fire prevention in their properties, under the 2004 Civil Protection Act. Norway had already passed similar legislation in the 1990's. Prior to the Swedish legislation, building owners tended to believe that if they passed the latest fire inspection they did not have to worry further about fire safety. The government has made clear that the owner must provide the safety features of the building, and the tenant is obliged to maintain them. Building owners have to show in writing what they are doing to prevent or mitigate fires in their buildings. The Swedish Rescue Services Agency encourages local fire departments to press charges against building owners who do not comply with this and other building and fire code regulations.

Response time goals in Sweden and Norway are more lenient than in the United States. The Scandinavian nations require the first responding unit to arrive in 10 minutes, versus a goal of 6 minutes in the typical United States city. Scandinavia generally gives more weight to prevention and early extinguishment by homeowners, less to rapid response.

Each municipality in Sweden is required to have a politically approved "risk action plan," revised every fourth year. The plan includes the approach to achieving fire safety in homes. In Stockholm, each of its 9 districts has its own action plan that is revised annually and tailored to its population and built environment.

Because the numbers of fires and fire deaths are relatively low, especially in residences, fire safety messages are often packaged in the broader concept of accidental injury prevention, but still are delivered by fire brigades. The Swedish Fire Protection Association president observed that most people cannot learn about fires from personal experience, because they may have only one serious fire in their home in a lifetime, and only have one chance to get it right. So the fire service needs to educate them on what a fire looks like, and what to do when one occurs in a way that will be remembered.

Firefighter recruit training in Sweden used to be 8 weeks long in the 1980s and 15 weeks in the 1990s. With the new Civil Protection Act of 2004 it is now 2 years long, including some periods of practice assigned to a fire brigade. About 25 percent of their overall training is in prevention and risk management.

Prevention officers are trained as fire and risk engineers by the Swedish national fire academy. As such, they bring the view point of risk management and analysis to developing and targeting local fire prevention programs.

Some firefighters in Sweden are given certification as public information specialists. Many firefighters are naturally gifted for making public presentations, and they are given special recognition.

The risk management view is used in making decisions on deployment of fire service resources. The end result is a that a Swedish fire brigade devotes a much greater proportion of its resources to prevention than does a comparable United States fire department. The operations staffing of a Swedish fire brigade would be considered dangerously thin by United States standards, but the results show otherwise.

Sweden had strict prescriptive construction codes until recently, when a switch was made to performance-based codes. Building designers have more freedom in design and material, but face the much more difficult task of demonstrating their safety equivalence. The fire service is equally challenged with enforcing the new approach. It applies to multi-family dwellings as well as commercial and institutional structures.

Swedish insurance cooperatives—owned by the insured collectively—are taking a greater interest in providing fire safety advice than other insurance companies. Some insurance companies own or co-own chimney sweep/home inspection programs.

Norway has a generally similar approach to Sweden, but with a few substantial differences. Since the 1950's, Norway has had strong building codes that apply to multifamily dwellings as well as industry. As a result, the fire chief of Oslo said that fires in building built since then almost never spread from one unit to the next.

In the 1980s Norway experienced a steady increase in fire losses, both in homes and industry. In 1990 a landmark paper was published on prevention, safety education, and efficient use of fire resources requiring cooperation between various stakeholders. It set a goal for a reduction in losses of 30 percent for both lives and property over the following 10 years. It led to the formulation by DSB of the Fire Prevention Act of 1990, which required that all rented and owned dwellings be equipped with smoke alarms and extinguishers. The owner was responsible for providing and maintaining them, and the tenant for not damaging them.

In 1995 legislation was passed in Norway requiring a new organization of the fire service with much more emphasis on prevention. This legislation requires at least one fire prevention employee for every 10,000 population protected. There is no minimum requirement for suppression staffing. This has had the effect of changing the ratio of fire suppression to prevention personnel from 95:5 to 90:10, doubling the prevention effort. Now stringent requirements are being put on the training and education of the prevention force, requiring the use of "fire engineers" with high technical training in risk management and prevention. Another effect of the 1995 law was to encourage consolidation of small municipal fire brigades in order to comply efficiently with the requirements. For example, if two adjacent communities of 5,000

each had to have one full time prevention person, it was less expensive if they merged, because they still only required one for 10,000 population protected.

Following this series of legislation and its implementation, fire deaths in Norway dropped by 10 percent from 1990 to 2000. Though they did not meet their goal of a 30 percent reduction in deaths, the decrease was still quite respectable. Fires were down 18 percent and large fires 43 percent. In 2001 a new fire program goal was launched with targets of a 10 percent further drop in fatalities in 5 years; no fires with more than 4 fatalities; no increase in property loss; and no loss of cultural heritage. Again, these targets were not fully met, but further decreases were achieved.

The specific best practices in home safety prevention we found in Sweden and Norway are discussed below, following the same topics in the same order as in the United Kingdom section of this report, with a few variations because of differences found between the two regions.

Fire Safety Inspections of Households

As in many central European nations, there is a tradition in Sweden and Norway—in fact, a requirement—for the use of chimney sweeps to clean chimneys and make partial home fire safety inspections. Some cities also do home safety inspections independent of chimney sweeps, but that is the exception.

Chimney Sweeps – Chimney sweeps in Europe are highly trained and regulated home heating safety specialists. To be certified as a basic chimney technician in Sweden, one must take a 20 week course at the National Fire Academy. To be certified to do home inspections and be a master chimney sweep who can supervise others requires a second 20-week course after three years of experience as a sweep.

