

Rockefeller Grant FINAL

10.14.2013

1. The Rockefeller Foundation defines *resilience* as the ability of a system, entity, community, or person to withstand shocks while still maintaining its essential functions and to recover quickly and effectively. How does this definition of resilience resonate with your city? What are the five most pressing resilience-building priorities for your city?* (2000 characters)

Resilience and adaptation are real challenges Boulder is currently wrestling with as the community recovers from historic flooding that created severe and lasting impacts. This follows just three years after experiencing (then) Colorado's most financially destructive wildfire in state history.

These experiences and a long history of climate mitigation initiatives have taught the city that resilience strategies involves more than managing or recovering from disruptive events. Resilience as the ability to "bounce back" is insufficient. To mobilize the resources and community support necessary to significantly increase our social, economic and ecological resilience, we must formulate a compelling vision of the future towards which our efforts allow us to "bounce forward".

Recognizing that many other cities will continue to face similar challenges, Boulder is positioning both its climate mitigation and adaptation to grow the technological, financial and social innovations that can be useful to others. For Boulder, growing our resilience is a core theme in our future economic development strategy. The six resilience building priorities for Boulder include:

1. Complete flood infrastructure design and implementation based on the experience of recent 100 year+ flood event.
2. Update the design and infrastructure related to storm water, wastewater and drinking water, particularly in high flood/fire risk zones.
3. Increase fire hazard mitigation treatments, particularly in high vulnerability zones.
4. Continue to diversify transportation options to increase mobility and access, particularly for lower income residents.
5. Expand "localized" energy such as distributed generation and microgrid development to decrease vulnerability and increase stability and reliability of critical power systems during extreme weather or other disruption events.
6. Identify cross-cutting opportunities between essential functions that prioritize resilience planning.

2. Do you have a formal risk assessment for your city? What are the most significant hazards, shocks, and stresses that your city faces and how do they affect the ability of your city to function?* (2000 characters)

Boulder has a number of risk assessments, both community-wide and within key departments.

These include:

- Multi-Hazard Mitigation Plan (2012)
- Water Conservation Futures Study (2013)
- Boulder County Climate Change Preparedness Plan (2012)
- Water Utility Master Plan (2011)—includes climate change analysis section
- Drought Response Plan (2010)
- 2012-2017 CIP Project Plan

These assessments point to wildfire, flood, drought, invasive species, and increased disease vectors as areas of greatest risk for the community. Boulder's recent experience vividly illustrates the city's vulnerability to both

wildfire (4 Mile Canyon 2010) and flood (Sept 2013.) Regional climate assessments project weather pattern changes that increase the likelihood of extreme precipitation events, floods, fire, drought and related threats. The 2011 NAS assessment indicates that a 1 degree C increase in temperature increases fire incidence probabilities by over 600%. The recent flood demonstrates that the combination of fire then flood magnifies the impacts of both. During the September flood, one fire-impacted tributary recorded a 17' high flow of mud and debris.

Increases in drought cycles frequency magnify these flood and fire risks and create additional risks for the city's water supply that is derived from an adjacent watershed. These dry conditions have in turn exacerbated insect, exotic weed and disease threats in the flora and fauna communities. Several million acres of the area's forest has been impacted by outbreaks of pine bark beetles, resulting in mortality of over 80% of pine species in some local areas.

Public health concerns have also been accentuated by warmer temperatures, particularly in the increase in duration of summer insect breeding cycles. The Boulder area has seen sporadic increases in several vector borne diseases, most notably mosquito borne West Nile Virus.

3. Many cities already have some activities that are directly relevant to building resilience. What specific current or recent project(s), urban plan(s) or policy(ies) has made the most significant positive contribution to the resilience of your city? Were there innovations that you can describe?* (2000 characters)

Boulder has engaged in comprehensive planning since 1970, with recent plans including segments addressing future climate risks. Its strong focus on open space managed growth helped reduce the spread and impact of recent upland fires into city neighborhoods. In contrast to the 2012 Colorado Springs fires that heavily damaged housing developments that had taken place in the wildland urban interface, Boulder's plans and standards were likely significant factors in the ability to both stop fires and reduce property damage.

Boulder has also conducted an extensive update of its flood zone mapping with substantial increases in focus on upland watersheds. This work, along with targeted infrastructure development and diversion features, created effective flood water diversion during the flooding in the areas that had been fully implemented. Despite over 16" of rain in a five day period, many areas that had been redesigned experienced minimal long-term damage. Areas without these treatments experienced much greater impacts. Post flood, the city is mapping affected areas in preparation for adjusting flood maps and refining flood regulations

Boulder has also aggressively pursued development of local renewable energy resources. It currently has an installed local solar capacity of over 14MW, one of the highest per capita watts photovoltaics in the US. The city is currently exploring forming its own municipal utility to implement a series of resilience building strategies, including undergrounding of electricity delivery systems, support for much more extensive microgrid development, and much more extensive distributed generation development.

