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Grand Challenges in Resilience & Sustainability

2026 Request for Proposals

In-Depth Analysis of Fire Events

Proposals Due: Monday, March 16, 2026, by 11:59 pm Eastern Time

Background & Motivation

As part of our commitment to addressing the research priorities identified in the SFPE Research Roadmap and the SFPE Foundation's Grand Challenges Initiative (GCI), we invite proposals that address key topics related to Resilience & Sustainability (R&S).

In 2023, SFPE published a white paper on "Grand Challenges in Resilience & Sustainability: A 10-Year Plan for Strategic Cooperation in Research and Education to Advance Fire Engineering." The paper identified five major focus areas for fire engineering in relation to global challenges in Resilience & Sustainability:

1. Quantification of the costs and/or benefits of resilience/sustainability
2. Building materials
3. Fire risk reduction and protection measures
4. Community risk reduction
5. Inspection, testing, and maintenance (ITM) of fire protection systems

Since then, GCI Partner organizations have made progress within the topic of building materials (see *Fire Testing of Resilient & Sustainable Building Materials*). Now, the R&S Working Group seeks to address some of the urgent needs within the subtopic area of "quantification of the costs and/or benefits of resilience/sustainability." Ultimately, we envision a future where fire protection methods and approaches are included in globally recognized sustainability rating schemes (such as, for example, LEED). This is desirable since inclusion in these indices is often a prerequisite for serious engagement with building and property managers, architects, and others who face strong incentives to meet performance goals that determine their rankings within these rating systems. By learning to recast fire protection systems through the lens of sustainability, we can help to ensure that fire safety remains a top consideration in the design, implementation, and performance of more resilient and sustainable buildings throughout the entire building lifecycle, thereby enabling more fire-safe communities for all. To get there, we need an

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established method and approach for demonstrating a more expansive set of relative costs and benefits for different fire protection systems through the lens of resilience and sustainability metrics.

To achieve this goal, the R&S Working Group envisions a multi-year arc of projects that will build upon one another:

- **Project 1: In-Depth Analysis of Fire Events**
  Study specific fire events in depth, including detailed information about the structure (such as green attributes, occupants, and community characteristics) from before the fire event to how the fire started and developed to the impact of fire protection systems, the role of the fire service, and how the fire ultimately impacted the occupants and the local community. Measures of impact should include direct economic impacts as well as indirect impacts, such as environmental, social, and health outcomes.

- **Project 2: Impact Factors**
  Identify impact/cost factors of fires in different types of occupancies that can be applied globally (with the necessary regional adjustments) to describe fires across countries and jurisdictions. These must factor in what the cost is to the community, to the environment, and to the owner of the building. When looking at the community, the analysis must consider impact/cost factors of fire as well as socio-economic factors that influence community risk, and how each impacts the others.

- **Project 3: Fire Protection Systems LCA**
  Develop a Life Cycle Analysis (LCA) for Fire Protection Systems that focuses on the resiliency and sustainability of these systems within a changing climate. Fire protection systems must be resilient and sustainable through installation, inspection, testing, maintenance, and (if needed) deployment (should the system be activated by a fire event). Here, we are interested especially in the trade-offs between different approaches in terms of costs and benefits. For instance, even though sprinkler systems can save significant amounts of water in the event of a fire, the use of water for ITM purposes can have an ongoing environmental impact. It is also something that can be impacted by a changing climate, as water is becoming a scarce resource in some areas.

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The R&S Working Group believes that these projects should be performed sequentially in the order shown to be most successful. Hence, this Request for Proposals is for **Project 1: In-Depth Analysis of Fire Events.**

This RFP: In-Depth Analysis of Fire Events

When measuring the impact/costs of fire events, we traditionally focus on casualties and direct property damage. These are the data captured in national statistics where available. While this is indeed critical information to obtain for each fire event, it provides limited context to the role fire safety and resilience play in sustainable design.