Most chimney sweeps in Sweden work for a local private sector company that has a monopoly for a certain area but must in turn perform satisfactorily to keep the business. The local fire brigade monitors their performance. In some areas of Sweden, especially those where heating-related fires comprise a large portion of residential fire losses (in some areas up to 50 percent), the regional fire protection association and insurance company are co-owners of the chimney sweep company. A fire brigade such as the one in Umea may meet regularly with the local master chimney sweep to discuss inspection problems and fees. In Norway, most chimney sweeps operate as a section of the fire brigade itself.

In Sweden, a home owner or owner of a multi-family dwelling is required by law to have a certified chimney sweep inspect and clean chimneys according to a schedule determined by the

type of heating fuel used and the level of use. The frequency of visits varies from eight per year to once every four years. For example, wood heating may require inspections every 8 weeks in the winter and every 12 weeks in the summer, while oil heating requires a visit once every 1–4 years. The specified inspection frequency depends on the level of usage as well as the types of heating system and other factors such as their condition and age. In both Norway and Sweden, the chimney sweep master decides on the appropriate inspection frequency, but the minimum is once every four years. In addition to the schedules for cleaning chimneys, homes are inspected by the chimney sweeps once every four years or eight years, depending on risk. The frequency is determined by the sweepmaster independent of the chimney cleaning schedule.

The inspection checklist used by the chimney sweeps varies from city to city. The items to be inspected are not just for the chimney's cleanliness (creosote build-up), but the proximity of flammables to heat sources or pipes, the sealing of the flues and vents that carry hot gases, and other hazards. The sweeps also may check to see that there are working smoke alarms. SRSA indicated that about 85 percent of fires involving heating are due to faulty installation. New, "optimized" heating and do-it-yourself installations are emerging problems.

The sweeps are trained not only to detect but also to fix chimney and heating-related problems they discover, though the homeowner may choose to have someone else do the repairs. The owner pays a $50 basic fee for the home inspection visit and extra for any repairs. The chimney sweeps will of course clean the chimney if needed. The basic cleaning involves brushing particles of creosote or other matter from the interior surface of the chimneys. However, it has been found that the main risk of serious chimney fires is from the hard crusty creosote buildup that cannot be brushed off with the traditional chimney sweep wire brush; special equipment is needed to break it up, and there is an extra charge if that is needed. The sweeps can issue a citation if owner does not correct the hazards found.

The homeowner may elect to clean his own chimney. To do so he must take a one-day course and obtain a certification. He still has to have a chimney sweep inspect his home, perhaps once every two years. Few elect to do this.

In Oslo, changes in the heating systems used in the city have resulted in less need for chimney cleaning, but the chimney sweep system has been preserved to do home fire prevention inspections. Each household has the choice of arranging for a chimney sweep visit from the fire brigade or contracting for a visit from a private service. About 50 percent of households have a fireplace that requires inspection. The inspection frequency requirement is lower than in Sweden—most people get them cleaned every fourth year, some every two years, and a few every year. The cost for a visit runs $15–$50 per year depending on what is done. Besides cleaning, the inspection covers the chimney, fireplace, condition of heating system, placement of

flammables near heating, smoke alarms, extinguishers, and escape routes. Oslo wants to expand the chimney sweeps to deal with special risks such as old low-rise flats that have old wood floors and rows of townhouses.

Other Home Inspection Visits – For about the last seven years the Umea fire brigade has been doing home safety inspections in addition to chimney sweep visits. They generally do inspections when it is cold and people are likely to be home, often in the week prior to Christmas when national and local campaigns associated with Advent are taking place. Last year they asked each station to visit 300 homes. The stations decide which homes to visit. Home visits by firefighters are thought to make a memorable impression on the households. During the visits firefighters test smoke alarms, check extinguishers, and talk about fire risks with the household. If no smoke alarms are present, the household is given a written notification to get one to comply with the national law. To affirm compliance, the household sends back to the fire brigade part of the written notification form.

The Umea home visit campaign is advertised ahead of time in local media, so people will not be afraid when firefighters appear at their door. Eight or nine firefighters ride together on a fire truck to make the visits. The visits typically are made from 6:00 pm to 8:00 pm to maximize the probability of finding someone at home. Although voluntary, virtually everyone agrees to the offer of home visits by firefighters.

In Oslo, too, firefighters visit homes to do safety inspections as part of the fall fire safety campaign. Each station is assigned 50 apartments in their district that do not have chimneys (and therefore do not receive visits from chimney sweeps). Like in Umea, the station firefighters choose the homes to visit.

There are about 3000 blocks of old apartment buildings in Oslo, most over 100 years old. Many have only one stairway and no fire escape. The fire brigade goal is to visit all these old apartment buildings annually to inform the inhabitants on how to make the buildings safer. The fire brigade is working with insurance companies on this campaign. Premiums vary for these buildings depending on the number and types of safety measures taken, so it is to the occupants' advantage to make the buildings safer. Posters are put up in the buildings prior to the visit of the fire brigade so the residents know they are coming. When the brigade comes, it holds a meeting for residents to discuss safety issues. Every flat is given a safety brochure whether they attend the meeting or not. The program has been highly successful; there is now only about one serious fire a year in these rows of apartment buildings. The Oslo fire chief said this was their most important and successful residential campaign.

The Oslo Fire Brigade also visits condominiums but not the individual units. Rather, they work with condominium associations to address safety of their building units. The strategy is to educate the board of the condominium, give them checklists for inspecting apartments, and have them pass the checklists to unit owners to do the inspection themselves. The Oslo brigade is thinking of using chimney sweeps for these non-required inspections, too.

The Norwegian DSB estimated that nationwide about 40,000 homes received fire safety visits last year (out of a population of 4.6 million). Most returned survey questionnaires to DSB that were used to evaluate the program.

