



INFORMATIONAL MEMORANDUM

TO: Public Safety Committee
FROM: Rachel Bianchi
CC: Mayor Ekberg
DATE: May 10, 2017
SUBJECT: Public Safety Plan Sustainability Goals

ISSUE

Staff is seeking direction from the Committee on sustainability goals associated with the Public Safety Plan buildings program.

BACKGROUND

As the City continues to implement the Public Safety Plan, it is important that staff has direction from the City Council as to its thoughts and priorities around sustainability. Weinstein A+U, the architectural and engineering firm hired to design the fire stations has prepared the attached memo that provides an overview of various sustainability options, including an overview of third-party certification options.

The Public Safety Bond planning did not include funding for such certification, which alone can cost upwards of \$100,000 to receive the designation. Certification cost does not take into account hard costs that could be associated with achieving a certain certification as well. Overall budget implications will be an important part of whatever final strategy is laid out regarding the City's sustainability goals for public safety facilities.

RECOMMENDATION

Staff seeks the Committee's thoughts on potential sustainability strategies, goals and general guidelines to consider as the programming process for the fire stations moves forward. Staff would collect the Committee's comments and share them with the full council at an upcoming Council of the Whole meeting to solicit consensus from the entire council.

ATTACHMENTS

Weinstein A+U Memo dated May 9, 2017
Weinstein A+U Presentation
Resilient Cities Summit Report (for background)
Roadmap to Green Government Buildings (available online)

EVALUATING THIRD PARTY GREEN BUILDING CERTIFICATION FOR TUKWILA FIRE STATIONS MAY 9, 2017

Submitted by Weinstein A+U in collaboration with O'Brien and Company

Introduction

According to the *Tukwila Comprehensive Plan*, published in 2015, the City of Tukwila desires to be a community that prioritizes livability for its residents and responsible environmental stewardship for the benefit of future generations. In the execution of the Public Safety Program, the City now has a unique opportunity to embody those priorities in a set of buildings that will continue to serve Tukwila for the next 50 years or more. The design team for the new Tukwila Fire Stations, led by architecture firm Weinstein A+U, is delighted to assist the City in crafting new buildings that embody the culture of the City, in addition to optimizing the operations of the Tukwila Fire Department.

The design team recognizes that the City already has many critical goals directly related to sustainability, such as low building operating costs, the use of materials that will continue to perform and be attractive for the lifespan of the buildings, and promoting the health of the city's waterways. By choosing to fund high-performance buildings, not only will Tukwila support a healthier environment for all and save money over the life of the buildings, but it will also provide resilient, restorative facilities for its first-responders. A building that operates with minimal energy input will have an enhanced ability to function in the event of a natural disaster or fuel shortage, running much longer than a conventional building when forced to use a back-up generator. Buildings that incorporate quality daylighting strategies and high indoor air quality standards have been demonstrated to improve both the physical and mental health of their occupants, increasing worker productivity and reducing the number of sick days taken by employees. Lastly, cities that are growing at a rate such as Tukwila's have an opportunity to influence the quality of that growth by setting a good example with their public facilities. High-performance public buildings can be advertised as saving tax-payers money in the long term, but they can also further educate constituents about the varied benefits of sustainable design, inspiring consumers – and by extension, private developers – to value sustainable strategies in all types of construction.

Given the many benefits of choosing to pursue high sustainability goals for new public buildings, the purpose of this memo is to help the Tukwila City Council understand how Green Building Certification could help achieve those goals on their new fire stations, as well as adding further value to these projects.

Why consider third party certification?

Third party certification of a project's green building features provides three main benefits: **accountability, public recognition, and better building performance.** Accountability means that an owner can use third party certification to hold the design and construction team to established standards, and receive verification that those standards were met by an impartial outside entity. This leads to a transparency and comparability that allows public owners to communicate to constituents and stakeholders that they are providing a building of a certain standard, which can be compared to projects provided by other public entities using the same certification system.

The most direct value for owners from using a third-party certification is driving better building performance. Many certification programs are comprehensive, requiring projects to address multiple environmental issues to a certain level in order to earn certification. This acts as a driver for owners

and project teams to identify ways to improve all aspects of environmental sustainability addressed in a certification program. Third party certification also provides an additional, impartial metric for evaluating individual strategies for a project, allowing teams to determine which strategies will best achieve a given performance threshold within a project budget.