By contrast, sustainability is based on three pillars:

1. Environmental impact.
2. Social or societal impact.
3. Economic impact.

When choices are made for building design through the lens of sustainability, they are based on how materials and systems score related to the three pillars across the lifetime of the building. Each material is evaluated from cradle to cradle, which includes the potential for reuse. Nowhere is the impact of fire or fire safety systems included in these discussions. Fire safety is kept outside the sustainability discussion as a topic handled by the codes, despite sustainable design often going far beyond the codes on all other features.

To become more relevant in sustainability discussions, we need a broader understanding of the impact of fire, especially in terms of environmental and social impacts, and a more expanded definition of economic impact. The first step to get this understanding is through an in-depth analysis of fire events through the lens of the three pillars of sustainability.

We invite proposals from researchers that seek to address the following required elements:

1. **Specify a methodology for studying the full impact of fires**: This should include an initial list of impact factors to consider for each fire (see below for an initial list provided by the R&S Working Group); respondents are encouraged to consider methodologies used for other hazards (e.g., earthquakes).
2. **Number of specific fire events to be studied**: At least three fire events taking place in at least three different building types; these will be the case studies used for this project and should be selected with attention to the future projects we expect to build on the outcomes of this analysis.

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3. **Geography**: All study fires cannot be from the same continent; hence, multinational project teams are encouraged for this project.
4. **Time Scale**: Respondents should aim to study impacts from before the fire to 5 – 10 years after the fire event, depending on the type and date of the event.
5. **Building types**: At a minimum, the cases should include the following types of buildings:
    - Residential.
    - Municipal, which could include schools, firehouses, police stations, or government buildings.
    - A building with a high density of hazardous materials, which could include big-box stores, warehouses with chemicals, or industrial sites.

The R&S Working Group considered the following initial list of factors and impacts to include in each case study. Project proposals are encouraged to expand upon this list. These factors are essentially variables that should ideally be observable and measurable across fire events.

- Pre-fire:
    - Building type
    - Building size
    - Type of construction in detail
    - Fire protection in place
    - Occupant characteristics
    - Local environment
    - Built to code
- The fire event:
    - Casualties
    - Percentage of buildings damaged
    - Estimated direct loss
    - Cost of emergency response
    - Cause of fire
    - Factors impacting fire spread
    - Impact of fire prevention measures
    - Updated to the current code at the time of the event
- Post-fire:
    - Social
    - Economic
    - Environmental

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Proposals will be differentiated based on their approach to the required elements above. Respondents are also encouraged to describe the specific outputs of the project they see as being most useful to contributing to the overall three-project arc outlined in the opening "Background & Motivation" section of this document.

Project Goals & Objectives

Proposals should clearly indicate what the outputs and outcomes of the research project will be. Strong proposals will draw clear linkages between the proposed research and the needs identified in the GCI Resilience & Sustainability white paper and the three-project arc described at the beginning of this document. Successful applicants will be able to articulate the potential impact of the research on the field of fire safety science and fire protection engineering. They will also demonstrate clear understanding of the logic behind examining fire events through the lens of the three pillars of sustainability, as well as command of the areas where we already have research on these topics that can be cited and incorporated, and the areas that are relatively understudied and where new attention is needed.

Project Deliverables

1. Detailed work plan (including proposed approach and timeline to completion) that accounts for all proposed objectives and tasks. This should include an initial planning meeting + one mid-term check-in + a post-project debrief meeting with Foundation staff. Additionally, the selected research team will be expected to check-in with their assigned SFPE Foundation staff liaison about every 4-6 weeks regarding progress.
2. This project is expected to involve input and feedback from an External Advisory Panel of 5-10 individuals outside of the SFPE Foundation Board of Governors (selected with input from the Foundation's Technical Committee, SFPE and SFPE Foundation staff, and other stakeholders) with expertise in the subject area under study. For this project, we will be soliciting additional funding support from industry partners, each of whom will be invited to have one representative serve on the External Advisory Panel. The project team is expected to be in contact with this group as needed for input and feedback on the study (about monthly), including during the midterm and final reporting phases.
3. Draft final report and internal presentation for SFPE Foundation and External Advisory Panel review and input.
4. Final revised report incorporating SFPE Foundation and External Advisory Panel feedback and properly formatted for public dissemination. SFPE Foundation staff will provide a template and guidance on formatting.
5. Access to any tools or research materials produced as part of the project.
6. Evidence of student engagement in the research process.

