



Title: **Needs & Redistribution Technical Working Group**

Paper: NR TWG 18-08: Discussion paper on the fire funding formula by the NFCC

Date: 18 May 2018

Venue: MHCLG, 2 Marsham Street, London

POLICY DEVELOPMENT: NOT A STATEMENT OF GOVERNMENT POLICY

Introduction

1. In January 2016 the responsibility for the fire service transferred from the Department for Communities and Local Government (DCLG) to the Home Office. The Ministry of Housing, Communities and Local Government (MHCLG), which has replaced the DCLG, have requested that the fire sector discuss their requirements for a fire funding formula and present their conclusions to the Fair Funding Review Technical Working Group.
2. This paper does not seek to propose a finished product in terms of a revised fire and rescue formula – rather it represents the combined view of the National Fire Chiefs Council (NFCC) with regard to the cost drivers and weightings within the current fire and rescue formula and how well that matches the service as it is today.

Summary

3. The NFCC strongly believes that the fire service requires its own specific fire funding formula and that fire funding should not be distributed wholly through the proposed “foundation formula”. **That being said, NFCC members agree that the population of an area, adjusted for geography, deprivation and cost remain the primary cost drivers for the service.**
4. The fire service must not only respond to day-to-day demands – it must also be prepared for major incidents; events that are rare but whose impact can be devastating. The implication of this in terms of creating a funding formula is that expenditure data or historic demand does not represent the full picture. Therefore there currently is, and the NFCC believes there should continue to be, an element of judgment within the formula to account for these risks. Hence, the National Fire Chiefs Council (NFCC) supports the continuation of the current blend of statistical techniques and judgment in the revised fire formula.

5. The NFCC has considered the current formula and cost drivers in light of present fire and rescue activities and feels that it is broadly reflective of the current service. However there are a number of suggestions they would like to make. These are summarised below and examined in greater detail in the rest of this paper.
- Ideally, modelling should be carried out at a **small area level** to reflect the granularity of areas in terms of deprivation, density and rurality and also to guard against underfunding of certain characteristics.
 - The Council has concluded that there is likely to be additional costs as a result of providing a fire and rescue service in a **sparsely populated area**. Therefore an adjustment for sparsity should remain – whether that takes the form of a top-up or an inclusion in the area costs adjustment.
 - As the proportion of incidents that are unrelated to fires increases, measures should be sought to specifically recognise the fire and rescue service’s attendance at **road traffic collisions**. It is likely that this pattern of activity is not reflected elsewhere in the formula.
 - That **large transport hubs** (railways and airports) and other sites identified by currently ongoing work by the NFCC should be included within the cost drivers in reflection of the fire service’s risk planning - both in terms of major incidents and of potential terrorist targets.
 - Further time should be spent investigating the requirement for the **coastline** top-up and its relative weighting.
 - Consider increasing the current “over 65” threshold in the **community fire safety** top up to reflect recent research into fire risk.

The Current Formula

6. The fire and rescue relative need formula has not been reviewed fully since the 2008-10 formula review prior to the 2011-12 settlement. The current formula is based primarily on projected population but also includes top-ups to reflect different demands on the service. Top-ups a, b, d and e were created following a regression exercise using historic expenditure as the dependent variable. The remaining top-ups for property and societal risk, sparsity and fire safety distribute a fixed proportion of the fire and rescue control total based on ministerial judgement. This mixture of statistics and judgement is necessary for a service which is resourced for risk, rather than demand (please see section below).
- a) **Coastline Top-Up** – Originally established to recognise that not all authorities have neighbouring authorities along their entire boundary to call upon when demand spiked.
 - b) **Population Density Top-Up** - This top-up reflects the increased threat of fire in densely populated areas.
 - c) **Population Sparsity Top-Up** - Some FRSs face a significant challenge in reaching sparsely populated parts of its area. This is reflected through this

top-up, which was added at the most recent formula review and is worth 1% of the total need.

