

Communities of Practice Final Report

World Fire Congress

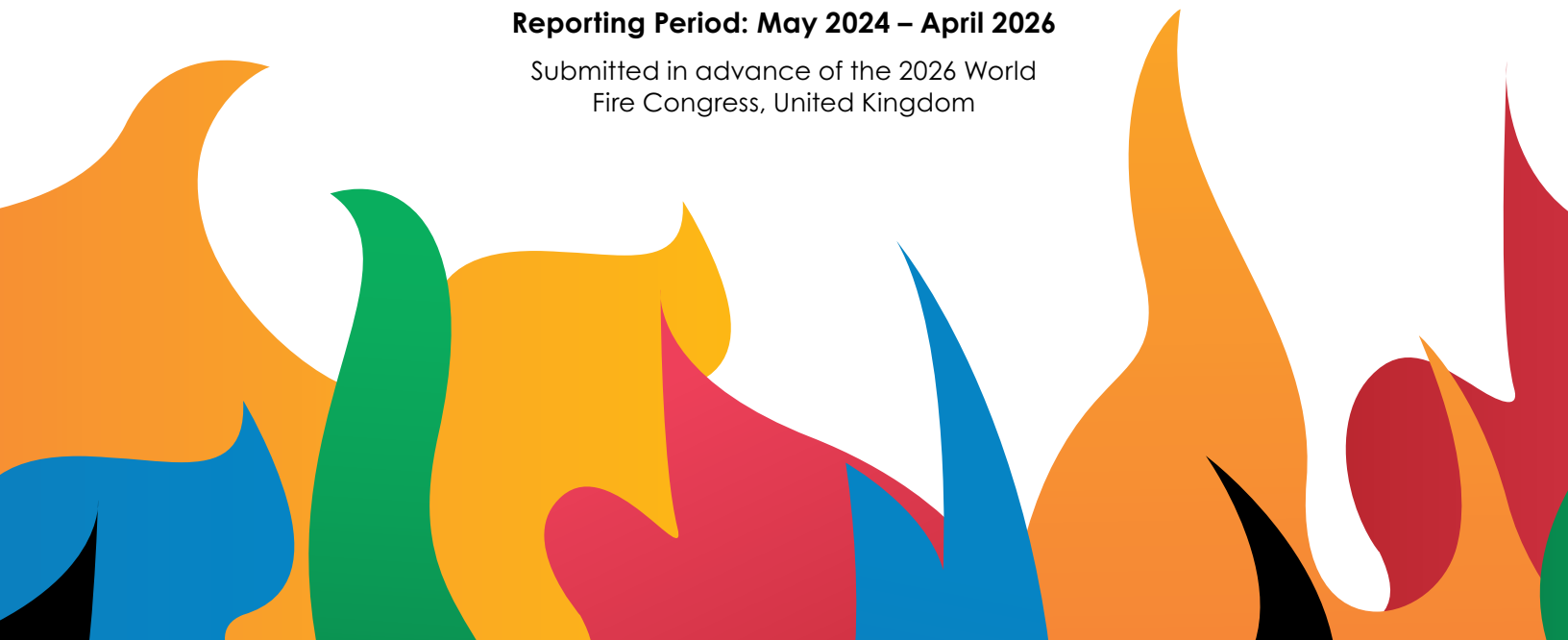


World Fire
Congress

2024 | United States

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Research Institutes | Fire Safety



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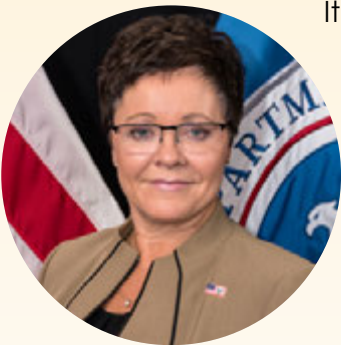
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Foreword from the Inaugural Chair



It is my distinct honor to present this Final Report from the U.S. led Communities of Practice (CoPs) established at the inaugural 2024 World Fire Congress (WFC), held May 7–8, 2024, in Washington, D.C.

That historic meeting brought together delegates from 56 nations — fire service leaders, researchers, practitioners, and subject-matter experts — united in a shared conviction: the challenges facing the global fire service today transcend national borders, and the solutions must be developed in concert.

Over the eighteen months that followed, six Communities of Practice convened, deliberated, and produced the body of work captured in this report. Their members met across time zones and languages, navigated platform and resource constraints, and persisted in the work of comparing notes, sharing data, and developing recommendations they will carry to the 2026 WFC in the United Kingdom.

Five themes echo across every CoP report: the urgency of shared global infrastructure for knowledge exchange; the need for translation services that allow every nation a full voice in the discussion; the value of regional working groups that can engage in real time; the importance of cross-sector collaboration that reaches beyond the fire service itself; and the recognition that emerging technology and climate change are reshaping operational reality faster than codes, standards, and training can adapt.

I extend my gratitude to every delegate who participated in this work, to the CoP leads who shepherded these conversations, and to the staff at UL Standards & Engagement and the Fire Safety Research Institute who made the technical infrastructure possible.

This report is offered as a foundation for the work ahead. The momentum begun in Washington must continue in the United Kingdom and beyond.

Sincerely,

Dr. Lori Moore-Merrell

Dr. Lori Moore-Merrell
Former U.S. Fire Administrator
Chair, 2024 World Fire Congress

Introduction & Executive Summary

The Inaugural World Fire Congress

In May 2024, the inaugural World Fire Congress (WFC) was convened in Washington, D.C. to gather international fire service leaders, researchers, practitioners, and subject-matter experts. The two-day event emphasized the importance of international collaboration in addressing the evolving complexity of structure and wildfires, and the critical need for global information sharing. Alongside presentations and panel discussions led by fire service leaders and experts, attendees shared experiences and perspectives on the challenges and risks firefighters face, including emerging technologies, climate change, natural disasters, and structural fires — particularly in newer construction.

During the WFC, a network of Communities of Practice (CoPs) was established to address these issues, challenges, and risks on a global scale. Each CoP received a Statement of Concern to guide its discussion and frame its recommendations to the WFC. Delegates were invited to participate in at least one CoP to capture an accurate international perspective. The CoPs were tasked with meeting regularly between World Fire Congress biennial meetings and delivering a final report to the executive committee of the 2026 World Fire Congress, scheduled to meet in the United Kingdom.

Six Communities of Practice

- Stakeholder Engagement (CoP SE) — The Hub
- Structure Fire & Response (CoP SFR)
- Fire Risks of Emerging Technology (CoP FRET)
- Firefighter Health, Wellness & Safety (CoP HWS)
- Firefighter Education & Training (CoP FET)
- Climate Change Impacts (CoP CCI)



How the CoPs Worked

Under the leadership of a U.S. representative, each CoP established its own method for conducting business — meeting virtually, communicating by email, or combining the two. The CoPs prioritized issues within their topic areas, shared resources and best practices, and developed recommendations for the WFC.

Initial agenda for each CoP:

- Review the Statement of Concern
- Complete literature review and compilation
- Submit materials to the WFC web page
- Brainstorm related sub-challenges
- Establish priorities for consideration
- Identify deliverables to the WFC nations — best practices, solutions, new insights
- Develop actionable recommendations to the WFC

Cross-Cutting Conclusions

The discussion reports converged on a clear finding: sharing knowledge, research, experiences, and best practices on an international scale is critical to understanding the evolving challenges faced by all members of the fire service. In each report, CoP members agreed that collaboration is essential to identifying common priorities, emerging risks, and opportunities to strengthen firefighter health, safety, and operational readiness globally.

Despite the widespread use of virtual meeting platforms, convening regular meetings that enabled participation by most members proved challenging for all CoPs because of time zone differences. Many CoPs conducted business by email, a repository platform, or a combination of virtual meetings and email. Language barriers and a lack of translation services were identified as additional challenges during virtual meetings.

On enhancing collaboration, most CoPs recommended establishing an interactive website or repository to upload documents, comments, and other background materials.

Additional cross-cutting recommendations

- Create regional subgroups of each CoP to address time-zone differences.
- Engage organizations and systems beyond the fire service to share information.
- Create opportunities for cross-training and develop multi-hazard preparedness frameworks.
- Develop a comprehensive Fire Service Training Standards Survey to examine established standards, their sources, and their influence on curriculum development.
- Add emerging technologies, such as AI, and the impacts of climate change as standing topics for all CoPs.