Media Campaigns

Fire safety campaigns in Sweden and Norway are conducted around the calendar, with ties to seasonal and holiday activities. The fire services in both nations publish a year-round calendar of suggested fire safety activities to add regularity to the prevention planning and to give the public specific times to take various prevention actions. The brigades gave calendars to school children with key monthly prevention actions to perform, and also make the calendars available to adults. The calendars flag days to do smoke alarm testing, battery changing, extinguisher checks, and other actions.

Seasonal Safety Messages – The four Sundays before Christmas are widely celebrated in Sweden as Advent, especially the first Sunday in December. During Advent many candles are lit in homes, and the number of fires used to increase during this period. Because more people than average go to church at this time, Stockholm churches were asked to include in their Advent sermons a message encouraging people to take care of themselves, and to practice fire and accident prevention. The Stockholm Fire Brigade said that most parish priests cooperated with this campaign.

Part of the Advent celebrations is the "living lights," where children selected to be "princesses" wear a crown of lit candles on their heads, decorated with flammable moss for the reindeer. Electric lights now are used more than wick burning candles, but the latter tradition continues. The Stockholm Fire Brigade conducts an Advent campaign on the dangers of the living lights, Christmas trees, fireplaces and other seasonal home hazards. The Advent fire safety campaign includes the annual reminder to change batteries in smoke alarms (like the "Change Your Clock, Change Your Battery" campaign in the United States).

From May to the end of summer "grill parties" are popular in Stockholm. Some grilling takes place on apartment balconies. The fire service provides information on how to manage a safe party.

In Norway, the campaign calendar has somewhat different emphasis than the one used in Sweden. Candles are heavily used in homes during the winter, when it can be dark from 4:00pm to 9:00am in Oslo. Candles dispel the gloom but also increase fire danger, so candle safety is one target of the seasonal campaign. The first of each month is noted as the time to check smoke alarms. The second fire safety task assigned each month varies. It may involve making a family escape plan, cleaning filters over stoves and the kitchen vent, etc. or other actions.

The DSB develops and provides fire safety materials to the fire brigades for the national campaigns. The DSB evaluates results of the annual campaign and revises the materials as needed. The evaluation looks at the number of fires after the campaign and surveys families as to whether they took safety actions such as holding a family escape drill, testing their smoke alarms, and other actions recommended in the campaign. DSB also provides the fire safety calendar used in school programs and elsewhere.

Media Used – The Scandinavian fire services make use of a wide variety of media as do most Western nations, but there are some novelties, too.

The Advent season campaigns in Stockholm use paid television and radio advertisements, many of which are funded by the SFPA. The Norwegian DSB develops national radio and television spots and ads for newspapers, in conjunction with the Norwegian Fire Protection Association and a major insurance company. Another insurance company plus DSB and the Fire Protection Association help sponsor Fire Prevention Week activities related to the campaign.

Newspapers are used both for paid advertisements and for articles on safety. Special efforts are made to maintain good media relations and get free articles on seasonal safety issues tied to the various Swedish campaigns.

In Norway, the Oslo Fire Brigade's public relations director said that they had only a small budget for buying media time or ads. But by befriending reporters and providing good access to information on fires and accidents, they get articles published on prevention. They feel that people are more likely to read a story than an ad. Norway has many local newspapers that are hungry for articles and well read locally; the fire service supplies them with stories about fire safety.

The internet is of growing use for disseminating fire safety information in Scandinavia, especially to younger people who are computer literate and frequently online. In Umea, a university town, the fire brigade maintains an interactive website. The brigade posts safety information and has a dialogue with students and others with fire safety concerns and questions.

Supermarkets are another venue for fire safety education in Umea. Firefighters stationed in supermarkets show shoppers a short film on fires using a television console. Virtually every

household has someone shopping for food, and so this is thought to be a good location to obtain wide outreach of safety information.

A rather unusual media is the public walls in apartment houses. For example, posters are put in stairwells of apartment buildings in Oslo to address the need to remove clutter in the public spaces that can interfere with evacuation in an emergency, especially when there is heavy smoke and the clutter cannot be seen. People often store baby strollers or other bulky items in the public areas for convenience and to avoid using space inside their apartments.

Movie theatres in Sweden have agreed to show a one-minute fire safety spot just before New Year's Eve, in the heart of the winter fire season. The spot focuses on the results of mixing alcohol and fireworks, which are used in New Year's celebrations. The film was produced by a film student and cost only about $50,000 to produce and distribute nationally.

Smoke Alarms – A key prevention theme year-round in Sweden and Norway as in the United Kingdom and United States is to encourage more people to install and maintain smoke alarms. Swedish law holds landlords responsible for providing smoke alarms. Less clear within the law is whether the landlord or the renter is responsible for maintaining the smoke alarms. This has led to uncertainty in enforcement and responsibility. Nevertheless, national and local smoke alarm campaigns promote testing and maintaining smoke alarms.

The SFPA estimates that 91 percent of Swedish homes have smoke alarms, but 60 percent of fire deaths occur in homes with no working smoke alarm, so reaching that last 9 percent without alarms and getting people to maintain them is important. In 2007 the SRSA suggested use of hard-wired smoke alarms for people who have difficulty maintaining an alarm on their own (because of mental or physical disability), and also to require special smoke alarms for the hard of hearing.

The fire service in Nykoping sells smoke alarms with 10-year batteries. They install them for free in community-owned residences where the city is the landlord.

As noted earlier, the national "change your batteries day" in Sweden is during Advent, and is part of the seasonal campaigns. In Norway, one day a year is designated as "Smoke Alarm Day." School children are encouraged to make sure their smoke alarms in their homes are tested that day and the batteries replaced if needed.

