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2021 Research Roadmap Request for Proposal

“Climate Change, Public Water Supplies, and the Implications for Fire Protection Systems”

Background

It is widely acknowledged that the impacts of climate change include more widespread and prolonged drought conditions, increased risk of flooding, rising temperatures, reduced snowpack, and shifts in weather patterns globally. Many of these changes not only increase the risk of fire events, but also place additional strain on the public water supplies that are an integral part of many fire protection systems. The need for conservation of natural resources – including public water supplies – is greater than ever before. According to the World Data Lab, more than 2 billion people live in countries experiencing high water stress. At the same time, growing industries (including new agricultural and energy technologies) increasingly demand a greater share of available freshwater resources to operate. As a result, many urban, suburban, and rural areas worldwide face new and increased demands on their existing public water supply that raise questions about its reliability in the context of fire protection systems design.

Problem Statement

To design for more resilient communities in this context, fire protection engineers need to understand the linkages between climate change, public water supplies, and fire protection systems design. The SFPE Foundation seeks proposals for research projects that will help us gain a better understanding of the reliability of public water supplies in the context of climate change, how they have changed over time and are likely to change in the future, the implications for designing fire protection systems, and the scope of the problem in global comparative perspective. Our focus in this RFP is on the built environment and in-building fires, though we recognize structures may be in areas where wildfires and the wildland-urban-interface are also a consideration for fire systems design.

We invite proposals that seek to address a broad range of questions on this topic, such as:

- What factors influence the reliability of publicly available water sources for building fire protection?
 - *Supply factors:* What are the most common sources for public water supplies? What storage systems exist to maintain reliable water supplies?
 - *Demand factors:* Who relies on public water supplies to meet their needs? How might this impact the availability of water during a fire event?
 - *Contextual or Jurisdictional factors:* Who monitors and controls access to public water sources? How might governance structures, public vs. privately controlled access to community water supplies, or regional regulatory environments influence the reliability of public water supplies for planning and design purposes?
 - *Infrastructural factors:* What is the current condition of the piping network? Are pumping stations and storage systems being tested and maintained? Have water supplies deteriorated over time due to age and/or lack of maintenance?



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- How have these factors changed over time (e.g., in the last 75 years) because of climate change, drought conditions, and/or policy initiatives that impact water reliability?
 - How are they most likely to change in the next 5, 10, 20, or 30 years?
 - Have there been direct impacts on fire protection systems design (e.g., new code requirements)?
- What alternatives to water-based fire protection systems exist in climate change affected areas?
 - What are 2-3 examples where alternatives have been implemented as a response to water supply shortages, and with what level of success?
 - What barriers to more widespread implementation of non-water-based models (or even lower flow water-based models) exist?
 - How does the location of the fire – as an outdoor versus indoor event – interact with the appropriateness or availability of alternatives? Note: Please focus on fires in the built environment, but a discussion of the relevance with respect to WUI could be useful.
 - What alternatives are available as a function of geographic location?
 - What options exist in terms of water availability for fire protection systems across jurisdictions? What new concerns might be introduced by relying on private suppliers to backup public water resources in the context of fire protection? Note: The successful grantee will need to define “public water supply” in relation to other sources, such as “privately controlled” water supplies.
 - How are fire protection engineers adapting their designs to address each of the above considerations? How could they in the future?
- What stakeholder groups need to be consulted to best understand the current challenges with public water supply for fire protection systems?
 - How does climate change impact which groups are affected or need to be consulted?
- Where are there gaps in our knowledge? What areas should receive priority for future research and/or educational outreach and training?

Project Goals & Objectives

The goal of this research project is to gain a better understanding of whether and how climate change-related conditions, such as drought and increased attention to the need for water conservation, have impacted the reliability of water supplies and the implications for the design of fire protection systems that rely on public water supplies. To that end, we seek proposals designed to address the topics and questions identified in the above Problem Statement. All proposals must include consideration of the problem in a global comparative perspective (in other words, they may not be focused exclusively on public water supply for a specific jurisdiction or country). They must also include clear delineation of the connection between the reliability of water supplies and the design of fire protection systems of relevance to the profession of fire protection engineering. Additionally, the successful proposal is likely to include:

- A comprehensive literature review addressing the questions outlined in the Problem Statement that draws on evidence from around the world.