All CoPs expressed gratitude to the WFC leadership for creating these opportunities to share information, research, and best practices on an international level, and look forward to continuing this important work.



Communities of Practice — Report Summaries

The following six summaries identify the Statement of Concern, the focus of each CoP's discussion, and its high-level recommendations to the WFC. Full reports follow.

1 CoP SE

Stakeholder Engagement — The Hub

Statement of Concern

- The global fire service must stay connected to be aware of one another's strategic priorities, challenges, and needs.

Discussion

The CoP SE determined that a centralized, email-based process was more effective than scheduling virtual meetings. One person collected event updates and distributed a compiled list to the other CoPs each month, creating a living document that ensured accuracy and timeliness. Providing a method to submit information without attending meetings increased flexibility for participants.

Recommendations

Develop a secure online platform for WFC members to submit, browse, and access event information and additional resources.



2 CoP SFR

Structure Fire & Response

Statement of Concern

- Nations experience billions of dollars in direct and indirect economic loss from fire.
- Globally, fire threatens critical infrastructure, national security, and public safety.
- Structure fires are a leading cause of civilian fire deaths and injuries — and most are preventable.
- Many fire departments lack adequate resources to respond safely, efficiently, and effectively



Discussion

The shift from load-bearing masonry and natural materials to lightweight modular construction, combined with synthetic and composite materials, has reduced costs and timelines but introduced new fire-behavior risks. The CoP SFR examined research, experiences, resources, best practices, and lessons learned for addressing these evolving challenges, with participation from 17 nations.

Recommendations

Improve information exchange through smaller regional working groups, translation services for virtual meetings, and a globally accessible webpage and information repository.

3 CoP FRET

Fire Risks of Emerging Technology

Statement of Concern

- Beneficial innovations such as electric vehicles and lithium-ion battery bikes and scooters are needed to move us away from dependence on fossil fuels.
- Innovation can lead to unintended consequences, including new fire threats.
- Globally, there is a need to share information on threat realization, policy, response resources, public-awareness campaigns, research, and firefighter training.

Discussion

Discussions centered on lithium-ion (Li-ion) battery technologies — including energy storage systems (ESS), electric vehicles (EVs), and electric mobility devices. Members reviewed 12 EV fire control approaches and identified the most viable as conventional cabin suppression, ongoing battery cooling, non-intervention, and fire-blanket use in outdoor settings. Regional variation in SOPs reflected adoption rates, fire-service culture, and water-runoff management expectations.

Recommendations

Continue to address Li-ion battery hazards; expect new threats from self-driving vehicles, AI, and advanced materials. Provide a universally accessible file-sharing platform, document-translation services, and dedicated support staff for meeting coordination, note-taking, and analysis.



4 CoP HWS

Firefighter Health, Wellness & Safety

Statement of Concern

- The firefighting community struggles with elevated rates of cancer and mental-health conditions.
- Firefighters have a 9% higher risk of developing cancer and a 14% higher risk of dying from cancer than the public.
- Firefighters and other rescue personnel develop PTSD at rates similar to military service members returning from combat.
- To compound these challenges, many nations are struggling to recruit firefighters.

Discussion

The CoP HWS examined the firefighter career continuum — cancer, cardiovascular disease, behavioral health, injury, sleep and shift work, annual medical exams, neurodegenerative disease, women's health, retirement, volunteer firefighter health, and emerging hazards including climate change and Li-ion exposures — emphasizing both acute and long-term risks.

Recommendations

Establish a formal international Health, Wellness & Safety network under the WFC; advance a coordinated global research agenda with shared measures; engage organizations beyond the fire service, including primary care, occupational health, public health, and labor stakeholders.



5 CoP FET

Firefighter Education & Training

Statement of Concern

- Firefighters serve communities globally, but training standards vary considerably.
- Entry-level skills are taught through fire academies or training programs approved at local, regional, state, or national levels.
- Skills should be evaluated and reinforced regularly throughout a firefighter's career.
- Many countries face shortages of basic training resources, with even fewer opportunities for advanced officer training.



Discussion

Fire service training is delivered locally, but the challenges are universal and training must be career-long. The CoP FET — a core group of 30 members from 17 countries — held seven virtual meetings averaging 10 participants, plus a December 2025 joint session with industry on immersive learning technologies.

Recommendations

Develop a comprehensive Fire Service Training Standards Survey; expand discussion of AI in achieving validated training outcomes; broaden exploration of immersive learning tools by soliciting feedback from current users.

6 CoP CCI

Climate Change Impacts

Statement of Concern

- Climate change has a broad range of observed effects and is changing the baseline risk environment for fire departments globally.
- Climate-driven wildfires are growing in intensity, size, and destructiveness.
- Drought, extreme heat, floods, severe storms, extreme cold, and rising sea levels all affect emergency-response events.
- Impacts on communities can be catastrophic — overwhelmed response capabilities, loss of life, socio-economic devastation.

Discussion

Climate change touches the full spectrum of fire-service operations, from wildland fire management and the urban interface to flooding, drought, and storm response, as well as emerging hazards like sea-level rise and permafrost thaw. Year-round readiness from fire and emergency services is now required.

Recommendations

Institutionalize climate change as a standing agenda across all CoPs; facilitate global agreements on mobilization standards and equipment compatibility; develop multi-hazard preparedness frameworks; fund cross-border training and simulation exercises.



1 Stakeholder Engagement (CoP SE)

Prepared by Diane Haithcock



The Community of Practice on Stakeholder Engagement (CoP SE), under the World Fire Congress (WFC), brings together global representatives from across organizations to share upcoming fire-safety events. At its inception, the CoP SE convened regular meetings to share upcoming events in each country on topics of interest to firefighters and administrators. Dates, locations, themes, and website information were collected and posted in the meeting report. As the group explored ways to improve its method, members began emailing event information to a coordinator rather than holding virtual meetings; the coordinator then collated the events chronologically into an email distributed to the members of all six Communities of Practice.

Scope: The CoP SE brings together global representatives from across organizations to share upcoming events focused on fire safety.

Community Background and Purpose

Each meeting invitation was sent to roughly 60 invitees from a range of organizations across 15 countries. Despite this broad outreach, virtual attendance averaged around eight participants and represented primarily the communications role within each organization. Initially, information about upcoming events was compiled in the meeting report and posted on the WFC SharePoint site. However, because of low meeting participation and a desire to reach a wider audience, the group shifted to a centralized, email-based process. One designated person collected event information by email each month and distributed the compiled list to all six CoPs. The list functioned as a living document, with events removed as they occurred.

Information requested for each upcoming event included: event title, topics/agenda, date,

location (with virtual-participation option noted), target audience, and any additional details the contributor wished to share.

Key Findings

- More event information was received by email than through virtual meetings, because not everyone with event information could attend a given meeting.
- There was debate about posting event information on a public website, as not all events were intended for public knowledge. For that reason, the CoP SE decided to share only with the six CoPs.
- There was a desire to store a list of all events shared, but the means for doing so was not resolved.
- Overall, members appreciated the channel as both an outlet to share their events and a way to learn about others.

Recommendations to the Next WFC

For WFC Convenors:

- The CoP SE plays a valuable role by providing members with a space to share their own events while learning about other initiatives that advance the shared goal of improving fire safety.
- Offering a way to submit information without attending a meeting increases flexibility — participants can contribute on their own schedules, and the approach offers an accessible option for those less comfortable communicating in English during live discussions.
- The best method for sharing collected events still needs further consideration. Email may not be the most effective approach in the long term. An online platform where members can submit, browse, and access event information at their convenience — ideally with the ability to upload supporting materials such as flyers — could be a more sustainable solution.



participants — primarily those in communications roles. Early efforts to share upcoming events through meeting reports and the WFC SharePoint site proved insufficient for broader engagement. In response, the group transitioned to a centralized, email-based system in which a single coordinator gathered event submissions each month and distributed a consolidated list to all six CoPs. This list served as a dynamic resource, updated regularly as events concluded, and represented a more effective approach to reaching the wider audience the group sought to engage.

Acknowledgments

A special thank you to all the CoP participants for sharing their event information.