"Take Care of Yourself" Campaign – In 2003, Stockholm had a $60,000 budget for materials and meetings to promote the theme that people should take care of themselves to prevent various types of accidents, including fires. The "Take Care" campaign was conducted in partnership with the Red Cross, state and town "missions" (which work with the "socially

disabled"), organizations working with the homeless, the social service department of the city, and organizations working with people with disabilities. The Stockholm Fire Brigade developed a manual for use in this campaign. The campaign messages, aimed at "less fortunate" people, included the following:

- Don't use polyester clothing (they are more flammable than wool)
- Don't smoke in bed
- Don't allow people with mental disabilities to cook on their own (which is more of a problem now that people with disabilities have been allowed to live on their own in apartments)
- Turn electricity off when not using it
- Don't use candles near curtains
- Call emergency services at 1-1-2

"Safe Home" Campaign – The Swedish Fire Protection Association started a national campaign in 2007 that will run for the next four years, each year with a different emphasis. The SFPA has 23 regional fire protection associations in which 600 fire officers work on their days off (for pay). The regional associations help implement the national campaign.

The campaign is trying to convince people and the media that there still is a fire risk in the home, and to inform them on what to do about it. Because the SPFA is not a government agency, it can be more aggressive in its statements. It believes that having a yearlong campaign with one focus, not just a campaign during fire prevention week, increases message exposure and retention.

The message in 2007 was that smoke will kill you, and that it is important to close doors to block smoke and fire. The "close the door" theme is aimed especially at people in apartment buildings, who in a fire often flee their apartment, leaving the door open to the hallway, which allows smoke and fire to spread to other apartments and block exit paths such as stairways. The fire service recommends that people stay in their own apartment and not evacuate if the fire is elsewhere; the likelihood of getting injured is thought to be greater if they flee through a smoke-filled stairway than stay put. The stairway escape problem is worse in Sweden than many other nations because the codes allow apartment buildings under 30 meters (roughly 9 stories) to have only one stairway. The SFPA is lobbying to require 2 stairways in apartment buildings.

Another part of the SPFA safe home campaign is directed at the 4 or 5 largest home builders in Sweden. They met together to discuss the safety features of new homes, with the potential for allowing the home builder to advertise that "we build fire safe homes" in return for improving the built-in safety. The SFPA proposed a logo that could be put on a home to indicate

that it met the safety criteria. Safety was said to be trendy in Sweden, and an appealing part of sales campaigns, which has not been the case universally. Eventually they would like builders to include home sprinkler systems, but they think they are still far from getting that to happen.

Employee Safety Education

In Sweden and Norway, employee education programs promote safety at home as well as at work. In Nykoping all city employees are trained on a variety of safety topics over a four-year cycle. They are taught about fire safety, accident prevention, first aid, and other topics. The employees include care providers for the elderly, day care workers, and school teachers. They are taught to take responsibility for safety on the job and at home, not just for fires but also falls and other risks. About 25 percent of the employees sign up each year in this voluntary program. It consists of 4–5 classes of three hours each, one of which is devoted to fire. There are 4,000 people employed by the community, so this is a significant part of the population, considering the multiplier effect through their families. Employees who have taken the course are encouraging new employees to take it.

Also in Nykoping, hands-on training is given to some employee groups in private industry on how to use extinguishers. This training applies to home extinguishers as well as those at work.

The Nykoping industrial safety education program is evaluated with a worker safety survey. Employees fill out a questionnaire on their perception of the risks at work. Then a safety management coordinator and representatives of the owner, fire and rescue service, environmental service and local council for crime prevention, visit the work unit. Together with the work unit manager, a safety representative and the local caretaker go through the risks that were identified in the survey and decide on how to deal with them. This process has been used since year 2000 in schools, places for elderly care, the rescue service, electricians, and building owners (including owners of apartment houses).

In Umea, too, fire safety education is given to a variety of work groups. Some companies hire the fire department to instruct their employees on fire safety and how to respond to a fire. The fire safety lessons provide not just information on workplace safety, but also information on home fire safety, including a movie on how fast a fire can spread in the home.

In Oslo, firefighters teach fire safety to businesses, private fire brigades, and city government workers. Firefighters do this instruction on overtime, and the fire brigade is reimbursed by the customers.

School Programs

The Swedish fire service attempts to reach all children at least twice in their school years. They are largely successful even though the program is voluntary—each school decides whether to accept the program. Almost all schools welcome the fire safety instruction because they do not have to pay for it, it offers a fresh set of instructors for the children, and it is viewed as an important topic. Some fire brigades are reaching children with safety information in three or four grades from pre-school to high school. A striking aspect of the school program reaches virtually all children in each grade targeted.

The materials used in the program are developed by the Swedish Fire Protection Association and the SRSA, with some locally produced supplements. In Norway, materials from DSB and Norwegian Fire Protection Association are used for some school programs, while locally developed materials are used for others.

Six year olds are the first age group targeted by the school fire safety programs in Sweden. In Stockholm, all 6 year olds are brought to fire stations to receive a joint presentation by firefighters, police, and ambulance personnel on safety issues. Stockholm uses firefighters who volunteer to staff the program, but if not enough volunteer they select the ones thought likely to do the best job, the "socially gifted" personnel. The safety programs in the fire stations are conducted during specified periods in the autumn and spring school terms. Umea's school program is similar to Stockholm's, but all the 6 year olds are brought in to fire stations during a single month, November, rather than spread the lessons throughout the year. In Sundsvall the fire brigade goes to the pre-schools to deliver a one and a half hour session. In Nykoping, too, 6-year olds are given basic information on fire safety, car and bus safety, police work, bicycle safety, swim safety, and other safety issues.

The next age group targeted in schools is 8–9 year olds. Sundsvall firefighters present a two and a half hour program to this age group each year. Close to 100 percent of the children in this age group are reached annually. A shift at a fire station near each school is directed to do the safety presentations, but they decide themselves which particular firefighters will do it. In Umea the program is presented in 40-minute blocks using two firefighters; the program is delivered class by class, not to a large group. The firefighters who deliver the programs are taken off shift duty for 3 ½ weeks to do the school education.