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- A proposed set of case studies (minimum of 4) that will help illustrate the different factors to consider as identified in the literature review responding to the Problem Statement questions. These proposed case studies must be varied (at minimum) along the following dimensions:
 - Globally representative – they cannot all come from a single geographic region, e.g., North America, Asia-Oceania, etc.
 - Level of urbanization – they must contain a mixture of urban, suburban, and rural environments.
 - At least one case should allow for illustration of the dynamics involved for building structures in the wildland-urban-interface.
- A discussion of best practices for fire protection systems design in this context written for a fire protection engineering audience, supported by real-world case study examples and data where possible.
- A stakeholder mapping graphic that illustrates the various groups/entities/individuals involved in the public water supply chain as it relates to fire protection systems.
- A gaps analysis that shows areas where further research is needed and identifies which stakeholder groups should be engaged for each of those areas.
- A summary of policy or regulatory changes that could enhance fire protection systems design in the context of reduced water supply reliability, supported by real-world case study examples.

SFPE Foundation recognizes this initial project may yield new information about avenues for future research.

Project Deliverables

1. Detailed work plan (including proposed approach and timeline to completion) that accounts for all the objectives and tasks identified above. This should include an initial planning meeting + at least two mid-term check-ins + a post-project debrief meeting with SFPE Foundation staff.
2. Draft final report for SFPE Foundation review and input.
3. Final revised report incorporating SFPE Foundation feedback and properly formatted for public dissemination.
4. Access to any tools or research materials produced as part of the project.
5. Evidence of student engagement in the research process.
6. Proposed method(s) for packaging and communicating the information produced throughout the research process to best meet the needs of relevant stakeholders.
7. Presentation on research findings (to be recorded) at a future SFPE / SFPE Foundation conference, webinar, or other event.
8. Completed “Grant Report” (due to SFPE Foundation staff no more than 30 days after project completion). A template will be provided to the grantee.

Intellectual Property



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The SFPE Foundation will retain the rights to the final report and any tools developed in conjunction with the scope of this research project. We may make the final deliverables publicly available via the SFPE Foundation website and/or affiliated online platforms, and research products may be used, shared, or referenced at future SFPE Foundation-affiliated events.

Cost and Duration

The project should be complete no more than *five months* after the date of initiation. The cost of the proposed research project is not likely to exceed \$20,000 USD. However, we encourage proposals that suggest approaches from \$20k to \$30k (USD), providing enhanced options at different price points in case the Foundation may elect to award up to \$30k (USD) for the proposed project.

How to Respond

Applicants should submit a single proposal document no longer than 7 pages single-spaced outlining:

1. Qualifications and experience for all relevant team members (1 page max)
2. Proposed Approach
3. Proposed Timeline for Project Completion
 - a. This should include an initial project launch meeting with SFPE Foundation staff.
4. Total Amount Requested & Budget Justification
 - a. This must include a description (i.e., "Budget Justification") accounting for each expenditure in the proposed budget and any other funding sources (including amounts) that will be used to support the work (including in-kind support).
5. A standalone section ("Project Impact") that addresses each of the following questions:
 - a. How does the proposed work align with SFPE Foundation's mission to "enhance the scientific understanding of fire and its interaction with the natural and built environment?" (150 words max)
 - b. If executed as planned, how will this project help SFPE Foundation deliver on its Strategic Goals (including student engagement and education)? (Please refer to the [2019-2021 SFPE Foundation Strategic Plan.](#)) (250 words max)
 - c. How will you assess/evaluate the impact of this grant? Please include 2-3 quantitative and/or qualitative measures that you will track and report on as indicators of progress toward the goals identified in your proposed approach. (250 words max)
 - d. How will your approach to this project contribute to increasing diversity, equity, and inclusion throughout the research process, as well as enhance the potential positive impact of the project deliverables for underrepresented, marginalized, or historically disadvantaged communities globally? (250 words max)
6. A discussion of any potential conflicts or restrictions that exist and may impact the conduct of this research project, or the presentation and publication of results.



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Applicants are permitted to submit a single proposal. Should multiple proposals be received by a given applicant, the applicant will be given the choice of which to prioritize for Foundation review. Proposals will be reviewed based on the following criteria: *Scientific Merit (30%), Achievability (25%), Project Value (20%), Team Qualifications (20%), Student Engagement (5%)*.

Further details on the review process may be found on the Foundation's [website](#).

Deadline for Submittals: 5:00 pm, EDT, June 30, 2021

Direct submissions and inquiries to Dr. Leslie Marshall, SFPE Foundation Manager, at foundation@sfpe.org.

Contractor Selection

Proposals will be evaluated by the SFPE Foundation Technical Committee based on the proposal elements listed above. *The project will proceed only upon receipt of a proposal deemed acceptable to the Foundation.*