Maria F. Theodori, MS, PE

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Professional Profile

Maria Theodori is a licensed Fire Protection Engineer with expertise in wildland fire modeling and performance-based design engineering. She recently transitioned from full-time to part-time as an Associate with Reax Engineering Inc. to focus her pursuit on a PhD in wildland fire with UC Berkeley's Department of Mechanical Engineering. Her doctoral research focus is on quantifying community fire risk to support decision-making and improve resilience against extreme fires that encroach the wildland-urban interface. As a professional consultant working in the Bay Area, and previously for the engineering design firm Arup in New York City, Maria's breadth of experience in fire protection/life safety strategy development and code consulting ranges from projects in energy infrastructure to single-family homes, to international airports and historic preservations. She is passionate in helping clients and communities understand fire hazards and reduce risk by curating holistic and actionable mitigation strategies. Her work incorporates relevant research and analyses on fire science, climate change, and new technologies with an evaluation of building/fire code and related standards. Maria is a member of the Society of Fire Protection Engineers and the International Association for Fire Safety Science and has served a combined 8 years in various committee leadership positions for the two organizations.

Professional Licensure

Licensed Professional Engineer, State of California, # FP2088 (Fire Protection Engineering)

Education

PhD – Mechanical Engineering, University of California, Berkeley, August 2020 - In progress
- Major focus area: Combustion; Minor focus areas: Environmental Studies, Computational Techniques

MS – Fire Protection Engineering, University of Maryland, College Park, January 2015 - May 2016
- Thesis title: "Data-driven wildfire propagation modeling with FARSITE-EnKF"

BS – Fire Protection Engineering, University of Maryland, College Park, January 2011 - December 2014
- Double Minor in Project Management and Modern Greek Language

Professional Experience

11/19 – present **Reax Engineering Inc.** Berkeley, CA *Associate Engineer*
Responsibilities include:
- Fire protection engineering – code consulting, fire/life safety systems, performance-based design, analysis and justification of alternate means and methods
- Wildland fire consulting – hazard and risk analysis, fire spread and behavior modeling, climate change, risk mitigation, policy guidance and resilience strategy at multiple scales, emergency preparedness and response planning
- Fire modeling – smoke alarm/detector activation, heat detector/sprinkler activation, time to untenability or incapacitation by smoke and heat
- Building evacuation modeling – human behavior and egress design analysis, time required for safe egress of occupants

3/19 – 11/19 **Arup Advanced Technology + Research** San Francisco, CA *Fire Engineer/Wildfire Specialist*
Representative activities:
- Served as lead wildfire subject matter expert across the global firm of over 14,000 employees, both an internal- and external-facing role.

- Contributed to projects and research activities as part of a multi-disciplinary team of experts on natural hazards and climate change.

6/16 – 3/19   **Arup Fire** New York, NY *Fire Engineer*

Representative activities:
- Assisted clients with design and engineering of fire protection and life safety systems, including building code and fire code consultation and performance-based approaches for justification of alternative means and methods.
- Appointed Deputy Project Manager on various projects; coordinated across stakeholders and engineering disciplines to ensure a high quality of work production and delivery of projects on-time and within budget constraints.
- Contributed to internal initiatives for digital transformation of the fire engineering practice, including workflow process automation, digital upskilling, and advanced data manipulation.

Selected Project Work

Large outdoor fires and multi-hazard:
- Quantitative wildland fire risk and detection effectiveness analyses for a water resource restoration project
- Technical and project management support for development of a near-term fire risk forecast model to improve electrical grid resiliency under a grant from the California Energy Commission (California)
- Evaluation of wildfire-related standard operating procedures, fire protection equipment, and associated training documents for a gas transmission entity spanning several states (United States)
- Quantitative analysis of greenhouse gas emissions from wildland fire caused by ignition from overhead powerline (California)
- Development of a wildfire mitigation strategy for an 8,600 ft^2 single-family residence on a 17-acre property (St. Helena, CA)
- Assessment of wildland fire hazard and risk, and subsequent development of vegetation management and fire risk reduction plan, for a mixed-use campus of over 20 buildings (Marin County, CA)
- Development of a wildfire policy strategy and CEQA wildfire impact compliance review for a masterplan development at the wildland-urban interface (Concord, CA)
- Assessment of community evacuation and wildland fire risk under CEQA regulations for an asphalt plant development in a high-risk fire area (Willits, CA)
- Analysis of wildland fire hazard and risk, both qualitatively and quantitatively, for a global portfolio of data centers as part of a multi-hazard resiliency assessment (Global)
- Development of design fire scenarios for external urban fire spread analysis to inform creche fire safety strategy in informal settlement communities (South Africa)
- Analysis of wind hazard and probabilistic risk to proposed energy infrastructure for due diligence of site selection (Indonesia)
- Assessment and data collection of telecommunication buildings susceptibility to various disasters (flood, wind, hurricane, fire), used to calibrate fragility curves as input to risk models (US)