In middle schools and high schools, there is variation in fire safety programs from city to city in Sweden. Local fire station personnel in Stockholm go to schools to give safety presentations to 11–12 year olds and 14–15 year olds. The teachers also may use the safety materials at other times. In Sundsvall, the 11–12 year olds are given basically the same material

as presented to the 8–9 year olds, but with juvenile firesetting, ethics, and penalties for setting fires added to the curriculum. They also are shown the SFPA film on how fire spreads and its deadliness. Umea used to target 14 year olds but gave up because they were not receptive and played around during the safety classes. The Umea fire brigade is pondering how to get through to this age group. In Nykoping, all 13-year olds are given a presentation on safety issues at the camp used for training firefighters. It is conducted for a half day in the spring, 2–3 hours per group. Subjects include understanding who to call in an emergency, knowing the way out, closing doors, maintaining smoke alarms, and learning how to extinguish a fire. Nykoping also teaches fire safety in high schools as part of a worker safety curriculum, which was found to appeal to teenagers.

In Sweden as in the United Kingdom, proactive programs are presented to youths to dissuade them from intentionally setting fires. The fire service tries to create peer pressure not to start fires. They emphasize the danger to one's friends, the penalties if caught, and other problems caused by the fires. They do this in an auditorium meeting in addition to the fire safety classes that are conducted in classrooms. The fire service asks school children to report anyone they see starting fires, and try to make the firesetters look "uncool."

In Oslo, elementary schools are visited by the fire service in November, prior to the winter fire hazard season. Both firefighters and full-time prevention personnel deliver hour-long programs. Some schools do it class by class and others in a general assembly. The focus is on the fifth and sixth grades, 10–11 year olds, because they feel that at this age a child is old enough to be the "fire chief" of their home. The children are given a list of fire safety measures to take, with different tasks each month, including smoke alarm testing and knowing where the fire extinguishers or fire hoses are kept. The school children are taught how to check the pressure of extinguishers and to find out if the fire hose is attached to a faucet in the bathroom, laundry room, or kitchen. Other safety tasks are to develop a family escape plan, check that fireplaces have a spark guard, know the emergency telephone number, and check that portable electric heaters are not close to flammables. Oslo is reaching about 70,000 children a year with this program in 65 of 110 schools. Some schools do not want the program because they are "too busy" and some want it but forget to schedule it.

The current version of the Oslo program is just two years old. They received much resistance from the firefighters asked to deliver the programs at first, but now it is very popular to do. The schoolchildren even ask the firefighters for autographs. Younger firefighters have been found to be better speakers and to relate better to the schoolchildren, who are pre-teens. The Oslo brigade prepares the lesson materials themselves; they are used by seven neighboring

brigades as well, which promotes consistency of messages in the region and economy of scale for the materials.

In addition to the program for 10–11 year olds, the Oslo Fire Brigade brings "kindergarten" children to visit the fire station, and has line firefighters visit them at school. They combine doing an inspection of the school and talking to the children and the staff on the same visit. Workers in Norway are paid their salary to be home with their children for the first year of life. "Kindergarten" is a four-year school starting with two-year olds, which goes until they start elementary school. The children are getting acquainted with firefighters and fire safety from a very early age.

The Oslo Fire Brigade also conducts fire safety classes for the ninth grade, but only if requested. The program and materials are designed for use by the teacher without the fire brigade if they so desire.

Programs for the Elderly

Most fire deaths in Sweden involve individuals who are 65 years and older. As noted earlier, the new practice of removing the elderly from institutional "homes for elderly" and establishing them in their own apartments is increasing fire risk.

The elderly receive home visits as needed by the "home service" (social welfare) system. Caretakers may cook meals twice a day, give medication, change clothing, etc. But no one can be there all the time and if the elderly cook, smoke, or smoke or do other potentially hazardous things, they are at risk.

Because people are living longer, the elderly now are divided conceptually into two groups in Sweden, the "the younger elderly" (65–80 years old), and the "older elderly" (over 80 years old). Norway considers people as being elderly when they are over 67 years old, which is the normal pension age there. As noted earlier, over half of fire deaths in Norway are in this elderly age group, and they are also a high proportion of the fire deaths in Sweden. In Nykoping, Sweden, a nurse on the prevention staff of the fire brigade reaches out to elderly organizations to offer a broad safety program that includes prevention of falls as well as fires.

A particularly dangerous combination is an elderly person living alone who is wheelchair bound and a smoker, even more so if they wear polyester clothing, and yet higher risk if they are alcohol drinkers. Besides behavioral advice provided by the fire brigade, social services, and health agencies on smoking's health effects, some fire brigades promote the use of a "smoker's apron" for the incorrigible elderly. This is a fire-resistant apron to be worn when smoking, just as an apron is worn when cooking. It will collect embers and not ignite clothing. The smoker's

aprons are on the market and were developed for smokers in hospitals. They are not yet used much by people living alone at home.

In several cities in Sweden and Norway the fire service trains caretakers of the elderly in fire safety. Training must be done on a continual basis because of the turnover of caretaker staff. In Umea, the fire service was educating the "home health services" on the fire risks to look for when assisting elderly at home. Classes were held at the fire department and were required by the home help service for their employees. However, the home help service stopped sending their employees to the training to save money—the salaries of the people attending plus those filling in for them. Although the training has dropped back to being voluntary, the concept continues to be sound.