Alternatives to third-party certification

Third-party certification has an additional cost to the project and can sometimes require projects to implement strategies that are not the best fit. There are other tools an owner can use to achieve the accountability and building performance that third-party certifications provide. These tools can also be used in conjunction with a third-party certification to assure a successful certification; however, they do not provide the same ability to promote a project's achievements, or to understand how the project is performing compared to similar projects.

Some examples of these tools are:

- Contracting methods: Integrated Project Delivery, Design/Build with performance guarantee
- Decision-making tools: Life-Cycle Cost Analysis and Energy Benchmarking
- Verification tools: Monitoring-based commissioning, building envelope commissioning, Energy Star Portfolio Manager

Regional Precedents

Since third-party certifications for green building began to show up in the market in the late 1990s, many government entities of all sizes have looked to these outside resources to help set consistent, impartial standards for achieving environmental, climate, and performance goals for the assets they build and manage. According to the US Green Building Council's Public Policy Library, there are currently 215 government policies in the US requiring some sort of green building certification for public buildings (*searched 05/03/2017*). These stretch from the federal level to small and large cities and are in the East, South, Midwest, Southwest, and Western parts of the country. The following section highlights some of those policies relevant to the Pacific Northwest region.

Federal, State, and Local Municipal Certification Requirements

Federal Executive Order 13423, adopted in 2007, requires federal agencies to meet high-performance and sustainable building goals. Those goals have been translated into federal guidelines by the General Services Administration, who has endorsed both LEED and a version of Green Globes as tools for agencies to prove compliance with the guidelines.

Since 2005, Washington State has required that all major facility projects of public agencies receiving funding in a state capital budget, or projects financed through a financing contract, be designed, constructed, and certified to at least the LEED Silver standard. RCW 39.35.040 also requires these projects to conduct a life-cycle cost analysis to evaluate energy efficiency options.

King County's 2013 update to the Green Building and Sustainable Development Ordinance requires all eligible new construction projects to strive for LEED Platinum certification or, for non LEED-eligible projects, the highest level of certification available on an internal sustainable infrastructure scorecard or other approved third-party certification. Other approved programs include Built Green, Evergreen Sustainable Development Standard, Salmon Safe, and Living Building Challenge.

City of Seattle's Sustainable Buildings and Sites Policy for municipal facilities requires new construction and major renovations 5,000 square feet or greater to meet LEED Gold, as well as key

performance requirements for energy and water efficiency, waste diversion, and bicycle facilities. Seattle also has several private-sector incentive programs in place that provide fast track permitting, additional FAR, and additional height.

The cities of Kirkland, Shoreline, Lynnwood, Bothell, Newcastle, and Redmond all have private-sector incentive programs for green building (fast-track permitting is the most common), but no policy requirements for municipal buildings. Issaquah has Resolution 2004-11, which requires LEED Silver or Built-green 4-star. Non-applicable building types must refer to those systems for applicable green building practices but do not have to pursue certification.

Certification Status for Fire Stations Locally and Nationally

LEED is by far the most common certification program used by agencies and municipalities for fire stations and related facilities. There are over 300 LEED certified fire facilities internationally and another 300 registered. Seventeen of the certified projects are in Washington, primarily in Seattle. Olympia, Vancouver, and Issaquah also have certified fire stations. Green Globes has a handful of certified fire stations across the US, none in Washington. Overall Green Globes has certified 53 buildings in Washington of all types, many owned by federal agencies.

Example projects

- Seattle Fire Station 20, completed in 2014, is the highest rated LEED Platinum Fire Station certified. It is 9,400 sf with space for two apparatus and features a solar PV array, green stormwater infrastructure, durable low-maintenance materials, and high-efficiency glazing for daylight, sound control, and energy efficiency. In 2016 it earned the F.I.E.R.O. Honor and Seattle Design Excellence Awards.
- City of Eagan Public Safety Center in Minnesota was the first Green Globes certified fire station in 2011. The 38,000 sf building combined two previous fire stations into one centralized location and also serves as a training center and dorm for volunteer fire fighters. It features a ground source heat pump, daylighting and LED lights, and recycled materials.
- City of Olympia Fire Station 4 was also completed in 2011 and earned LEED Gold. It is 13,370 sf, including some administrative space, and features aggressive insulation, heat exchangers, and a highly efficient HVAC system along with functional daylighting design. This project won the National Fire Chief Station Style First Place award.