Reference

SharePoint site (all meeting reports): [World Fire Congress Communities of Practice — Meeting Reports](#)

2 Structure Fire & Response (CoP SFR)

Prepared by Chief John Donnelly, Chief Patrick Harper, Daniel Madrzykowski PhD, Marco Martins, and Ricardo Weewer PhD

The purpose of the Community of Practice on Structure Fire and Response (CoP SFR) is to provide opportunities to share information, knowledge, and experiences on firefighting strategies and tactics — including best practices, lessons learned, research results, standards, technology, and resources — through the organization of national and international events.

Scope: Topics discussed within this CoP included building construction, community risk reduction, firefighter exposures, firefighting equipment, fire hazards, fire safety, research, standards, tactics, technology, and training and instruction.

Major Findings

To the WFC convenors:

- Improve the logistics and infrastructure for CoP meetings to enable greater participation.
- Strengthen the connection between the WFC event and the CoPs themselves.
- Develop a globally accessible webpage and information repository to improve information sharing.

For the fire service:

- Implementing a global information-sharing network is essential for addressing challenges faced by fire services worldwide.
- Learn about current best practices and uses of emerging fire-response technologies and equipment based on fire-ground experience.
- Develop awareness of the applied research on structural fire response conducted by fire-service organizations, universities, and research institutes around the world.

Community Background and Purpose

The physics of fire is the same around the globe. However, differences in the built environment, regional weather conditions, and economic and societal norms can affect the causes, growth rates, and responses to fires. Further, the adoption or implementation of new technologies is not uniform across the world. Some technological changes — such as new construction methods and materials, or the use of alternative fuels such as lithium-ion batteries or hydrogen — may constitute new fire hazards. Other changes in new firefighting strategies or equipment may be solutions to current and emerging challenges. As a result, it is important to share knowledge and experience from around the world to improve everyone's ability to understand and respond to fire emergencies.

Online meetings were typically held once a month. They provided participants with an opportunity to share information about fire-related issues in their regions with members from other countries. When new guidance, reports, or resources were available to share, the CoP SFR maintained a page where links to the information could be posted.

While the CoP SFR had no set membership, participants from the countries listed below attended meetings between September 2024 and December 2025.

CoP SFR Participating Nations	
Australia	New Zealand
Canada	Portugal
Denmark	Qatar
Estonia	Romania
Fiji	Sweden
Finland	Switzerland
Japan	Ukraine
Liberia	United States
Netherlands	

Key Findings — Global Shifts in Structure Fires

- Fires are changing worldwide due to sustainability measures, energy transitions, e-commerce, and socio-economic shifts.
- Research is addressing these changes reactively, but there is significant value in the timely sharing of fire-ground experience — whether the structure is a wood high-rise, a battery energy-storage system, a mega-warehouse, or a residential occupancy.
- A global network is essential for addressing challenges shared by the fire service worldwide. Challenges identified by participating countries included Li-ion battery fires, changing building construction methods and materials, increased building size, and changes to (or lack of) building standards.

- Fire departments from different countries shared experiences and best practices for using emerging response technologies — including unmanned aerial vehicles (UAVs) and robots for size-up, hazard mitigation, search and rescue, and fire suppression.
- Fire-service organizations, universities, and research institutes worldwide are conducting applied research on structural fire response. Research areas include the life cycle of Li-ion battery hazards, examination of fire incidents, building construction, occupant and firefighter safety, and coordinated fire attack.
- While fire departments are organized, managed, and funded differently across countries, there is strong commonality in the mission of the fire service: life safety, hazard mitigation, and property conservation.

Recommendations to the Next WFC

Continue the CoPs and consider how to improve international sharing of knowledge on structure fires and response. The experience of being an inaugural CoP brought unexpected logistical challenges. Setting a meeting time that was both productive and accessible to all members stemmed from participants' diverse time zones. Language differences and the lack of access to translation services (written, oral, and real-time) limited the ability to share information across all interested countries.

Recommendations for addressing these structural issues:

- Subdivide the Communities of Practice into smaller, geographically based working groups to facilitate real-time interaction. The CoP SFR included participants from UTC -05 through UTC +12; regional meetings should be recorded and shared with the other groups for review.

- Provide translation services for meetings, or use a platform that translates in real time.
- Strengthen the connection between the WFC event and the CoPs. Most CoP SFR participants did not attend the WFC, which created an initial disconnect between the questions generated at the WFC and the interests of CoP SFR participants.
- Develop a globally accessible webpage and information repository with translation capabilities.
- Consider exchanging knowledge and experiences between countries' fire-service training schools.
- Consider the efficacy of developing an international fire code applicable globally.
- Consider integrating CoP meetings into the WFC event, or combining them with other regional fire conferences to increase knowledge sharing.

Global Implications

The modern fire service operates in an environment that is increasingly globalized in both risk and consequence. Advances in communication, data sharing, and professional collaboration have demonstrated that the world is no longer as operationally isolated as it once was. Structural firefighting challenges that emerge in one nation are rapidly replicated across continents, reinforcing the reality that fire services worldwide face a common set of hazards, operational limitations, and strategic pressures.

Regardless of geography, the fire service is facing strikingly similar problems:

- Continued challenges in firefighter recruitment and retention have created global implications, making staffing a high priority for fire-service organizations worldwide. The challenge is especially pronounced in volunteer agencies, where population migration, demographic shifts, and changing generational expectations have disrupted traditional models.

- Lightweight and modular construction methods in residential, commercial, and industrial occupancies have become the global norm. These methods introduce significant fire-behavior concerns — increased fire spread rates, early structural failure, reduced fire resistance, and accelerated collapse timelines.
- The pace of innovation in building materials has outpaced the ability of building codes and regulatory frameworks to adapt. Engineered products, synthetic components, and composite materials are entering the built environment faster than their fire performance can be fully evaluated, tested, and codified.
- Structural and material changes have contributed to globally observed trends in rapid fire growth and shortened time to flashover. Fires today progress faster, burn hotter, and release greater quantities of toxic smoke than in previous decades.
- The proliferation of 'mega' buildings — structures with unprecedented footprints, heights, or both — places extraordinary demands on suppression, water supply, access, and command and control.
- Increased use of stored energy, including electrification of fire-service equipment, has created new fire challenges, with many unknowns about operational capabilities under extreme conditions.

Finally, the fire service worldwide is confronting emerging health, environmental, and geopolitical concerns that extend beyond the fire ground. The presence of per- and polyfluoroalkyl substances (PFAS) in firefighting foams and protective gear represents a shared global issue, affecting firefighter health, environmental stewardship, and public trust. Increasing global instability and the threat of regional and international conflict present additional challenges — armed conflict, civil unrest, and hybrid threats place critical infrastructure at heightened risk and may require fire services to operate in degraded environments.



Closing Statement

Sharing knowledge and experiences is critical to developing fire-service capabilities in the prevention and fighting of structural fires. A global network of contacts is necessary to share information and knowledge from each country, as well as the ability to share knowledge and experiences through national and international events, expert exchanges, and international training. This initial implementation of the CoP SFR was beneficial — but the WFC CoP program needs improved infrastructure to meet the needs of a broader community of participants.

Acknowledgments

Thank you to all CoP SFR participants — and especially to those who gave formal presentations. The CoP SFR appreciates the support of ULSE and the significant efforts of Diane Haithcock for facilitating meetings and maintaining the CoP SFR's data-sharing site.

Reference Sources

This SharePoint site contains specific reports and information shared by CoP SFR participants:

[World Fire Congress – Structure Fire & Response CoP](#)

The webpages below provide access to research and activities from organizations presented or discussed in CoP SFR meetings:

- [Brandforsk](#)
- [Department of Fire and Emergency Services \(Western Australia\)](#)
- [Fire Protection Research Foundation](#)
- [Gothenburg \(Sweden\) Fire Department](#)
- [Lviv State University of Life Safety \(Ukraine\)](#)
- [The National Firefighters School \(Portugal\)](#)
- [Netherlands Institute for Public Safety](#)
- [RISE Fire Research \(Sweden\)](#)
- [Tokyo Fire Department](#)
- [UL Fire Safety Research Institute](#)
- [United States Fire Administration](#)

3 Fire Risks of Emerging Technology (CoP FRET)

Prepared by Adam Barowy, ULRI/FSRI

The World Fire Congress (WFC) established the Community of Practice on Fire Risks of Emerging Technology (CoP FRET) to identify emerging technologies with hazards that could impact emergency response. The CoP FRET was organized to share and discuss significant incidents, standard operating procedures (SOPs), public education, and research outputs.