When the caretakers or fire service visit the homes of the elderly, they may install smoke alarms or change batteries. However, when the smoke alarms go off the elderly may be too infirm, groggy, or mentally impaired to escape, so other measures are necessary. The SFPA would like home fire safety inspectors or social services to check the mobility of the elderly they reach. If an elderly person is thought not likely to be able to escape when a smoke alarm goes off, then he or she is a candidate for a portable mist sprinkler system provided by the community. These units cost about $2,700 but can be reused. Specifications for these portable systems has been established by DSB and SFPA.

In Norway, caretakers of the elderly are given a checklist to follow for reviewing safety of their homes. The insurance industry is paying the fire service to train the care takers and paying for the smoke alarms and batteries. In return, the completed home safety checklist is given to the insurance company, which compiles statistics and uses the information to tailor safety education. The cost of insurance is a flat fee for everyone, so the information is not used to raise rates on a household found to be at high-risk. Based on a sample of 734 elderly households, an insurance company found that 8 percent had no smoke alarm, 22 percent no working smoke alarm, and 14 percent no escape route they could use themselves; e.g., they were in a wheelchair and could not get out alone. Thirteen percent were misusing electrical equipment; e.g., drying clothes on top of an appliance not meant for this, and 70 percent did not have shut-off timers on their electric stoves (an idea that will be discussed later under consumer product safety ideas). On the other hand, this means that 30 percent of the elderly did have automatic stove shut-offs, which is no small contribution to cooking safety. Social services will provide stove timers to the elderly if they want them.

In Norway as in Sweden, many elderly now are living at home instead of in institutions. There are apartment houses built for pensioners, but they do not have any special safety features, nor special provisions for escape in case of fire. The DSB is working with municipalities to

improve the safety for the elderly wherever they live. They feel there are three main alternatives to offer:

- Improving access to features of the home that allow an elderly person to escape by themselves (e.g. early alarms, adequately sized doors, and safe elevators that accommodate wheel chairs)
- Providing local assistance (e.g. as is found in nursing homes and could be provided in a building with high elderly population)
- Installing home sprinklers (including retrofits with portable mist systems)

They argue that if flashover occurs within 3–5 minutes, and the fire brigade response time is 10–12 minutes, the elderly have to escape on their own in many cases. Among the solutions being planned are to sprinkler more of the housing intended for elderly, and to plan to move someone in a wheelchair to a temporary refuge that will hold long enough for the fire brigade to arrive and rescue them.

Fire Station Safety Programs

Fire houses are open to make safety presentations during certain holiday seasons in Sweden and Norway. The open houses are well advertised in advance, including advertisements in newspapers that are run twice before the scheduled period.

Winter holidays for schoolchildren and many others are during weeks 7–9 (February–March) of each year. Fire stations in Stockholm have open house for three days in week 9, from Tuesday through Thursday. Many people come to the stations with their children and receive fire safety tips. In 2007, Stockholm drew an average of 800–1000 to each of their ten stations, versus 150–200 people per station in prior years. Stations in the inner city were said to have had queues of people waiting to get in. They suspect the surge was related to an eight-part reality television series on firefighters' life saving work.

To make the station visits more meaningful to adults, the firefighters in Umea are given questions to ask the visitors, such as "Do you have smoke alarms?" and if so, "Do you maintain them?" This makes the visits more effective than just public relations.

In Norway, fire stations hold an open house during Fire Prevention Week in the autumn, usually on a Saturday. While open to all of the public they especially hope to attract 4–7 year olds. In 2006 about 235 stations were open and received 163,000 visits this one day, about 700 per station on average.

Improved Consumer Products

We found several interesting products for promoting fire safety in Scandinavia.

Stove Timers – A way to prevent many cooking fires is to put electrical timers on the stoves. In Norway, most stoves are electric. Many now have built-in timers that can be pre-set for 30 or 60 minutes. Alternatively, the stove can be plugged into a timer. The stove shuts itself off if you forget about your cooking. You can reset the timer it if you want to cook longer. Some stoves also have a temperature sensor that shuts the stove off if the temperature raises too high before the timer goes off. The DSB is trying to get the timer technology made into a requirement for stoves sold in Norway.[12]

Stoves used with plug-in timers will not operate unless the timer is set, so one has to be at least clear-headed enough to do that when starting to cook. The plug-in cooking timer costs about $16. The built-in timers plus heat sensor cost $450. Oslo encourages children and grandchildren to provide them as presents to elderly relatives, just as had been encouraged for smoke alarms in the past. The Oslo Fire Brigade believes this simple technology has prevented many fires, saved many lives, and reduced burn injuries from cooking.

Electrical Timer Shut-Offs – Beyond stove timers there is growing use of timers on electrical appliances and electric circuits, in Sweden and Norway. The SFPA would like to see timers on all electrical equipment in the kitchen, and circuit breakers on all circuits.

In Norway, most homes were said to have the capability to turn off much if not all electrical equipment at night. The main approach is to use power bars (also called power strips) into which televisions, computers, printers, stereos, etc can be plugged and shut off with one switch. Children are taught in school that "if you see the red light [on a power strip], turn it off at night." This has led to some humorous conflicts with parents wanting to charge cell phones or watch television in the evening but a child insisting that the red light has to be off before they go to sleep "because of what the fireman told me." But overall the approach works and is sold not just as a safety measure, but also as a "green" approach to reduce unnecessary electricity use at night.

"Portable" Stand-Alone Mist Sprinkler Systems – Portable stand-alone home sprinkler systems are being considered for use in high-risk households. The tank and piping can be retrofit to protect one or two rooms. They protect about 25 square meters, generally one room, but an extra nozzle can be added to extend protection to a second room. They have 150 liters of

[12] A United States appliance association noted that the timers may burn out under the heavy electrical load of stoves. We did not hear of that problem in Norway, but it might be a problem in the United States with different voltages.

water and a high pressure pump. They are triggered by the smoke alarm, and use a water mist system like those used on ships. They are particularly appropriate protection for a bed-ridden person. The mist systems are commercially available. The Scandinavian nations are trying to create a sustainable market for these products, which cost about $2,700 per unit. A guide for producers and buyers has been issued jointly by DSB and SRSA. Part of it comes from CEN standards on water mist systems.