Certification options

When evaluating use of a third-party certification program, it is important to consider that there are a variety of options, including the most common system, Leadership in Energy and Environmental Design (LEED) by the US Green Building Council. Some address green building across multiple categories and some focus on one aspect of sustainability that may align best with an owner's goals.

Comprehensive Environmental Sustainability Certifications

LEED

- Most widely recognized and accepted program; used by most municipal, county, and state policies for green building.
- Estimated \$85,000 to \$125,000 in administrative costs and certification fees per building. Some efficiencies for projects designed and built at the same time by the same teams.

- The latest version, LEED v4, has a number of new credits that can drive better building performance, such as those for integrative process, whole building life-cycle assessment, green stormwater infrastructure, and advanced commissioning.
- LEED certification for similar buildings are likely to be one level lower in Version 4 than it would have been in the previous version, e.g. LEED v3 Gold building = LEED v4 Silver building

Green Globes

- Criteria substantially similar to LEED, except no prerequisites and includes the ability to determine which credit categories are applicable.
- Uses surveys and on-site verification to ease documentation requirements. Access to verifier via phone and e-mail during design.
- Estimated \$60,000 - \$80,000 in administration, verification, and certification fees.

Living Building Challenge (LBC), LBC Petal, or Net Zero Certification

- All features of the program are required for LBC certification, and the features from three of six categories are required for Petal certification. Net Zero certification is available for buildings that produce 105% of the energy they use on an annual basis.
- Requirements are high, e.g. net zero energy or net zero water, which results in a high performing building.
- Performance verified after one year of continuous operations.
- \$15,000 - \$25,000 in certification fees. Additional administrative costs could exceed LEED costs.

Certifications Specific to an Environmental Attribute

Salmon Safe

- Unique local program focused on regional issues of storm water management, water quality, habitat, and landscape management.
- Requires recertification every five years to maintain recognition. Requirements customized in agreement between certifier and organization receiving certification. On-site verification.
- Fees variable and grants sometimes available. Less cost than LEED and Green Globes.

Energy Star

- National, federal benchmarking program for building energy and water efficiency.
- Based on one year of performance data, verified by an engineer.
- No certification fees. Costs for verification negotiated with verifier.

WELL Building Standard

- New standard focused on health and wellbeing. Developed and run by for-profit "B" corporation with support from the US Green Building Council (also manages LEED) and International Living Future Institute (also manages LBC).
- Compatible with LEED and LBC, with a segment of overlapping requirements.
- \$25,000 in certifications fees. Administrative costs still unknown.

Recommendations

Since the values of the City of Tukwila and the functional needs of the Tukwila Fire Department are both supported by the construction of high-performance fire stations, the design team strongly suggests that the City incorporate sustainability goals into its Public Safety Program. The intensity of those goals and the decision how (or if) to certify those buildings will be largely determined by the available funding.

In order to meet those goals, regardless of whether a third-party certification system is used:

- Set specific measurable objectives for building performance and develop owner's project requirements (OPR) early in the design phase.
- Establish a fair method of verifying results to hold the project team accountable for achieving the project goals and requirements.
- Engage commissioning professionals for both building systems and building envelope commissioning. Consider ongoing, monitoring-based commissioning.
- Use Energy Star Portfolio Manager to benchmark and track building performance. Consider Energy Star building certification.