- d) Deprivation Top-Up** – Contains a “risk index” which was created to model the number of calls a fire authority received – both for fire and non-fire incidents. The current index includes the following measures:
- (i) The proportion of working age adults with no qualifications
 - (ii) The proportion of the working population which are not in employment - receiving Incapacity Benefit, Severe Disability Allowance or Employment support Allowance, or were New Deal Program Starters/Apprenticeship learners.
 - (iii) The proportion of persons who are, or whose partner is, in receipt of Income Support/Income Based Jobseeker’s Allowance/the Guarantee Element of Pension Credit
 - (iv) Mortality Ratio under 75 years
- e) High Risk Top-Up** - Reflecting the increased risk of COMAH (Control of Major Accident Hazards) sites, this top-up distributes additional funding in proportion to the number of top tier COMAH sites per resident.
- f) Property and Societal Top-Up** – based on the Secretary of State’s estimate of property and societal risk, in turn based on Valuation Office Agency and 2006 Fire Services Emergency Cover Toolkit information, on a per person basis. The indicator is constructed using the number of different types of property in each FRA multiplied by the risk frequency factors relating to both property loss and societal risk. Societal risk relates to the likelihood of a large number of people who would require assistance by the fire and rescue service to escape from a fire. It is currently worth 6.55% of the fire and rescue control total.
- g) Community Fire Safety Top-Up** - This top-up reflects the increased risk associated with children, OAPs and those residents which require fire safety education. As well as the numbers of children and elderly people it also includes a measure of the number of residents with a greater need for fire safety assistance. This top-up is currently worth 6% after being increased from 3% following the 2006-07 settlement.

Statistics versus Judgment

7. The Fire and Rescue Service is often said to be “resourced for risk”, rather than demand. The 2015 NAO report into the financial sustainability of the fire service¹ provides the following explanation:

“...fire and rescue authorities are risk-based, designed to provide resilience against major events rather than meet average demand...” [Para 2.19]

¹ <https://www.nao.org.uk/wp-content/uploads/2015/11/Financial-sustainability-of-fire-and-rescue-services-amended.pdf>

8. The current formula includes population as one of the key cost drivers and this should continue to be the case. Previous formula reviews have suggested that the inclusion of coastline, community fire safety, property and societal risk do not “add value” to the model. In layman terms this means that including these measures does not explain any more of the variance observed in the expenditure data of the fire and rescue services.
9. However, in recognition of the risk-based nature of the FRS, the NFCC is fully supportive of additional top-ups and measures being included by judgment to compensate for the *risks* of providing and fire and rescue service in a given area.
10. In other words, to simplify the fire and rescue formula in such a way as to only base allocations on expenditure-based regressions would be to ignore one of the key functions of the fire and rescue service – to be prepared for the risk of major events.

Modelling

11. As mentioned above, previous formula reviews of the fire and rescue formula have often used expenditure-based regression or principal component analysis, with number of calls/incidents as the dependent variable. These analyses have often found a strong relationship between deprivation and expenditure/incidents.
12. However, the fire service also carries out other activities – prevention and resilience – which are more difficult to quantify and, in some cases, should have the effect of reducing recorded incidents.
13. There is also some evidence of increased costs and/or greater response times associated with providing a fire and rescue service in rural areas (see sparsity section, below).
14. Regressions carried out at an authority-level smooth out the granularity of many measures – not just sparsity but also density and deprivation. Looking at an FRS area as a whole risks missing pockets of highly concentrated drivers of risk/demand.
15. It is for these reasons that the NFCC requests that the Ministry investigates the use of multi-level-modelling/small area analysis when constructing the fire and rescue need formula.
16. As highlighted above, the council continues to support the mixture of statistical techniques and judgement.

RECOMMENDATION: That analysis, where possible, is carried out in small areas when reviewing the fire formula and that judgemental areas of the formula continue to be included.