Safety Candles – Candle safety in Sweden and Norway is being improved by the availability of "safety candles" whose wicks do not go all the way to the bottom of the candle. That reduces the danger when a candle is not set on a flame-resistant surface or in a flame-resistant candle holder and burns to the end. (One might think of them as self-extinguishing candles.) Norway and Sweden also encourage use of flame-resistant candle holders (i.e. ones not made of wood or plastic).

A startling statistic was that Norwegians use 20 times the number of candles per capita as in the United Kingdom; Sweden is probably similar to Norway in this respect. Both emphasize candle safety in their public education.

Fire Safe Cigarettes – Sweden and Norway participation in the EU Fire Safety Network discussions on reduced ignition propensity (RIP) cigarettes and have been tracking the legislation and results of RIP cigarettes in the United States. There are no regulations at present for RIP cigarettes in Europe, but they are expected.

Home Fire Extinguishers – Sweden does not require home fire extinguishers, but encourage their use. They are in 35 percent of households according to the SRSA. Some insurance companies also are promoting their use.

The argument made for the use of extinguishers is that the fire service will be too late to put out a small fire; their response target is 10 minutes and they estimate flashover can occur in as little as 3–5 minutes. So they encourage homeowners to use extinguishers while the fire is small. Umea tells people to fight the fire if small, and if not, close the door and evacuate. Going one step further, Umea tells people to look at the fire and decide from the smoke level whether to fight the fire with extinguishers from within the fire room or from the doorway. The priorities taught are to help fire victims and potential victims first (pull them away from the fire, warn others), call the fire brigade, and then attempt to put the fire out. If more than one person is available, two or all three tasks can be done simultaneously.

As noted earlier, Norway requires fire extinguishers in the home under a 1990 national law. The Oslo Fire Brigade said they now frequently respond to fire calls after the occupant has extinguished a fire. They check that it is out and help with smoke removal if necessary. During

the annual open houses at fire stations, people are given the opportunity to practice using extinguishers.

Inflatable Cushions for Jumpers – While the focus of this research study was on measures to improve fire safety in the home, Oslo has been using a relatively new approach to save people when all else has failed and they have to jump from a window to escape a fire. Oslo uses large rapidly- inflatable cushions for the people to land on when access to ladders is blocked or the ladder trucks are too slow to arrive. (There are only three ladder trucks for the entire city.)

The cushions rapidly inflate and are carried on each engine. In 2001 (the year in which they first tallied the statistics) Oslo saved 13 jumpers from fires with the cushions. They also counted 30 saves by ladder, and 30 by smoke divers helping people out. (This included all types of structures, but was primarily from residences.) Only two people died in fires that year. People can be saved by jumping onto the cushions from up to the fourth floor; above that it is harder to aim for and land on the air cushion.

Fire Data and Data Collection

The Scandinavians have good data on their fire experience, and are developing approaches to improve the validity and usefulness of data on fire fatalities.

National Fire Data – Overall, Scandinavia has averaged somewhat lower fire death rates than the United States. In Sweden, from 2000 to 2006, there were 638 fire deaths in homes, an average of 91 per year or 10 per million population. This was down from 110 deaths in 1999.

The national goal, set by SRSA, is to reduce the number of people dying from residential fires by 10 percent over the next three years. They thought they were getting there in 2004, but then experienced an upturn in fire deaths for unknown reasons. In the first six months of 2007, 43 persons died in fires in Sweden, which annualizes to 86, slightly less than the previous years' average.

Norway had 62 fire fatalities in 2006, slightly down from 69 in 1996 but still about 14 per million population, which is a slightly higher rate than in the United States or Sweden. Half of the fatalities in Norway are people over 67.

Local Fire Data

STOCKHOLM: In recent years fire deaths in Stockholm had been quite low, 3–13 per year with considerable statistical variation from year to year because of the small numbers involved. Most of the deaths occur in one-fatality fires. The data for the last few years is shown in Table 4.

Table 4: Number of Fire Deaths in Stockholm, 2004–2007

Year	Fire Deaths
2004	3
2005	8
2006	13
2007	8 (first two months only)
Average	**13**

NYKOPING: This city had 2 fire deaths in the last 10 years, one of which was caused by an arsonist having a heart attack in the process starting a fire. They now have about 30-40 residential fires per year. In 1990–1995, they had 70 residential fires per year. In 1997–2001 this dropped to an average of 33 per year. They feel that the drop is due to emphasis on c hanging people's attitudes to take more responsibility for their own safety.

SUNDSVALL: In 2006 Sundsvall had 2 fire deaths. They typically have 1-2 deaths per year for a population of 115,000. Most fire deaths are residential. They had 171 residential fires reported to the fire brigade in 2006.

Table 5: Number of Fire Deaths in Sundsvall, 2002–2006

Year	Fire Deaths
2002	6
2003	4
2004	2
2005	2
2006	3
Average	**4**

UMEA: The Umea fire brigade reported 4 fire deaths in the last 6 years, all in residences. This is the equivalent of about 7-8 deaths per million population. Their fire calls to residences have been in the range 0.4 to 0.75 per thousand population, compared to about 0.65 per thousand nationally in Sweden. Most recently (2005) they have been at the low end of this range.

OSLO: Oslo has had 2-7 fire deaths a year in the last several years, with an average of about 4. This equates to about 8 per million population, below the U.S. average.

