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# Critical Assessment of Lifeline System Performance: Understanding Societal Needs in Disaster Recovery

By  
*Applied Technology Council*



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Cover image – Emergency generators en route to Montgomery, Alabama following April 2011 tornadoes (Photo credit: FEMA).  
Drinking water distribution following Hurricane Sandy, November 2012 (Photo credit: FEMA)

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Prepared for  
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# Preface

In September 2014, the Applied Technology Council (ATC) commenced a task order project under National Institute of Standards and Technology (NIST) Contract SB1341-13-CQ-0009 to assess current societal expectations of acceptable lifeline performance levels and restoration timeframes that are informed by the phases of response and recovery, distinguishing those that are hazard independent and those that are specific for seismic (including tsunami), wind (including hurricane and tornado), flood, snow/ice, and wildfire hazard events.

The project included consideration of the social institutions and societal needs that should drive lifeline system performance levels and recovery timeframes and the assessment of current system guidelines/standards and performance criteria so that deficits could be identified and potentially addressed through better awareness and definition of community requirements and goals as part of the overall NIST Community Resilience Planning process.

The starting point for the project was an initial effort by the ATC-appointed Project Technical Committee to summarize key guidelines, standards, and current performance criteria, and to identify critical social considerations and system interdependencies. Those and subsequent efforts helped identify and form a set of overarching considerations and recommendations, which were then refined through several rounds of review by an ATC-appointed Project Review Panel.

The culminating effort was the development of this report, which contains:

- Detailed analyses of a broad range of societal considerations;
- Lifeline assessments and reviews of standards, guidelines, and performance criteria for electric power, natural gas and liquid fuel, telecommunication, transportation, water and wastewater systems;
- A review and analysis of available information on lifeline interdependency issues; and
- Findings, conclusions and recommendations that identify needed developments in lifeline codes, standards, and guidelines; needed research; modeling opportunities; and needs related to lifeline system operations and operational design.

ATC is indebted to the leadership of Laurie Johnson, who served as Project Director and Lead Editor, to Thomas D. O'Rourke, who served as Project Co-Director, and to the members of the Project Technical Committee, consisting of Stephanie Chang, Craig A. Davis, Leonardo Dueñas-Osorio, Ian Robertson, Henning Schulzrinne, and Kathleen Tierney, for their contributions in developing this report and the resulting recommendations. ATC similarly appreciates and recognizes the attentive review and input of the Project Review Panel, which consisted of Bruce Ellingwood, Timothy J. Lomax, Douglas J. Nyman, Dennis Ostrom, Jon Peha, and Kent Yu (ATC Board Representative). The affiliations of these individuals are provided in the list of Project Participants.

ATC also gratefully acknowledges Therese P. McAllister (NIST Technical Point of Contact), and Steven L. McCabe (Contracting Officer's Representative) for their input and guidance throughout the project development process. ATC staff members Veronica Cedillos provided project management support and Amber Houchen and Carrie Perna prepared draft and print-ready versions of this report.

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