Discussion topics focused on energy-transition technologies — especially lithium-ion (Li-ion) battery technologies, including energy storage systems (ESS), electric vehicles (EVs), and electric mobility devices (E-mobility).



Key insights at a glance

- Li-ion batteries in powered products represent a sea change in emergency-response hazards.
- Of 12 EV fire-control approaches reviewed, conventional cabin suppression with ongoing battery cooling, non-intervention, and fire-blanket use in outdoor settings were judged most viable.
- Marketing claims for battery fire-suppression products are difficult to verify; fire services often lack the resources for rigorous third-party evaluation.
- The next WFC should continue to address Li-ion hazards and survey emerging technologies — self-driving cars, AI, and advanced materials — that may pose greater future threats.

The implementation of Li-ion batteries in powered products presents a sea change in emergency-response hazards. SOPs for EV became a focal point. The CoP FRET membership completed a survey to share different approaches for effective EV fire-incident response, which led to the review of 12 EV fire control approaches. The strategies the group deemed most viable were conventional suppression of the vehicle cabin, followed by ongoing battery cooling, non-intervention, and the use of a fire blanket in outdoor fire locations.

The CoP FRET also discussed the hazards and operational challenges posed by ESS — large, long-duration fires, explosions, reignitions, and smoke plumes that may require evacuating exposed personnel. The CoP agreed that response strategies and tactics for ESS SOPs should reflect the significantly different risk profiles across ESS installation types.

A recurring theme was that the fire service has difficulty verifying marketing claims for battery fire-suppression products being brought to market. Because of the lack of quantifiable data, fire services often must evaluate these products with limited resources, which may not yield accurate results.

Community Background and Purpose

Technology is always evolving to enhance productivity, increase the convenience of daily life, assist in moving people and resources around the globe, and increase the resilience and sustainability of the infrastructure on which our lives increasingly rely. Some of these beneficial technologies emerge with inherent and unprecedented hazards. Often, those hazards are not mitigated until their causes are well understood enough to engineer mechanisms for prevention and control. During the emergent stage, these technologies can pose significant risks to the public and, often, the greatest risks to emergency responders. It is essential that the emergency-response community continually assesses the landscape of response hazards to recognize new threats.

The CoP FRET was established to share information on risks from emerging technologies — threat realization, policy and regulation, response resources, public-awareness and prevention education, research, and firefighter training.

Meetings began at a monthly cadence and were reduced to every other month during summer 2025 due to anticipated low attendance. Meeting times were shifted several times as the topic drew participation from California to Europe to Southeast Asia. A time of 1000 UTC was eventually

deemed optimal for consistent participation from the EU and Asian nations.

Participation has included members from the following nations:

CoP FRET Participating Nations	
Australia	Japan
Austria	Luxembourg
Barbados	Netherlands
Brazil	New Zealand
Canada	Norway
Chile	Portugal
Denmark	Qatar
Estonia	Romania
Finland	South Africa
France	Sweden
Greenland	Switzerland
Guatemala	Taiwan
Iceland	United Kingdom
Jamaica	United States



Early in the meetings, the CoP FRET leadership created a Microsoft SharePoint platform to facilitate information sharing between member nations. A file directory was organized into categories for Emergency Response SOPs, Incidents Involving Emerging Technologies, Public Education and Community Risk Reduction, and Research and Development Efforts. Members uploaded information when prompted, but some struggled to access the platform due to their organizations' IT-security policies.

Key Findings

Shortly after initiating discussions, members were invited to share their nation's leading concerns related to their response experiences and their outlook on anticipated threats. Concerns were overwhelmingly attributed to energy-transition technologies — Li-ion batteries, photovoltaic panels at the individual and array scale, biomass power generation, and hydrogen technologies.

Detailed discussions to identify hazards presented by specific technologies, the rough scale of their impact, and resources for the fire service to mitigate hazards began with Li-ion batteries. The implementation of Li-ion batteries across a staggeringly diverse range of products presents a sea change in the hazards they pose. Fire incidents involving Li-ion batteries have become commonplace; the potential impact may eventually rival that of the introduction of synthetic materials. Across the diverse range of Li-ion battery-powered products, that level of hazard is proportional to the size of the batteries and to the degree of technology maturity.

Electric Vehicles (EVs)

EVs are the Li-ion battery product with the greatest interest for information sharing — especially SOPs. The U.S. National Transportation Safety Board reported in 2018 that only about 10% of fire departments surveyed had written protocols or SOPs for responding to EV fires. A report shared by the Netherlands Institute for Public Safety (NIPV) stimulated discussion about best practices and current SOPs.

The CoP FRET leadership coordinated a survey of SOPs to assess experience with 12 different firefighting strategies. Respondents included members from the U.S., Denmark, Japan, the Netherlands, Germany, Romania, and Portugal. Several SOPs were also sourced from U.S. fire departments (Phoenix, AZ; Illinois Mutual Aid Box Alarm System – Area 16; Montgomery County, MD).

Conventional vehicle fire attack was the most

popular method, followed by non-intervention (allowing the vehicle to burn out). Non-intervention requires diligent consideration of fire, smoke, and environmental exposures, as well as management of public perception. The third most popular tactic was the application of an EV fire blanket, typically as a second-line tactic when neither water suppression nor non-intervention is feasible.

Relocating the vehicle, penetrating and flooding the battery, and using container immersion or mobile sprinklers were viewed less favorably — each involves significant resource, training, or regulatory constraints. The least popular tactics were the use of water additives (including those marketed specifically for EVs) and placing the vehicle in an enclosed container with clean- or aerosol-based suppression agents.

A review of SOPs revealed regional variations driven by how quickly nations have adopted EVs, fire-service culture, and water-runoff management requirements. Fire services across Europe have faced an earlier and more pressing need for new tactics and tools to manage EV fires. Over the last seven years, Europe has been putting more than twice the volume of EVs on the roadways as compared with the U.S., while EV adoption in Europe, the U.S., and China eclipses that in the rest of the world.

Energy Storage Systems (ESS)

The last three meetings of 2025 focused on Li-ion battery energy storage systems. Several presenters highlighted incidents demonstrating that, while rare, ESS installations can experience failures with severe consequences — extremely large or long-duration fires, explosions, and large smoke plumes that may require evacuating exposed populations. Key codes and standards highlighted include the International Fire Code, NFPA 855, NFPA 68, NFPA 69, and UL 9540A.

Most discussions focused on commercial and industrial ESS installations and on methods to mitigate explosion risks. Residential ESS installations

likely present a greater life-safety risk during failures because the buildings are expected to be occupied, and known failure incidents have predominantly resulted in explosions. SOP tactics should reflect these different risk profiles.

Verifying claims about battery fire-suppression products

Outside the planned meeting agendas, a recurring sub-topic was that a lack of independent third-party evaluations, misinformation, or even disinformation makes it challenging and risky to decide whether to invest in firefighting products marketed specifically to mitigate Li-ion battery fires. The available information does not explain, using clear scientific principles, how the claimed extinguishing mechanisms overcome the barriers to traditional fire-extinguishing agents and technologies (i.e., product enclosures that prevent direct physical contact between extinguishing agents and cells in thermal runaway).

Recommendations to the Next WFC

Since technology is developing quickly within the far-reaching lithium-ion battery industry, the CoP FRET recommends that the next WFC continue to address hazards presented by batteries. The course of the energy transition is not predictable beyond a few years; it will be necessary to survey the landscape of emerging hazards again before committing too much bandwidth to Li-ion battery technologies. Other advances — self-driving vehicles, AI, advanced synthetic materials, and lightweight engineered assemblies — are likely to pose greater future threats.