Coastline Top-up

17. This top-up was originally established to recognise that not all fire and rescue services have neighbouring authorities along their entire boundary to call upon in the event of a surge in demand or major incident. In other words it is a measure to reflect the risk that, should a major incident occur, coastal FRSs cannot rely on cross border support (also known as mutual aid). Since the withdrawal of Maritime and Coastguard Agency (MCA) funding in 2011 there is no specific funding to support provision of “alongside assistance” (statutory) and “off-shore assistance” (non-statutory) by coastal authorities to Port/Harbour Authorities of the MCA itself.
18. The Coastline top-up currently accounts for just 2% of the total need formula, although it is clearly more significant for those fire services with a coastline. The top-up uses coastline data from 1991 per head of population; although this coastline measurement is out of date it should not have changed dramatically since then.
19. The NFCC would like MHCLG to consider whether the “per head” part of the measurement is correct. Would a measure expressing the coastline as a proportion of the FRS’s total border be more appropriate?
20. There is not sufficient data publicly available to support whether 2% represents the correct share. It is likely that the risk not only depends on the length of coastline but also the latent risk of an event occurring that would be large enough to require mutual aid.

RECOMMENDATION: That more time be allocated for investigating both the measure and the relative size of the top-up.

Sparsity Top-up

21. The current sparsity top-up was only added at the last (2010) formula review. It was included judgementally and given a weighting of 1%. Whenever previous formula reviews examined sparsity/rurality as a potential measure in their statistical analyses it was always found to be negatively correlated to expenditure and/or incidents.
22. However, there is strong qualitative evidence that there are additional costs associated with provision of fire and rescue services in rural areas. In 2014 the DCLG and DEFRA commissioned² Local Government Futures to look into whether there were additional costs associated with providing a fire service in a rural area. The report found a correlation between rural areas and higher unit costs for fire and rescue operations. The report went on to suggest that these higher costs could be due to a number of reasons:

²https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/388603/Rural_fire_and_rescue.pdf

- **Differences in stations, appliances and staff** – fire services in sparse areas were found to have a higher number of stations, operational appliances and staff relative to the number of incidents responded to. Supporting the argument that sparse authorities face diseconomies of scale in comparison to urban authorities, as they incur the same fixed costs necessary to provide emergency coverage to all areas, regardless of the number of residents living in those areas.
- **Differences in staffing structures** – Sparse fire authorities were found to have significantly lower employment costs per FTE member of staff – probably because they have a higher proportion of retained vs whole-time fire fighters.
- **Differences in the types of incidents attended** - The number of incidents per resident was only weakly related to sparsity. In 2013-14, rural FRAs attended fewer incidents per resident. This was mainly due to a lower rate of fire incidents, offset by a higher rate of non-fire incidents; mostly traffic-related. Of the fire incidents that did occur, the proportion of primary fires was higher in rural authorities (47%) than urban ones (36%), suggesting higher unit costs.
- **Differences in service levels** - There did not appear to be significant differences in casualty rates between rural and urban areas, although response times were systematically higher in sparse authorities.

23. It is for this reason that the NFCC further supports the use of multi-level-modelling in constructing a fire formula. It would seem possible that sparsity has, in the past, been under-represented in the calculation of funding allocations. If this is the case then it is hoped that a small area analysis might be able to understand, at a smaller geographic level, the impact rurality has on service delivery.

24. It is worth noting that despite many fire and rescue authorities providing a service to sparse populations, the aggregation of rurality to local authority boundaries means that very few FRAs receive any rural services delivery grant. In 2018-19 five stand-alone FRAs received just £1.4m of the £80m total.

25. The NFCC understands that the Ministry is considering whether sparsity should feature, as it does now, as specific top-ups or whether the additional costs of providing services in rural areas should be included in the area costs adjustment (ACA). It could be argued that where sparsity impacts on the type of incident being responded to then it should be reflected in the formula as a top-up, and where sparsity's impact is to increase costs then it should sit within the ACA.