To actively engage the community in assessment and redesign efforts intended to address future events, the city has conducted rapid post-flood and building assessments and is now also implementing a new neighborhood-based assessment and planning initiative based on the Ecodistrict planning system (see question 5).

4. How do the hazards, shocks and stresses that you've articulated impact your city's poor and vulnerable residents? How do you define poverty and vulnerability within the context of your city?* (2000 characters)

Boulder's lower income and vulnerable communities face a number of risks from increasing extreme and disruptive climate events. Boulder has temperature extremes at both ends of the scale—with periods of temperatures reaching well below zero or above 100°. Cold temperatures may be the greatest threat, particularly to Boulder's homeless population and lower income families unable to pay utility bills. Flooding and wildfire also pose threats to these populations. These populations often have the least personal and financial capacity to recovery from disruption and displacement caused by these types of events.

The National Hazard Center at the University of Colorado has just agreed to fund two studies of two of Boulder's most vulnerable populations, one looking at recent flooding impact on the city's homeless and the other looking at flood impacts on the communities elderly population. Boulder uses the federal definition of poverty as its basic measure but also computes a "self-reliance" income level based on Boulder's much higher cost of living. This nearly doubles the financial resources needed to maintain self reliance. 42% of Boulder's residents are also considered "housing burdened" (spending more than 30% on housing), a percentage that is likely much higher in the lower income portions of the community. During the recent flood event, many renters were also vulnerable to slow or substandard repair and restoration work.

The city and county have been working to coordinate a renters' assistance program to provide mechanisms for holding landlords responsible for timely and code compliant repair and restoration services. However, we are aware that many may not be receiving adequate services. These factors and others underscore the need for additional outreach and vulnerability assessment for these populations. These are areas we hope to address as part of participating in this program.

5. Describe how you will bring multiple stakeholders, including the private sector and other levels of government (e.g., state and or national) together in developing and executing a plan to build resilience. Please give examples of key stakeholders. Which stakeholders do you think are the most relevant and most critical to success?* (2000 characters)

Boulder has a long history of community engagement on community planning initiatives. Boulder passed the first tax to fund open space and the first community carbon tax and is currently exploring forming its own electric utility. These initiatives have been largely citizen driven and involved literally hundreds of participants across public, private, institutional and NGO constituencies. For resiliency planning, the city anticipates engaging and mobilizing participation across many of these same stakeholder groups, in particular:

Public: The city works closely with Boulder County in adaptation planning. Boulder has also initiated peer learning with other leading Front Range cities, including Fort Collins, Denver, Longmont and Loveland.

Private: The city is partnering with the Boulder Chamber to grow a clean tech cluster that can pilot technologies and services that increase community resiliency, energy self-reliance and adaptive capacity. Focus groups are being organized in four different industries sectors.

Institutional: The city is working with researchers at both the University of Colorado and the National Climate and Atmospheric Research agency (NCAR) to begin coordinating a series of over twenty different resilience related research efforts initiated as a result of the recent flood event.

Social: In response to the flood, we are revitalizing and modernizing neighborhood level planning approach (see Q10). We are beginning to reach out to social action organizations that have coordinated the participation of hundreds of community members over the past several years. A new focus during this phase will be even greater outreach to our lower income communities through our Family Resource Centers located

at schools serving low-income serving families populations, as well as direct outreach targeted to neighborhoods with high concentrations of lower income families and organizations like Intercambio and El Centro Amistad.

6. What specific technical support would you seek for the *development* of a resilience plan (such as financing mechanisms, technology and data analytics, land-use planning, infrastructure, and community/social resilience capacity building)? What specific technical support would you seek for *implementing* a resilience plan? Are there solutions or solution providers/ companies with which your city has already worked with or would like to work?* (2000 characters)

Resilience planning support

- Vulnerability assessment—Portions of community vulnerability have been analyzed but there is an acute need to develop a comprehensive assessment and ranking of key threats and vulnerabilities system-wide.
- Metrics and monitoring--Training and case studies demonstrating how to create resilience monitoring. This would include evaluation systems, tracking metrics and ways to integrate this data into ongoing reporting systems.
- Resiliency planning best practices—Best practices in community design and processes related to—physical, social, economic/financial infrastructure.
- Infrastructure—Best practices for utility distribution systems (waste and storm water, drinking water, communication, energy) fortification and stabilization against extreme weather events (flood, fire, high wind).
- Microgrid/utility “islanding” strategies—Local grid islanding strategies to sustain services during extreme events.
- Community engagement—New approaches to climate mitigation and adaptation engagement and community mobilization.