In terms of the CoP FRET experience, the next WFC would benefit from additional resources for facilitating the exchange of information:

- A universally accessible file-sharing platform
- Translation services for documents shared by members

- Dedicated support staff for meeting coordination, note-taking, communications, and analysis
- Meeting times that favor nations with the highest engagement
- Standard meeting recordings available to members unable to attend

Global Implications

The shifting hazards reflect a transition toward higher-energy, longer-duration, and more complex incidents occurring in a built environment to which fire services must continually adapt. Because the primary driver of identified hazards is electrochemical energy storage, global fire services should expect to respond to incidents involving sustained heat release, reignition potential, projectile hazards, and significant volumes of flammable and toxic gases — until the technologies mature enough to engineer these hazards out. Strategies should be developed to reduce resource requirements (suppression water, staffing, on-scene time) and to address air and runoff-water contamination.

Increased electrification of transportation means responders will more routinely encounter high-voltage shock hazards, delayed-ignition risks, and unfamiliar stabilization challenges at crash and fire scenes. Damaged or end-of-life batteries will move through the waste and recycling stream in greater volume, continuing to fuel deep-seated and large-scale fires at waste and recycling facilities.

The advancement of technology is forcing the fire service to become more technical, interdisciplinary, and resource-intensive. Electrochemical product-failure incidents require integration of fire suppression, hazardous-materials response, electrical safety, air monitoring, and environmental protection. Pre-incident planning, training, PPE, detection equipment, and suppression strategies all need to evolve accordingly.

Closing Statement

Though emerging technologies are driven by incentives to support the advancement of our societies and reach our goals for resilience and sustainability, they are fundamentally changing the risk profiles faced by the public and fire services worldwide. Fire services around the globe operate in a risk environment evolving faster than codes and standards, SOPs, and training cycles. These risks are not temporary. New risks presented by emerging technologies today will be integrated into the baseline response risks of tomorrow.

The global fire service must act with urgency and coordination. Advances in our ability to quickly share information and overcome language barriers facilitate the sharing of essential experiences from all areas of the globe. Using that technology with the structured conversations hosted through the WFC will enable more efficient SOP development, more rapid training updates, and improved public education about new fire risks.

Acknowledgments

The CoP FRET produced valuable findings through the dedication and professional generosity of those who chose to invest their expertise for the benefit of the global fire service. We extend sincere appreciation to Henk Brans, Kristoffer Gottlieb, Anna Andersson Carlin, Thomas Velle, and Mark Bokdam, whose shared presentation materials helped clarify complex operational challenges.



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4 Firefighter Health, Wellness & Safety (CoP HWS)

Prepared by Dr. Sara Jahnke and Chief Jason Wells

The Community of Practice on Firefighter Health, Wellness & Safety (CoP HWS) was convened as part of the World Fire Congress (WFC) to bring together fire-service leaders, researchers, practitioners, and subject-matter experts from around the world to address shared health challenges affecting firefighters. The CoP HWS was initially formed through volunteer participation during the WFC and expanded to include internationally recognized experts to ensure broad geographic and disciplinary representation. The goal of the CoP HWS was to identify common priorities, emerging risks, and opportunities for collaboration that could strengthen firefighter health, safety, and operational readiness globally.

Scope: The CoP HWS examined a wide range of health and wellness issues across the firefighter career continuum, including cancer, cardiovascular disease, behavioral health, injury, sleep and shift work, annual medical examinations, neurodegenerative disease, women’s health, retirement, volunteer firefighter health, and emerging hazards such as climate change and lithium-ion battery exposures. Discussions emphasized both acute and long-term risks, the interaction between individual health and organizational systems, and the challenges of implementing solutions across diverse fire-service models and resource settings.

Major Findings

Across topics, the CoP HWS identified strong alignment in challenges faced by fire services internationally. Firefighter health risks — including occupational cancer, cardiovascular disease, mental-health conditions, injury, and fatigue — were consistently linked to workforce sustainability and operational readiness. Participants highlighted gaps in exposure measurement, long-term surveillance, and standardized health data, as well as disparities in resources available to volunteer and smaller departments. Organizational culture, leadership practices, and policy decisions were repeatedly noted as critical determinants of health outcomes.

Five recommendations to the WFC and the fire service

- Formalize ongoing collaboration — a standing international mechanism under the WFC.
- Advance a coordinated global research agenda with shared measures and aligned priorities.
- Position health and wellness as operational readiness — foundational to response capability.
- Support scalable, resource-appropriate solutions for volunteer and resource-limited services.
- Prepare for emerging and future risks — climate change, new exposure profiles, neurodegenerative disease.

Community Background and Purpose

The 2024 WFC established a global leadership network dedicated to strengthening fire services internationally through shared knowledge and collaboration. By convening subject-matter experts and leaders from 56 countries, the WFC underscored that firefighter health and wellness are core components of operational readiness — directly impacting response capability, resilience, and long-term sustainability across diverse national contexts.

Initial engagement was elicited through the WFC meeting, with countries nominating personnel for inclusion. Invitations were sent via email throughout the two years. Initial meetings focused on outlining the health and wellness challenges facing the fire service worldwide. Subsequent meetings focused on different countries sharing programs, insights, and best practices.

Key Findings

Strong consensus identified several common themes in firefighter health, wellness, and safety across international contexts. While the initial focus in most countries has been on three core content areas (cancer, behavioral health, and cardiovascular disease), the CoP HWS identified additional concerns in key areas described below.

Cancer

The CoP HWS identified cancer as a critical and unifying issue facing the global fire service, with particular emphasis on prevention, exposure reduction, and early detection. Key challenges discussed included the adequate and consistent use of personal protective equipment (PPE), the need for clean fire stations and gear to reduce ongoing exposure to contaminants, and the importance of systematic approaches to early cancer detection. Participants also highlighted

persistent gaps in measuring and tracking occupational exposures across different fire-service contexts. Addressing firefighter cancer risk requires a comprehensive approach that integrates engineering controls, behavioral practices, surveillance, and evidence-based screening.

Behavioral Health

Behavioral health is a foundational component of firefighter safety and performance, as mental-health challenges directly affect individual well-being, team cohesion, and operational readiness. Key priorities included building resilience across the career span, addressing suicide rates through prevention-focused strategies, and improving understanding of the predictors of adverse mental-health outcomes such as PTSD and depression. Individual risk cannot be separated from the broader organizational environment — leadership practices, workload, shift structure, peer support, and stigma all shape mental-health outcomes.

Cardiovascular Disease and Health

Cardiovascular health and disease is one of the most significant and immediate threats to firefighter safety worldwide. Discussion focused on the impact of heat stress during fire suppression and training as both an acute risk and a contributing factor to longer-term cardiovascular strain. Chronic conditions such as hypertension, diabetes, and heart failure often develop silently but markedly increase the risk of sudden cardiac events under extreme occupational demands.

Injuries

Occupational injury — particularly musculoskeletal injury — is a persistent and costly challenge across fire services worldwide. Discussion focused on the need for clear, evidence-based fitness-for-duty assessments that reflect the physical demands of firefighting while remaining fair, consistent, and supportive of a safe return to work.

Annual Medical Exams

Annual medical exams are a core element of firefighter health, safety, and operational readiness; health inspections and medical evaluations must be specific to the physical and psychological demands of the job. The discussion also highlighted the critical role of engaging primary-care providers, many of whom may be unfamiliar with the unique exposures, work conditions, and health challenges firefighters face.

Women's Health

Women's health is a critical and often under-addressed area within the fire service. Discussion focused on pregnancy and miscarriage — including concerns about occupational exposures, physical demands, and inconsistent policies — and on the mental-health impact of workplace culture and inclusion. Increased awareness, screening, and research related to women-specific cancers were also emphasized.

Shift Work and Sleep

Sleep and shift work are critical determinants of firefighter health, safety, and performance. Chronic sleep disruption and circadian misalignment are inherent risks of emergency-response work. How shifts are structured and managed — shift length, rotation patterns, recovery time, workload — plays a significant role in mitigating or exacerbating these risks.

Retirement

Retirement is an important yet often overlooked phase of the firefighter career continuum. Cumulative physical exposures, chronic health conditions, and functional capacity may vary widely across individuals and systems. Fire-service organizations have a responsibility to support firefighters after retirement — access to health care, mental-health resources, peer connection, and continued engagement with the fire-service community.

Volunteer Firefighters

Volunteer firefighters are a vital component of the global fire service and face unique health and wellness challenges. Many are always effectively on duty, balancing emergency response with full-time employment and family responsibilities, often without the structured recovery time available to career personnel. Limited training time, fewer financial and organizational resources, and reduced access to equipment and infrastructure can increase risk.