Investigation Data– Data on fire causes, especially fatal fires, has been improved in Sweden. They have 40 fire investigators nationally who support SRSA and complement the fire investigations that are undertaken by the police. The investigation program is paid for by SRSA. Police take the same fire investigation training course as do fire investigators. The training involves starting fires of various kinds, having some classmembers extinguish them, and then

having other classmembers investigate them and try to determine their cause. A video is taken of the fire to show what actually happened. This improved training has led to better fire cause identification and better information on firefighting successes, how fires were detected, and how people reacted to them.

Data from all fatal fires are collected by SRSA directly after the fire. Fire brigades are encouraged to send in their reports. SRSA also collects police reports on the fires and newspaper articles. By mid-January every year there is a rather complete picture of the fire fatality problem of the proceeding year. This information is used to guide prevention programs and as input to regulation making.

A concept developed in Stockholm for improving data on the causes of fires is to annually revise the data that fire investigators are asked to include in their fatality report, based on analyses of previous data and open-ended questions. For example, more specific information is desired on the type of drugs involved in fire fatalities. Drugs are a common contributing factor in Swedish deaths involving the elderly. Stockholm would like to know the particular drugs used, not just whether they were prescription, over-the-counter, or illegal drugs. They will ask for autopsies of fire victims to try to pinpoint the drugs involved as best as possible, but often get this information by knowing what medications were being taken by the victim. Sweden has one national data base that contains all drug prescription records, which makes obtaining this information easier than in the United States.

The major categories of fire death victims identified by the Stockholm Fire Brigade were:

- Old and disabled persons
- Alcohol and smoking
- Alcohol-related (non-smoking)
- Drugs used by “socially disabled” (people with mental disabilities or anti-social behavior)

IV. CONCLUDING REMARKS

England, Scotland, Norway, and Sweden have made major changes in their approach to fire service delivery, emphasizing more prevention aimed at safety in the home. The changes have led to a substantial reduction in fire deaths and injuries in residences. The key programs have been home fire safety visits to targeted households by the fire service in the United Kingdom and home visits by chimney sweeps or inspectors in Scandinavia. All four nations also have well-targeted, well-funded fire safety campaigns at the national and local levels. They use socioeconomic and census data overlayed with fire incidence data to determine the high-risk areas, and to evaluate progress. They tailor safety programs to various ethnic and age groupings. They rely on partnerships with other agencies, especially police, health, and social services to leverage the fire service resources, especially for delivering fire safety programs to the elderly people with disabilities living at home. They all reach large percentages of students in schools with fire safety programs, often in two or more grades. They try to get schoolchildren to be the fire marshals of their home.

Norway has added requirements for extinguishers in the home, instituted use of timers on stoves to reduce fires from unattended cooking, and also has safety candles that do not burn all the way down.

There is no reason why most of these and other ideas we identified could not be used to reduce fire injuries in American homes. Each brigade we visited has had to work at changing the culture of the fire eservice and change strategy to emphasize prevention even at the cost of slower response, in order to have a net decrease in losses. CDC and the U.S. Fire Administration are the government leaders who can help make this happen in the United States, by working with local fire services to prove the viability of these approaches for the United States. It does not require new resources so much as redirecting existing resources. It can and should be done.

APPENDIX A: HOLIDAY GREETING CARDS

(front)

(back)


安安全全慶新年
Celebrate New Year Safely
如欲預約免費家居安全檢查及安裝煙霧警報器
Get a Free Home Fire Safety Check & Smoke Alarm
請致電 07837655542 (中文專線)
08007315958 (英文專線)
Ring 08007315958 (English Speaker)
07837655542 (Chinese Speaker)
恭賀新禧
Best wishes for
a Happy New Year

APPENDIX B: EXAMPLE OF HOW MOSAIC RESULTS ARE USED

Mosaic Type Description	Mosaic Group Description	No. of Accidental Dwelling Fires per Type Description	% of Accidental Dwelling Fires per Type Description	Cumulative %
Town Centre Refuge	Ties of Community	**11**	**16.92**	**16.92**
Sepia Memories	Grey Perspectives	**7**	**10.77**	**27.69**
Industrial Grit	Ties of Community	**6**	**9.23**	**36.92**
Cared for Pensioners	Twilight Subsistence	**5**	**7.69**	**44.62**
Small Town Seniors	Grey Perspectives	**4**	**6.15**	**50.77**
Middle Rung Families	Happy Families	3	4.62	55.38
Close to Retirement	Suburban Comfort	3	4.62	60
Sprawling Subtopia	Suburban Comfort	3	4.62	64.62
Respectable Rows	Ties of Community	3	4.62	69.23
Families Making Good	Happy Families	2	3.08	72.31
Dignified Dependency	Welfare Borderline	2	3.08	75.38
Old People in Flats	Twilight Subsistence	2	3.08	78.46
Corporate Chieftains	Symbols of Success	1	1.54	80
Provincial Privilege	Symbols of Success	1	1.54	81.54
High Technologists	Symbols of Success	1	1.54	83.08
Burdened Optimists	Happy Families	1	1.54	84.62
Conservative Values	Suburban Comfort	1	1.54	86.15
Small Time Business	Suburban Comfort	1	1.54	87.69
Original Suburbs	Suburban Comfort	1	1.54	89.23
Coronation Street	Ties of Community	1	1.54	90.77
Dinky Developments	Urban Intelligence	1	1.54	92.31
Ex-Industrial Legacy	Municipal Dependency	1	1.54	93.85
White Van Culture	Blue Collar Enterprise	1	1.54	95.38
New Town Materialism	Blue Collar Enterprise	1	1.54	96.92
Bungalow Retirement	Grey Perspectives	1	1.54	98.46
No available data	No available data	1	1.54	100

The results are clear... in Southport, **50%** of accidental dwelling fires occur in **just 5 lifestyle types.**