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7. Proposed method(s) for packaging and communicating the information produced throughout the research process to best meet the needs of relevant stakeholders.
8. Presentation on research findings (to be recorded) at a future SFPE or SFPE Foundation conference, webinar, or other event.
9. Completed "Grant Report" (due to SFPE Foundation staff no more than 30 days after project completion). A template will be provided to the grantee covering topics such as budgetary expenditures, ease of implementation, and an opportunity to provide feedback to the SFPE Foundation.

Intellectual Property

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 proposed research project should be completed no more than *18 months* after initiation. The Selection Committee may consider projects of a longer duration, though this needs to be explicitly named and justified in the proposal. Applicants may request up to $40,000 USD.

How to Respond

Applicants should submit a single proposal document (PDF format strongly preferred) no longer than 7 pages, single-spaced, outlining:

1. Cover Page (does NOT count towards the page limit), including:
    a. Full names, titles, affiliations, and contact information (email, phone, mailing address) for all research team members named in the proposal.
    b. Title of the proposal.
    c. Total amount requested (up to $40,000 USD).
2. Scientific Merit
    a. Proposed project and approach.
3. Achievability
    a. Proposed timeline for project completion.
    b. This should include an initial project launch meeting with SFPE Foundation staff; one midterm check-in presentation to the External Advisory Panel, SFPE Foundation staff, and the Technical Committee; a draft final presentation to the

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External Advisory Panel, SFPE Foundation staff, and the Technical Committee; and any other relevant project milestones.

4. Project Impact
    a. How does the proposed work align with SFPE Foundation's mission to "enhance the scientific understanding of fire and its interaction with the social, natural, and built environments?" (150 words max)
    b. If executed as planned, how will this project help the SFPE Foundation deliver on its Strategic Goals (including, but not limited to, student engagement; innovation; global reach; and diversity, equity, inclusion, and access)? (Please refer to the 2022-2025 SFPE Foundation Strategic Plan.) (500 words max)
    c. What kind of impact (e.g., on the fire engineering community, on fire engineering practice, on fire safety, on the world as a whole, etc.) do you expect the proposed project to have? (250 words max)
5. Project Value
    a. Total amount requested and budget justification.
    b. 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).
6. Team Qualifications (1 page maximum)
    a. Qualifications and experience for all relevant team members.
7. Conflict of Interest Disclosures (no page limit)
    a. All members of the research project team named in the proposal must download, complete, and sign the SFPE Foundation's Conflict of Interest Disclosure Form. All forms must be appended to the end of the proposal and included in the submission to be considered complete. *Note: These forms do not count toward the submission's page limit.*

Applicants are permitted to submit multiple proposals. Proposals will be reviewed based on the following criteria: *Scientific Merit (30%), Achievability (25%), Project Impact (20%), Project Value (15%), and Team Qualifications (10%).*

Further details on the review process may be found on the Foundation's website.

Deadline for Submittals: Monday, March 16, 2026, by 11:59 pm Eastern Time

All applications must be submitted through the SFPE Foundation's online Blackbaud Grants Management System at: https://bbgm-apply.yourcausegrants.com/apply/programs/35d6fa30-c7e0-4685-90a1-02b0300234ee

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Direct any inquiries to Dr. Leslie Marshall, SFPE Foundation Interim Executive Director, at foundation@sfpe.org. No phone calls, please.

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.*