Health Research

The CoP HWS emphasized the urgent need to expand and strengthen health, wellness, and safety research. Current practices rest on a relatively limited but critical body of existing research. A coordinated international approach — standardized measures, common data elements, and shared methodologies — would allow findings to be compared and aggregated across countries.

Neurodegenerative Diseases

Neurodegenerative disease is an emerging area of concern, with particular interest in Parkinson's disease due to growing anecdotal reports and early signals suggesting potential occupational relevance. The evidence base remains limited, underscoring the need for focused research, improved surveillance, and long-term monitoring.

Emerging Issues

Climate change is increasing exposure to extreme heat, longer fire seasons, more frequent and intense wildland-urban interface fires, and compounding physical and psychological stressors. Concerns about evolving exposure profiles — particularly lithium-ion battery exposures associated with EVs, ESS, and modern infrastructure fires — introduce new toxic, thermal, and explosion risks that are not yet well characterized in the health literature.

Recommendations to the Next WFC

- **Formalize the exchange of information and programs.** Establish a standing international Health, Wellness, and Safety network under the WFC umbrella to serve as a central hub for communication and knowledge sharing. Support quarterly virtual convenings focused on priority topic areas.
- **Strengthen cross-sector engagement.** Many solutions depend on systems outside the fire service. The next Congress should intentionally engage primary care and occupational-health leaders, public-health agencies, researchers and data scientists, and policy and labor stakeholders.
- **Focus on implementation in resource-constrained settings.** Highlight scalable, low-cost interventions, flexible training models for volunteers, and practical approaches to carcinogen reduction, screening, and wellness when infrastructure is limited.
- **Elevate health, wellness, and safety as a pillar of operational readiness.** Frame firefighter health explicitly as a determinant of response capacity, a workforce-sustainability issue, and a leadership responsibility.
- **Establish a global firefighter health and wellness research agenda.** Convene a dedicated session to identify priority research questions, agree on core standardized measures, and promote international data harmonization.

Global Implications

Across countries and fire-service models, common challenges — occupational cancer, cardiovascular disease, behavioral health risks, injury, sleep disruption, and emerging hazards — pose shared threats to workforce readiness and public safety. These issues transcend national boundaries, resource levels, and organizational structures.



A healthy workforce is essential to operational readiness: firefighters protected from preventable illness and injury are better able to respond, recover, and remain engaged throughout their careers. International collaboration through the WFC provides a unique opportunity to accelerate progress by sharing knowledge, coordinating research, and adapting proven practices across diverse contexts.

Closing Statement

The work of the CoP HWS makes clear that firefighter health is a shared global responsibility and a fundamental component of operational readiness. The WFC now has an opportunity to move from dialogue to coordinated action — strengthening collaboration, aligning research and practice, and accelerating the exchange of effective programs across borders.

Acknowledgments

We thank the participants in the CoP HWS who shared their experience and insights. A special thank you to Diane Haithcock, who coordinated efforts and communication, and to the CoP HWS chairs — Dr. Denise Smith, Chief Jason Wells, and Dr. Sara Jahnke.

5 Firefighter Education & Training (CoP FET)

Prepared by Ken Willette (USA), Chair; Craig Flannery (UK-Wales), Co-Chair

This report highlights the ongoing efforts to strengthen fire-service training through international collaboration and knowledge sharing. Key initiatives include maintaining peer-to-peer networking, facilitating best-practice exchanges through CoP meetings and communications, and developing a comprehensive survey to examine global fire-service training standards and their influence on curricula. The report describes a holistic fire-service training ecosystem involving standard-setters, curriculum developers, tool providers, and instructors, all of whom must collaborate to address evolving training needs. Stakeholder engagement and learning from international experiences are crucial steps before making significant investments. While fire-service training is locally delivered, its challenges are universal.

Community Background and Purpose

The 2024 WFC formed the CoP FET and issued a Statement of Concern: firefighters now serve communities globally, but training standards vary considerably; entry-level skills should be evaluated and reinforced regularly throughout a firefighter's career; many countries face shortages of basic training resources, with even fewer opportunities for advanced officer training.

At the inaugural meeting on November 12, 2024, attendees received summaries outlining each nation's recommendations and considerations related to training and education. A core group of 30 members from 17 countries was formed via a mailing list. Seven virtual meetings averaged 10 participants. In December 2025, a joint session with the CoP Industry Engagement featuring four immersive learning technologies drew 30 participants.

Key Findings

- Develop a comprehensive Fire Service Training Standards Survey that examines established standards, their sources, and their influence on curriculum development.

- Further the discussion on artificial intelligence (AI), with an emphasis on its application in achieving validated training outcomes.
- Broaden the exploration of immersive learning tools by soliciting feedback from current users and assessing optimal approaches for integrating these technologies into global fire-service training frameworks.
- Maintain peer-to-peer networking initiatives and the sharing of best practices and resources through CoP FET virtual meetings and ongoing email communications.

Recommendations to the Next WFC

- Further the discussion on AI, with an emphasis on its application in achieving validated training outcomes.
- Broaden the exploration of immersive learning tools by soliciting feedback from current users and assessing optimal approaches for integration.
- Maintain peer-to-peer networking initiatives, best practices, and resource sharing facilitated through CoP FET virtual meetings and ongoing email communications.



- Develop a comprehensive Fire Service Training Standards Survey examining established standards, their sources, and their influence on curriculum development.
- Continue engagement with the global fire-service training community, inviting training-prop designers and infrastructure providers to participate in the dialogue.

Global Implications

Each nation should ensure its fire-service members receive training throughout their careers. Limiting training to entry-level firefighters while overlooking senior and command staff undermines efforts to meet public-safety needs. Training should be a career-long activity.

The fire-service training ecosystem includes those who set standards, design curricula, provide tools, and deliver instruction. Each component is essential to preparing firefighters and officers, and all must communicate to address training needs. Stakeholder engagement and learning from others' experiences are vital before making major investments.

Closing Statement

The CoP FET found that, although fire-service training is delivered locally, its challenges are shared worldwide. International collaboration provides valuable insights, and the sustainable framework for these discussions provided by the WFC should continue.

Acknowledgments

The CoP FET thanks the WFC leadership for their support. We appreciate the help of the U.S. Fire Administration — including former Fire Administrator Dr. Lori Moore-Merrell, Interim Fire Administrator Chief Donna Black, and Superintendent of the National Fire Academy Eriks Gabliks. Our work was also made possible by the administrative assistance of Diane Haithcock, Director of Standards Programs at UL Standards & Engagement.

6 Climate Change Impacts (CoP CCI)

Prepared by Chief Sal Scarpa

The Community of Practice on Climate Change Impacts (CoP CCI), under the World Fire Congress (WFC), brings together global fire-service leaders, policy experts, and allied agencies to address the evolving risks and challenges posed by climate change to fire services worldwide. Since its inception, the CoP CCI has convened regular meetings to share best practices, innovations, and strategies for managing climate-related hazards, with a strong focus on wildfire preparedness, public education, and cross-border cooperation.

Scope: The CoP CCI addresses climate impacts across the full spectrum of fire-service operations — including wildland fire management, urban-interface risks, flooding, drought, storm response, and emerging hazards such as sea-level rise and permafrost thaw. Participants represent diverse regions and hazard profiles.

Major Findings

- Climate change is extending fire seasons globally, requiring year-round readiness.
- Public understanding of fire risk remains inconsistent; effective communication tools are critical.
- International standards for firefighter qualifications and mobilization improve interoperability.
- Cooperative frameworks between nations enhance readiness, resources, resilience, and operations.
- Climate impacts extend beyond wildfires, demanding multi-hazard preparedness.

Top Recommendations

- Expand global interoperability standards and training by promoting opportunities for cross-training in fire-prone areas.
- Invest in unified public-warning systems and risk-communication tools.
- Promote multi-hazard planning integrating wildfire, flooding, storms, and heat events.

- Increase the number of resource-sharing agreements and coordinated staging strategies.
- Advocate for climate-risk education targeting policymakers and the public.

Community Background and Purpose

The CoP CCI was formed to unify and coordinate global fire-service efforts in adapting to the operational realities of a changing climate. Its membership includes representatives from North America, Europe, Oceania, Africa, and the Caribbean. Meetings are held monthly to provide a platform for sharing operational lessons, research, and policy developments.