RECOMMENDATION: Sparsity and the impact of a dispersed population on service delivery should be investigated in a small-area-analysis. This should be used in order to inform the magnitude of future sparsity top-ups and/or adjustments to the area cost adjustments but not the existence of future sparsity adjustments.

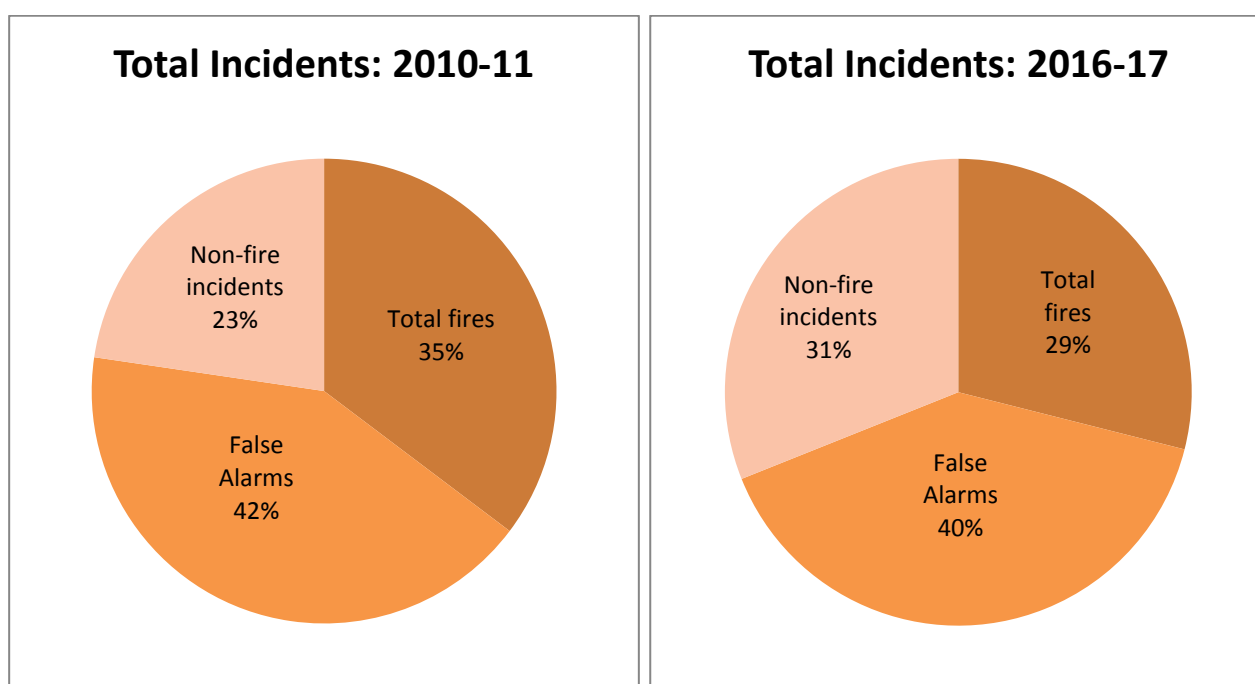
Deprivation Top-up

26. The Deprivation top-up includes a “fire risk index”. This was altered at the last formula review to make it more people-related, by removing dwelling-related measures. It is a measure where “all incidents” is the dependent variable. “All incidents” includes fires, false alarms as well as non-fire incidents – such as road traffic collisions (RTCs), lift releases and other rescues.

27. In past formula reviews alternative dependent variables have been considered:

- incidents that solely relate to fire,
- fire incidents and false alarms, and
- “all incidents” used but certain types of incidents (first aid, false alarms and suicide/suicide attempts) received a lower weighting.

28. The following two charts demonstrate how the pattern of incidents has changed since the last formula review.



29. The share of incidents classed as “non-fire” has increased significantly in just 6 years.

30. A significant proportion of the non-fire incidents are the service’s attendance at road traffic collisions (RTCs). The current risk index is effectively a deprivation measure, but RTCs are unlikely to follow such a pattern; instead being more likely to be a function of road type, length and traffic flow.