Fire protection engineering:
- Fire service access planning for a large, mixed-use commercial campus (Sunnyvale, CA)
- Design and fire code consulting for outdoor storage of hazardous materials at a chemical storage facility (Fairfield, CA)
- Design and fire code consulting for a cannabis manufacturing facility (Hayward, CA)
- Delivery of fire/life safety consulting and several performance-based design solutions for an 8-million-square-feet airport terminal building (Mexico City, MX)
- Quantitative analysis of apron fuel spill fire risk and exposure to structures and occupants in the fixed link boarding bridges of a new-design airport (Mexico City, MX)
- Development of fire models using computational fluid dynamics software to inform smoke control design for an enclosed train station located in a parking structure (Mexico City, MX)
- Design of fire/life safety strategy for a multi-modal transportation center (Mexico City, MX)
- Design of high-rise fire/life safety strategy, smoke control system design, and project documentation for authority approvals and permitting (San Francisco, CA)
- Fire/life-safety code compliance and performance-based design strategy for a mixed-use, high-rise development (Mexico City, MX)

- Peer review and due diligence assessment of an existing historic performance venue for a potential acquisition (New York, NY)
- Analysis of code changes and cost impact of each change during construction administration of a border crossing facility campus (Alexandria Bay, NY)
- Review of fire alarm shop drawings and voltage drop calculations for a school campus consisting of nine buildings (Frederick, MD)
- Assurance surveying of rail stations for contractor compliance with plan-approved installations of fire alarm and suppression systems (New York, NY)
- Analysis of fire and smoke movement using computational fluid dynamics software for a historic government building featuring open stairwells, high ceilings, and an atrium (Washington, D.C.)
- Inspection and reporting of fire code deficiencies for a 29-building campus of various occupancy types including laboratory, assembly, mechanical, utility, storage, and office (Laurel, MD)

Human behavior and evacuation analysis:
- Collaboration with integrated planners to determine optimal rail station design based on analysis of pedestrian movement using human behavior modeling software (London, UK)
- Calculation of occupant evacuation times for various exiting configurations of an underground research facility located 8,000 feet below grade (Lead, SD)
- Development of evacuation models using human behavior modeling software to evaluate occupant egress under various fire conditions in a non-sprinklered, historic building (New York, NY)
- Analysis of human behavior and egress using pedestrian modeling software under various fire and emergency scenarios for a sports stadium of 52,400-persons capacity (New Brunswick, NJ)
- Development of evacuation models of airport terminals to compare egress times for various occupant density scenarios, including during peak travel seasons and weather delay events (Atlanta, GA)
- Calculation of time for "reverse evacuation" of deplaning passengers to reach a point of safety within the terminal building, away from hazardous conditions on the apron (Mexico City, MX)
- Computer-Aided Design of emergency evacuation route diagrams per ASTM E-2238 for 29 buildings of various occupancy types including laboratory, assembly, mechanical, utility, storage, and office (Laurel, MD)

Selected Research Activities
- *Threat of Wildfires at the Urban-Rural Interface*, Arup, New York, 2017
  Lead investigator on research of global status of the threat of wildfires to communities at the rural-urban interface. Findings include risk factors; resilience, adaptation, mitigation and preparedness strategies; new technologies; policies and regulations.
- *Data-driven Wildland Fire Propagation Modeling*, University of MD, College Park, 2016
  Analysis of the effects of topography, wind, and vegetation on the propagation of a wildfire. Integrated existing wildfire prediction software FARSITE with data assimilation methods to model an algorithm that could improve forecast of fire line propagation.
- *Homeowner's Wildfire Risk Assessment*, Forest Research Institute, Athens, Greece, 2013
  Development of a home risk-assessment evaluation form for residents at the wildland-urban interface in Greece. Studied literature on fire dynamics and fire modeling to determine effective mitigation methods.

Leadership and Volunteer Activities
- **International Association for Fire Safety Science** *Large Outdoor Fire & the Built Environment Committee*
  10/19 – present   Co-lead of the Emergency Management & Evacuation Working Group
- **Society of Fire Protection Engineers** *Continuing Professional Development Committee*
  3/18 – present   Co-lead of the Emerging Professionals of SFPE Subcommittee
- **Society of Fire Protection Engineers** *Board of Directors Nominating Committee*
  1/20 – present   Member of the 2020 Nominating Committee
- **Society of Fire Protection Engineers** *Community Outreach and Advocacy Committee*
  10/16 – 12/19   Member of the Strategic Alliances Subcommittee
- **Society of Fire Protection Engineers** *New York Metropolitan Chapter*
  8/16 – 3/19   Served on the Board of Directors
- **University of Maryland Alumni Network,** *Greater New York City*
  8/17 – 3/19   Board Member

Conference Presentations and Invited Talks

1. Theodori, M., Hogan, J. "Real-time Wildfire Prediction, Detection, and Response in California". Course on Environmental Governance and Climate Resilience, Stanford University, CA. February 2020.
2. Panelist, "Situational Awareness and Fire/Weather Modeling". Edison Electric Institute Wildfire Technology Summit. Dallas, TX. February 2020.
3. Theodori, M. "WUI Resilience: Answering to Climate Change". Society of Fire Protection Engineers, North American Conference. Montreal, Canada. October 2017.

Awards

- Top 5 Under 35, Society of Fire Protection Engineers, 2019
- Chairman's Award, University of Maryland, Department of Fire Protection Engineering, 2014