The CoP engages through structured agendas, lightning briefs on best practices, and open discussions to identify challenges and collaborative solutions. The group's purpose extends to developing recommendations for the WFC and producing knowledge products for use by fire agencies globally.

Key Findings

Wildfire Response and Prevention

- Extended fire seasons require sustained readiness and resource allocation.
- Urban–Wildland Interface (WUI) growth increases complexity; public officials and communities often underestimate the risk, including the potential for casualties and damage.
- Best practices include integrating municipal and wildland firefighting training, standardized equipment, and coordinated mobilization protocols.
- National systems like the U.S. National Wildfire Coordinating Group set performance and equipment standards enabling seamless deployment across regions.
- International cooperation (e.g., Australia–New Zealand, Nordic agreements) enhances surge capacity.
- Continuous public education and tools for mitigating risk support informed decision-making.

Public Education and Risk Communication

- Inconsistent public understanding of fire-danger indices hinders risk mitigation.
- Effective tools include app-based alerts (e.g., Sweden), interactive web platforms (e.g., New Zealand's 'Check It's Alright'), and consistent national rating systems.
- Messaging must be concise, visually clear, and linked to actionable steps.
- Social media and traditional outlets remain vital for amplifying warnings.
- Clarifying the public's role — agencies must provide clear guidance on specific actions the public should take in response to changing risk conditions.
- Early education shapes public behavior in the school system.

International Cooperation and Standardization

- Standardized professional qualifications and training benchmarks improve multi-agency interoperability.
- Multi-national resource-sharing agreements and staged deployments reduce response times.
- RescEU serves as Europe's strategic reserve of firefighting aircraft, while the primary line of assistance — through the Union Civil Protection Pool (UCPP) — enables countries to share assets such as helicopters, planes, and ground modules.
- Peer review and knowledge exchange across member states improves prevention and mitigation outcomes.
- In Europe, coordination for assisting other countries exists, but resources are still needed at the local, national, and international levels. Prioritization changes; it is difficult to predict whether one will receive the resources needed.

Climate Change Impacts Beyond Wildfire

- Other climate-driven hazards include severe storms, flooding, landslides, droughts, temperature extremes, earthquakes, tsunamis, sea-level rise, and permafrost melt.
- These events strain fire-service resources, impact personnel welfare, and disrupt critical infrastructure.
- Multi-hazard risk assessment should guide investment and operational planning.
- Infrastructure protection and community resilience require closer integration into fire-service mandates.

Recommendations to the Next WFC

For WFC Convenors:

- Institutionalize climate change as a standing agenda across all CoPs.

- Facilitate global agreements on mobilization standards and equipment compatibility.
- Support the development of multi-hazard preparedness frameworks.
- Fund cross-border training and simulation exercises.
- Disseminate CoP CCI findings widely to policymakers and allied sectors.
- Consider how funding is made available to support risk management.

For the fire service:

- Adopt standardized qualifications and interoperable training.
- Leverage technology for real-time risk assessment and public communication.
- Build and maintain cooperative response agreements at the regional and international levels.
- Advocate for land-use planning that mitigates WUI risk.
- Incorporate climate-hazard scenarios into strategic planning.

Global Implications

The accelerating pace of climate change is reshaping fire-service operations worldwide. Fire seasons are lengthening, hazards are diversifying, and the demand for cross-jurisdictional coordination is rising. Industry must adapt by developing resilient supply chains for critical firefighting resources, investing in climate-resilient infrastructure, and fostering innovation in detection, suppression, and recovery technologies.

Equally important, a high priority should be placed on proactive risk-reduction initiatives that lessen both the likelihood of catastrophic events and the severity of their consequences. These initiatives include advancing materials research, improving facility-design standards, integrating predictive analytics for early warning, and supporting

community-based mitigation programs that strengthen resilience long before emergencies occur. Policymakers should prioritize funding and legislative frameworks that support the fire service's evolving mission in the climate era.

Closing Statement

The CoP CCI demonstrates the value of sustained international dialogue in addressing complex, transboundary threats. By combining local expertise with global coordination, the fire service can better anticipate, prepare for, and respond to the multifaceted challenges posed by climate change. The CoP CCI recommends conducting a comprehensive review before the next WFC to identify opportunities for improvement — assessing how the forum operates, ensuring that the right engagement by the appropriate experts and stakeholders occurs for each topic, and exploring ways to strengthen representation across other relevant agencies and partners. The focus of the review should be on operationalizing recommendations and tracking progress over time.

Acknowledgments

The CoP CCI thanks all participating agencies and individuals for their contributions, including representatives from the United States, Norway, Sweden, Finland, Australia, New Zealand, South Africa, Barbados, Romania, Switzerland, and the European Commission.

References

Meeting minutes, recordings, and supplementary documents from CoP sessions held between August 2024 and December 2025 — including national reports and agency presentations — are available at: [World Fire Congress – Climate Change Impacts CoP](#)

Related: [EU — 5 Ways the EU Is Preparing to Respond to Wildfires \(2025\)](#); [Check It's Alright \(New Zealand\)](#); [Varsom — Norwegian weather risk alerts](#)



Conclusions & Cross-Cutting Recommendations

Across all six Communities of Practice, five themes emerged repeatedly. These cross-cutting findings should be taken up by the 2026 World Fire Congress and built into the structure of any continuing CoP program.

Five cross-cutting themes from the six CoPs

- Shared infrastructure for global knowledge exchange — a single, secure online platform.
- Translation services and multilingual access — written, oral, and real-time.
- Regional working groups within each CoP — to address time-zone constraints.
- Cross-sector engagement — public health, occupational health, primary care, labor, and industry.
- Standing focus on emerging technology and climate change — as horizontal topics in every CoP.

Recommendation to WFC Convenors

The CoP framework established in 2024 has demonstrated its value as a vehicle for sustained international collaboration. To realize its full potential, the CoP program needs improved infrastructure: a globally accessible information repository, translation services, dedicated coordination staff, and clearer integration between the in-person WFC events and the year-round work of the CoPs themselves. Each CoP report in this volume offers specific guidance for how that infrastructure should be designed.

Recommendation to the Fire Service

The challenges the CoPs examined — emerging technology hazards, climate-driven operational stress, firefighter health and wellness, structure-fire complexity, training consistency — do not respect borders. The fire service is being reshaped at a pace that exceeds the cycle time of codes, standards, and training programs. The only sustainable response is structured, ongoing international collaboration. The WFC is uniquely positioned to provide that structure.

Acknowledgments

This Final Report is the product of eighteen months of work by hundreds of fire-service leaders, researchers, and practitioners from dozens of countries. The CoPs benefited from the generous time and expertise of every participant who joined a virtual meeting, contributed a presentation, submitted a SOP or research summary, or simply made the effort to be present across difficult time zones.

The Communities of Practice could not have functioned without the sustained logistical and administrative support of UL Standards & Engagement and the UL Fire Safety Research Institute. Diane Haithcock, in particular, served as the connective tissue across all six CoPs — coordinating meetings, maintaining repositories, and ensuring continuity of communication.

Program Team

- **Project Coordinator:** Diane Haithcock
- **Report Writer / Copy Editor:** Molly Natchipolsky
- **Program Officer:** Sean Patrick Carroll



Appendix

Community of Practice Participants

The following lists identify the participants in each Community of Practice between September 2024 and December 2025, grouped by country. Leads are indicated with †.