31. A piece of research carried out in 2010 for the DCLG by Greenstreet Berman found that traffic level (vehicle km per year) was the strongest predictor of RTCs but that length of A-road was also a good predictor.
32. The same research also found that there was a negative correlation between the predicted rates of RTC with the dwelling fire casualties. The study concluded that including RTCs into a relative risk index would alter the result rather than simply replicating the relative ranking given by fire risk.
33. In the past, incorporating measures relating to RTCs has been considered but appears to have been discounted as an option due to the measures thought to relate to RTCs not being well correlated to “all incidents”. The NFCC considers that “all incidents” data should be broken down into sub categories prior to measures being sought.
34. The significant remainder of non-fire incidents are all things likely to be represented by the current deprivation, fire risk or COMAH measures. Although members have highlighted the fire service’s response to flooding incidents which has a relatively high fixed cost in terms of equipment and training despite the frequency of incidents being low.
35. In addition to the issue of RTC attendance; the current risk index uses old data which is no longer being collected. Benefit data will be replaced by universal credit³, for which the full rollout is not expected until at least 2022. Additionally, even in the current formula, the New Deal data used was frozen from 2006-08. A replacement for this data will need to be sought – it may be that a subsection of the revised IMD may be an appropriate deprivation measure.
36. Recent research⁴ published by the Home Office into fires and fire-related fatalities highlights the groups more likely to experience a fire as:
- Those living in rented accommodation versus owner occupiers
 - Those living in flats versus those living in houses
 - Those where the head of the household is under 60
 - Those in larger households (5 or more people)
 - Those with a long-term illness or disability

RECOMMENDATION: As the proportion of non-fire incidents increases, measures should be sought to specifically recognise the fire and rescue service’s attendance at road traffic collisions. The current formula’s measures and top-ups are unlikely to reflect this activity which is much more likely to relate to characteristics of road networks.

³ jobseekers allowance, housing benefit, working tax credits, child tax credit, employment support allowance and income support

⁴https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/650869/focus-trends-fires-fatalities-oct17.pdf

High Risk

37. The high risk top-up includes a measure of the top-tier of COMAH sites. For reference; lower tier COMAH sites, broadly speaking, store similar substances but in smaller quantities.
38. The NFCC suggest that the high risk top-up should be extended to include major transport hubs, such as large railway stations and airports. These types of sites often feature in individual FRS risk management plans, indicating that the service does consider them a potential risk area; both as potential accident sites and also targets for terrorism.
39. The inclusion of major transport hubs is further supported by its inclusion in the now dated Fire Service Emergency Cover (FSEC) toolkit⁵ which contained a module entitled “major incidents” that includes the following risks:
- Railways
 - Motorway
 - Airports
 - Background aviation
 - Bombs
 - Flood
 - Chemical (sites)
 - Hazchem transport – road
 - Hazchem transport – rail
 - Ferries
40. The other FSEC “major incident” categories are likely to be covered through the inclusion in the formula of measures relating to road networks, COMAH and coastlines.
41. This FSEC toolkit is dated and is no longer used by a number of FRSs, but the NFCC’s Community Risk Programme is working on developing a national toolkit for use in developing fire and rescue service risk management plans. The revised toolkit will also be more reflective of the current risk-based service, rather than demand-led which will ensure alignment with the NFCC’s strategic commitment around assessing community risk. It is anticipated that some early results from this work can be shared with the Ministry later this year.

⁵ The toolkit was a suite of software, provided by the Government, free of charge, to UK fire and rescue authorities. The software was a geographic information based risk assessment toolkit that enabled FRAs to align local risks and resources on a cost-benefit basis. The Toolkit was developed by the DCLG for fire and rescue authorities’ use and was rolled out to all fire and rescue authorities in England, Wales and Scotland in 2004. However it has since become out of date and is now less widely-used.