Resilience Implementation

- Financial-- Identification of creative financing mechanisms for both public and private recovery activities is essential, particularly related to enhancement of future resilience.
- Data gathering—We would like to integrate resilience capacity development data into our recently completed comprehensive GHG inventory and monitoring system.

Boulder has worked with a numerous organizations and consultants in our various projects. Entities that have expressed interest in partnering with the city include:

Energy—Schneider Electric, Rocky Mountain Institute

Climate Action—Stockholm Environmental Institute

Adaptation—Stratus Consulting

Community planning and design—Ecodistricts/Portland Sustainability Institute (early stage)

Hazard mitigation – AMEC Environment and Infrastructure, Inc.

Social—Bridge House

Institutional—National Hazard Center (Univ of Colorado), National Climate & Atmospheric Research Agency

7. What is the desired impact you want your resilience plan to have in terms of success? How might the plan impact various communities, especially poor or vulnerable residents?* (2000 characters)

Success Metrics for this Process:

1. Vulnerability assessment--Completion of a comprehensive vulnerability assessment including ranking of risks and prioritization for action.
2. Clarification of roles and responsibilities—Allocation of roles and responsibilities to address key vulnerabilities. This will have both a public sector component and private sector or other non-governmental institutions roles.
3. Action plan—Integration of resilience action strategies into existing department priorities as core elements of their respective implementation plans—and annual evaluation metrics. Outside the city, we would help support and coordinate resilience actions by external partners.
4. Implementation partnerships—Development of new partnerships and consortiums that coordinate resources and implementation actions to maximize resilience capacity development.
5. Metrics and monitoring—Clear performance metrics and outcome targets for key action items. These would ideally be integrated into the city's new climate action data management system.
6. Performance benchmarks—Development of clear performance benchmarks and timelines by which the community can determine whether substantive progress is being made towards improving community resilience.
7. Broad-based support and investment—Demonstrated and measurable internal and external support and investment in the resilience implementation plan. Of particular importance will be how the plan recognizes and includes lower income and particularly vulnerable portions of the community (elderly, disabled, youth) in the development and implementation of this plan. The measures of benefit for these elements of the community will need to be developed in collaboration with these populations to ensure that they correspond to the issues of greatest concern to them. This aspect of the engagement process will be given special consideration and resources as part of the outreach and engagement strategy.

8. How do you envision the role of a Chief Resilience Officer? Beyond salary support, what structure would be established to enable the CRO to succeed in building your city' resilience? We recommend that the CRO would have a direct reporting line to the mayor or a senior official. If you already have someone in a similar function/role, what duties and powers is he or she currently vested with?* (2000 characters)

Boulder has a Council-Manager form of government. The City Manager provides overall staff direction and oversight. The Director of Community Planning and Sustainability and the Director of Public Works report directly to the City Manager and supervise functional areas under which the majority of climate mitigation and adaptation/resiliency take place.

Much of Boulder's climate adaptation efforts have taken place through the Local Environmental Action Division and the Public Works department. Prior to the recent floods, a more extensive evaluation of adaption and resilience planning had been planned as part of later year workplans. Given the extensive impacts of the floods and the potential for more events of this type, a greater focus on adaptation and resilience planning is now a high priority. The establishment of a Chief Resiliency Officer position would be timely as part of the revision of 2014 workplans now underway. This position would play a critical role in this new focus on resilience assessment and implementation.

The Directors of Planning and Public Works are both strongly supportive of the creation of this position and its central role in the development and implementation of this new emphasis area. This will be a senior staff position that reports directly to either the Director of Planning or the Director of Public Works. They would also work closely with the senior planner coordinating climate mitigation efforts to assist each city department to integrate both climate mitigation and adaptation/resilience as part of their workplan and performance measures. We would also anticipate creating a multi-departmental team that would work with the CRO to coordinate the key performance outcomes outlined above. The city is committed to this position as an

ongoing, long-term role within the organization given the long-term timeframe required to significantly expand the community's resiliency in the face of increasing climate change related factors.

9. One key element to 100RC is the creation of the 100 Resilient Cities Network to facilitate sharing of best practices and lessons learned as well as become a source of knowledge on urban resilience building. What are the things your city would like to gain from the network and what are three things your city would contribute to the network?* (2000 characters)

What we hope to get from the network

1. Lessons learned—Exposure to strategies utilized by other cities related to the costs, benefits, impacts, lessons learned and opportunities for replication of these approaches and sharing this information with our surrounding sister cities and county. This could include access to “real-time” learning through access to program staff in other communities.
2. Policy development—Identification of areas for joint policy development and advocacy that would enable us to influence state and federal policies that improve resilience program implementation.
3. Financing strategies—Creative or innovative mechanisms to fund critical resilience implementation work.
4. Economies of scale—Opportunities for economic or financial collaboration that leverages the resources or services that are needed to effectively enhance key resilience assets—both physical, social, environmental and financial.