CoP Stakeholder Engagement (SE)

20 countries · 50 participants

Country	Participants
Africa	Nancy Moore
Australia	Zoe Kenyon
Belgium	Bert Brugghemans
Canada	Gerry Doucette · Dr. Reginald Freeman · Dave Jane · Brian LeGros · Ramzi Mirshak · Tina Saryeddine
Denmark	Bjarne Nigaard
Europe	DAS Hans
Finland	Pauliina Eskola
Germany	Johann G. Goldammer · Tiina Ristmäe
Hawaii	Sally O'Brien, (CTR)
Japan	Tatsuhiko MACHIDA · Hiroyuki MURATA
Luxembourg	Marie Sattler
Netherlands	Nils Rosmuller
Nordic Region	Marcus Vilhelmsson
School of Public Health	Jennifer Taylor
South Africa	Danielle Antonellis · Lucía Vilariño Fiore · Helen Underhill
Sweden	Anna Andersson Carlin
Turkiye	Isa Ersoy
United Kingdom	Phil Garrigan · Mark Hardingham · Claire Hoyland · Paul Murphy
United Nations	Sebastien Penzini
United States	Genny Biggs · Ralph Bloemers · Mary Elinor Boyer · Evrim Bunn † · Lorraine Carli · Otto Drozd · Ryan Heffernan · Gary Krichbaum · Caitlin McGuire · Angelina Mussini · Teresa Neal · Eli Pushkarewicz · Michelle Royal · Nicole Sanders · Andrea Santy · Emily Saulsgiver · Deepa Shankar · Kevin Sofen · Adam Thiel † · Joel Thomas

† Indicates Community of Practice Lead

CoP Structure Fire & Response (SFR)

26 countries · 52 participants

Country	Participants
Australia	David Gill · Craig Waters · Rob Webb
Barbados	Damian Bayne
Brazil	Thiago John
Canada	Tina Saryeddine
Denmark	Bjarne Nigaard · Henrik Lindberg
Ecuador	Cristian Acuna
El Salvador	Ana Cea Canas
Estonia	Maret Rannala · Viktor Saaremet
Fiji	Puamau Sowane
Finland	Pauliina Eskola
Greenland	Jes Andersen
Jamaica	Stewart L. Beckford
Japan	Dai Miyazima · Hiroyuki MURATA
Liberia	Lemuel Hne Harris, Jr.
Luxembourg	Marie Sattler
Netherlands	Nils Rosmuller · Ricardo Weewer · Stephen Wevers
New Zealand	Pete Gallagher · Russell Wood
Pakistan	Brig. Umar Chatta
Portugal	Vasco Cabo · Marco Martins
Qatar	Hamad Eisa Alabduljabbar · Mohammed Ali Alsuwaidi
Romania	Golgojan Ionel - Puiu
Slovenia	Janko Cerkvenik · Zvonko Glazar · Neza Strmole
Sweden	Peter Arnevall · Anna Andersson Carlin · Kristoffer Gottlieb
Switzerland	Luc Bruttin
Ukraine	Oleksander Lazarenko
United States	Dan Madrzykowski † · Mary Elinor Boyer · Evrim Bunn · John Donnelly · Otto Drozd · Patrick Harper · Richard Kesler · Frank Leeb · Aaron Lipski · Richard Sexton † · Jonathan Simmons · Luke Watko

† Indicates Community of Practice Lead

CoP Fire Risks of Emerging Technology (FRET)

26 countries · 50 participants

Country	Participants
Austria	Raphael Koller · Robert Mayar
Barbados	Errol Maynard · Marlon Small
Brazil	Thiago John
Canada	Karen Fry · Brian Legros · Tina Saryeddine
Denmark	Emil Kritinn Bjodstrup Bay · Jan Christiansen · Bjarne Nigaard
Estonia	Tormi Soekorv
Finland	Pauliina Eskola
France	Christope Marchal
Greenland	Jes Andersen
Guatemala	Gretel Meng
Iceland	Jon Vidar Matthiasson
Jamaica	Stewart L. Beckford
Japan	Endo Takashi
Luxembourg	Marie Sattler
Netherlands	Mark Bokdam · Nils Rosmuller · Stephen Wevers
New Zealand	Pete Gallagher · Rob McMahon · Russell Wood
Norway	Ann Christin Olsen
Portugal	Marco Martins
Qatar	Hamad Eisa Alabduljabbar · Mohammed Ali Alsuwaidi
Romania	Zamfir Claudiu · Petre Ionut · Stoian Silviu
South Africa	Etienne du Toit
Sweden	Anna Andersson Carlin · Marcus Vilhelmsson
Switzerland	Luc Bruttin
Taiwan	Fang Ming Kuo · Ming-yuan Shih
United Kingdom	Phil Clark · Sarah O'Rourke
United States	Adam Barowy † · Steve Kerber † · Orly Amir · Mary Elinor Boyer · Evrim Bunn · Otto Drozd · Dan Munsey · Jonathan Simmons · Luke Watko

† Indicates Community of Practice Lead

CoP Firefighter Health, Wellness & Safety (HWS)

23 countries · 41 participants

Country	Participants
Australia	Darren Kennan
Brazil	Thiago John
Canada	Tina Saryeddine
Chile	Juan Carlos Field Bravo
Denmark	Bjarne Nigaard
Ecuador	William Munoz Arambuls
Estonia	Merli Ilm · Kätlin Jahi · Arles Nautras
European Union	Hans Das
Fiji	Puamau Sowane
Finland	Pauliina Eskola
France	Eric Flores · Christope Marchal
Iceland	Jon Vidar Matthiasson
Israel	Alon Ben
Jamaica	Stewart Beckford · Andrew Russell
Liberia	Lemuel Hne Harris, Jr. · Abraham Konneh
Luxembourg	Marie Sattler
Netherlands	Marie-Christine Plat · Nils Rosmuller · Ricardo Weewer · Stephen Wevers
New Zealand	Josh Darby
Portugal	Marco Martins
Romania	Zamfir Claudiu
Sweden	Peter Arnevall
Taiwan	Ming-Yuan Shih · Xin-Rong Su · Chun-Yu
United States	Sara Jahnke † · Jason Wells † · Mary Elinor Boyer · Evrim Bunn · Jeff Burgess · Otto Drozd · Kenneth Kunz · Stefano Napolitano · Denise Smith †

† Indicates Community of Practice Lead

CoP Firefighter Education & Training (FET)

19 countries · 34 participants

Country	Participants
Australia	Mark O'Brien
Barbados	Damian Bayne
Canada	Brian Legros · Tina Saryeddine
Denmark	Bjarne Nigaard
Ecuador	Jesse Hunter Valle
Estonia	Viktor Saaremets
European Union	Esther El-Haddad
Finland	Pauliina Eskola
Guatemala	Gretel Meng
Ireland	Clive Duke
Jamaica	Stewart Beckford · Andrew Russell
Liberia	Lemuel Hne Harris, Jr. · Abraham Konneh
Netherlands	Tanja Guyken · Nils Rosmuller · Stephen Wevers
Norway	Ann Christin Olsen
Portugal	Marco Martins
Romania	Samsodan Catalin-Vasile
Sweden	Peter Arnevall · Marcus Vilhelmsson
United Kingdom	Craig Flannery †
United States	Ken Willette † · Mary Elinor Boyer · Evrim Bunn · Otto Drozd · Eriks Gabliks † · Fernando Gray · Jim Keiken · Jonathan Killings · Jonathan Simmons · Amy Veras

† Indicates Community of Practice Lead

CoP Climate Change Impacts (CCI)

25 countries · 46 participants

Country	Participants
Australia	Darren Klemm · Katelyn Samsom · Megan Stiffler
Brazil	Thiago John
Canada	Tina Saryeddine
Denmark	Bjarne Nigaard
Ecuador	Fernando Ayala · Roberto E. Jurado Patiño
Estonia	Kaarel Langemets
European Union	Hans Das · Catherine Ebah-Moussa · Esther El-Haddad · Gabriele Spitoni
Fiji	Puamau Sowane
Finland	Pauliina Eskola
France	Eric Flores · Christophe Marchal
Greenland	Jes Andersen
Israel	Shay Levy
Jamaica	Stewart L. Beckford · Andrew Russell
Netherlands	Edwin Kok · Stephen Wevers
New Zealand	Tim Mitchell · Hamish Smith
Norway	Hans Kristian Madsen · Thomas Velle
Pakistan	M. Idrees Mahsud
Philippines	Kwan Tiu
Portugal	Marco Martins · Fábio Silva
Romania	Ionut Brehui · Zamfir Claudiu · Gherman Sergiu · Stoian Silviu
South Africa	Etienne du Toit
Sweden	Marcus Vilhelmsson
Switzerland	Luc Bruttin
United Nations	Sebastien Penzini
United States	Aitor Bidaburu † · Kathy Bossman · Mary Elinor Boyer · Evrim Bunn · Otto Drozd † · Rebecca Harned † · Salvatore Scarpa †

† Indicates Community of Practice Lead





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