More information can be found here:

<http://webarchive.nationalarchives.gov.uk/20120919203951/http://www.communities.gov.uk/document/s/corporate/pdf/1838272.pdf>

RECOMMENDATION: Many fire and rescue services specifically list airports and railways in their risk management plans – not just as potential accident sites but also as potential terrorist targets. The NFCC would like to see the addition of large transport hubs, and possibly other sites identified by their revised toolkit, in the fire and rescue funding formula.

Community Fire Safety

42. As highlighted earlier, the fire and rescue service carry out some duties which are harder to quantify – including fire safety education and prevention activities. The community fire safety top-up is worth 6% of the total need allocation after it was increased from 3% in the 2006-07 settlement.

43. As well as the numbers of children and elderly people (65+) it also includes a measure of the number of residents with a greater need for fire safety assistance based on ACORN classifications. The Ministry have indicated that they are considering a replacement for ACORN data in the formula review.

44. The Home Office's research (sited above, under deprivation) reports that the following groups of people as being at a greater risk of dying in a fire:

- Older people (80 plus group at significant risk of fire-related fatality compared to younger groups)
- People with disabilities
- Those in single parent households
- Males, aged around 40-60 years who live alone and drink and smoke in the home
- Young people aged 16-24, including students.

45. The World Health Organisation has also projected that the number of fire related fatalities will fall across all age groups, except for those aged above 70, for whom these is expected to be a slight increase.

RECOMMENDATION: NFCC members consider that the current threshold of "65 plus" should be raised in recognition of recent trends in incidents and World Health Organisation predictions.

Conclusion

46. The NFCC supports the continued inclusion of projected population and believes that population, weighted for deprivation, geography and costs, remains the key cost driver for the service. However, the NFCC strongly feels that the fire and

rescue service's "risk-based" responsibility requires its own specific fire formula. Fire funding distributed solely through a foundation formula risks ignoring the additional prevention, protection and readiness work carried out by the service.

47. Coastline top-up – further work is required to establish the need, quantum and whether the current "coastline per head" measure is appropriate.
48. Density top-up – the NFCC accept that density should continue to be included in the formula.
49. Sparsity top-up – agreement that sparsity should continue to be reflected *somewhere* in the formula, either as a top-up or within the area cost adjustment or a mixture of the two. Additional work would be required to establish whether the current 1% of total need is correct.
50. Deprivation top-up – the current risk index contains out-of-date benefit data which, due to the roll out of universal credit, can no longer be replaced. The NFCC proposes replacing the out-of-date benefit/deprivation with the following categories (identified by the Home Office's research into dwelling fire risks) where there is a higher risk of fire:
 - Those living in rented accommodation versus owner occupiers
 - Those living in flats versus those living in houses
 - Those where the head of the household is under 60
 - Those in overcrowded/larger households (5 or more people)
 - Those with a long-term illness or disability
51. The non-fire incidents are now a larger part of the fire and rescue services work and in recognition of this the NFCC would like to see data reflecting road traffic collisions included in the formula. Previous research has indicated that the following measures are likely to be strong indicators:
 - Traffic level (vehicle km per year)
 - Length of A-roads
52. High Risk top-up – there is agreement within the NFCC that COMAH sites carry high risk but members request that major transport hubs (airports and train stations) and possibly other high-risk locations (identified by the NFCC's ongoing work to create a revised toolkit) also be included in the definition of "high risk".
53. Property and Societal Risk top-up – the current top-up draws on the now out-of-date Fire Service Emergency Cover toolkit so will need to be updated. The NFCC's ongoing project to replace the toolkit may provide an alternative.
54. Community Fire Safety top-up – this top-up should be updated to reflect the move towards more targeted prevention activities. The current measure of "population aged 65 plus" should be increased to those over 80 – based on recent trends in fire-related fatalities and World Health Organisation predictions.

55. Those in need of fire safety education are likely to be the following groups; who have been found to be most at risk of fire-related fatalities.

- People with disabilities
- Those in single parent households
- Males aged around 40-60 years who live alone and drink and smoke in the home
- Young people aged 16-24, including students.