What we have to offer the network

1. Financing strategies—Experience and strategies for developing voter approved tax-based financing for climate and resilience program implementation.
2. Climate action monitoring—Experience from recent development of an extensive data management system designed to manage both the city organization and community-wide GHG related information. We can share the design and operations of this system, as well as explore how it can be expanded to include resiliency related data.
3. Local energy management—Experience and strategies for development of municipal utility and other local energy/renewable energy development and management systems, including extensive experience in development of residential and commercial energy efficiency services and standards.

10. Are you currently a participant in or have you participated in other networks? Which ones?* (500 characters)

Boulder collaborations include:

- International Council for Local Environmental Initiatives (ICLEI),
- Ecodistricts—Founding member city for national initiative focusing on neighborhood based resilience and sustainability planning
- US Sustainability Directors Network,
- Western Adaptation Alliance (WAA),
- Colorado Climate Network,
- US Conference of Mayors,
- Denver Regional Council of Governments - Sustainable Communities Initiative,
- Alliance for Innovation, and
- Applied Solutions

11. What about your city in particular makes you a good candidate for 100 RC? What unique perspective, knowledge, or capability do you bring? What essential problem must be addressed whose solution can also be replicable for other cities?*(2000 characters)

Boulder has a long history of innovative initiatives related to sustainability and climate change and to assisting other communities as an innovation partner. As noted earlier, we were the first community to tax itself for the preservation of open space, first to implement mandatory green building requirements, and the first to establish a carbon tax. We have a highly supportive and engaged community who recognize and support the importance of developing local solutions for global issues such as climate change. Boulder also has a unique set of local resources—both public and private—that have been successfully engaged in other major initiatives. These include:

Public/Institutional--the University of Colorado, National Institute for Standards and Technology, National Center for Atmospheric Research, the National Renewable Energy Lab, including its national wind energy center.

Private—Ball Aerospace, Google, IBM, Tech Stars, Tendril, E-Gauge, Simple Energy, The Foundry, Infield Capital, Sequel Venture Partners, Rally Software, Pivotal Labs, and numerous other venture start-up and capital firms.

These assets give Boulder the capacity to quickly pilot and scale-up promising approaches to both climate mitigation and adaptation/resilience strategies. Boulder is also working closely with other Front Range cities in Colorado to identify strategies and policy initiatives that require multi-community collaborations for implementation. These vehicles may also be of value to other communities and regions working on similar challenges.

While Boulder's vulnerabilities to climate related risks are not entirely unique, Boulder is attempting to design a replicable methodology that allows a community to quickly assess risks, identify opportunities and implement a short- and long-term vision. Operationalizing this type of practice is critical to dealing with future disruptive events.

12. Include a link to a map of your city in which you highlight and annotate areas and features of particular importance to your application responses.*

Please see attached map.

13. Please attach your letter of support from the senior-most representative of your city's government, whether elected or appointed.*

Please see attached letter.



CITY OF BOULDER OFFICE OF THE CITY MANAGER

October 10, 2013

Dear 100 Resilient Cities Grant Committee,

An epic flood on September 11 – 14, 2013, impacting cities across the Front Range of Colorado, including the city of Boulder, has tested and continues to test our community's resilience. The significant damage and displacement from historic rains has challenged the city's functions—and our residents and businesses—at an unprecedented level. But this event has also presented our community with an opportunity to come together, with neighbors helping neighbors and everyone pulling together. I'm proud of the city's response to the enormous logistical challenges during and after the flood, and our staff team's swift, capable, well-coordinated service, delivered with calm and compassion. I am also heartened by our successful collaborations between departments, with our community, and with other agencies, including Boulder County, the State of Colorado, the National Guard and FEMA.

But we could do better, and we know that with global climate change and the increased risk of wildfire, drought, storms and floods, there will be more—and potentially worse—natural disasters ahead. This is why I strongly support Boulder's application to participate in the 100 Resilient Cities Centennial Challenge.

The technical support and resources offered by the Rockefeller Foundation for developing and implementing a plan for urban resilience will enable Boulder not only to take the next step in crisis planning—building on what we've already learned and planned—but also to serve as a model in this field for other cities in Colorado, the nation and the world. The Boulder community values innovative, forward-thinking policies, and has a strong planning tradition and many leading edge programs to build upon. As our staff team has moved from flood response and near-term recovery to thinking about the challenges ahead, our conversations have focused on the concepts of resiliency, hazard mitigation, community engagement and integrated planning. The 100 Resilient Cities award would provide our community with timely and needed financial and technical support as we enter this important area of endeavor. I, my staff and our partners look forward to the opportunity to work with the Rockefeller Foundation in the 100 Resilient Cities Centennial Challenge.

Sincerely,

Jane S. Brautigam