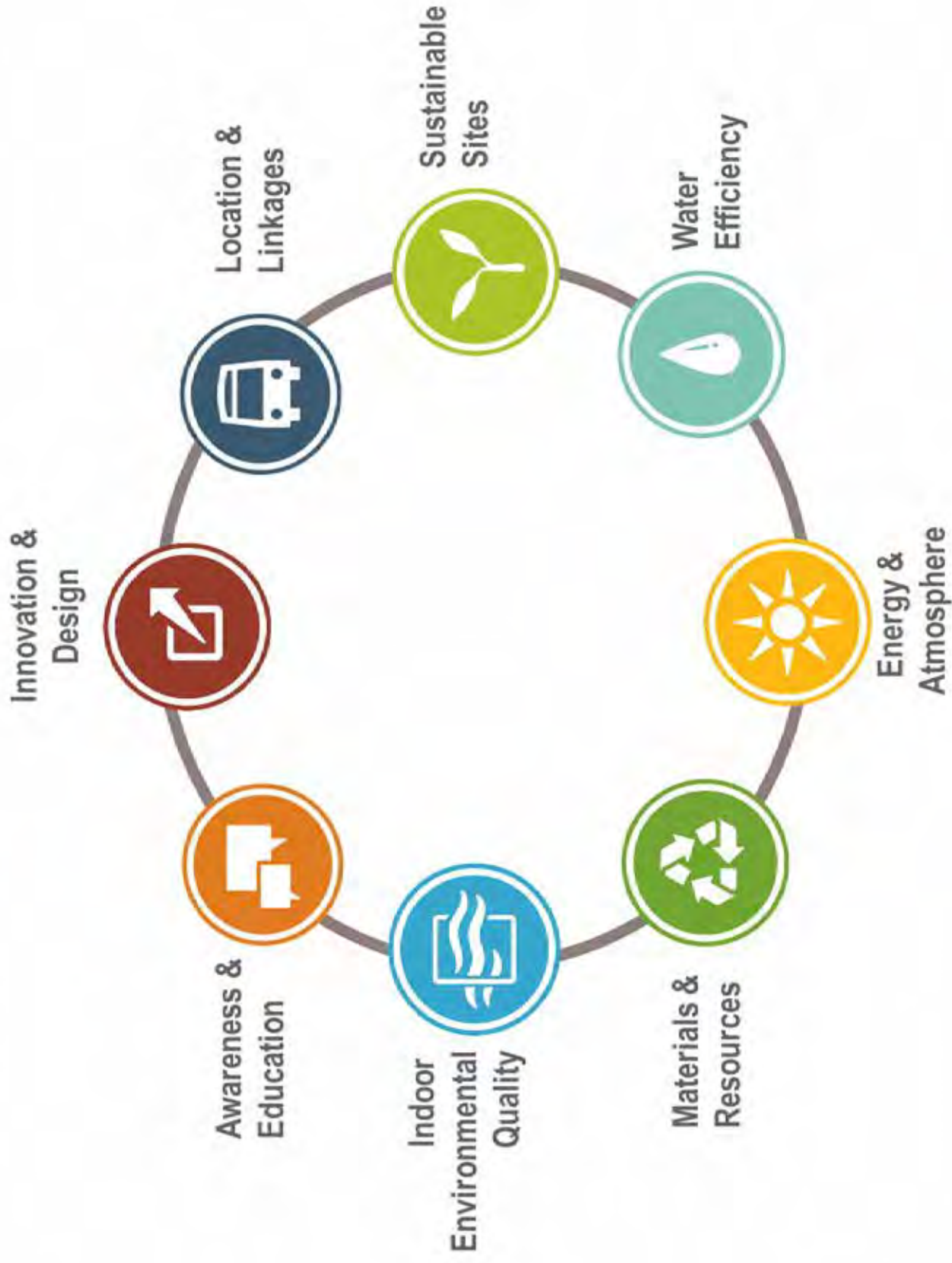
In considering whether to use a third-party certification system:

- Understand how your project goals and desired sustainability strategies align with what the system measures. Projects that follow the steps above and craft a strong approach to green building often are very easy to certify, requiring limited adjustments or additions to what was already planned.
- Articulate what makes a certification valuable to this project so it is clear what the process should achieve – additional accountability, tools for public recognition and reporting, a higher level of building performance, etc.
- Decide as early as possible if you will proceed with a certification to allow the project team to integrate the standards in the system into the design from the beginning. This minimizes possible additional costs for redesigning and backtracking to collect information.

Timeline

While it is most efficient for a design team to have established sustainability goals to work with when going into the programming phase for a new building, we understand that the City of Tukwila's priorities for its new fire stations are still evolving. Before moving forward into the schematic design phase of the first station in August 2017, the programmatic needs and desires of both the fire department and city will need to be reconciled with the budgets that have been established for all three stations. Given that there is likely to be some modification of either budget or building scope that comes out of that reconciliation process, we recommend adding a desired level of sustainability performance to that decision matrix.

In order to facilitate those decisions, the design team will strive to organize our final building programs and subsequent cost analysis into a set of options that will help the City choose which level of spending best aligns with its highest priorities. For the City's part, it will be crucial to understand and finalize their priorities in the coming weeks so that a final decision on scope and budget can be made efficiently during the budget reconciliation period, which is currently scheduled for July 2017.



BUILDINGS

SEQUIM CIVIC CENTER, INTEGRUS ARCHITECTS, LEED GOLD



EVERETT MUNICIPAL COURT, DLR GROUP, LEED SILVER



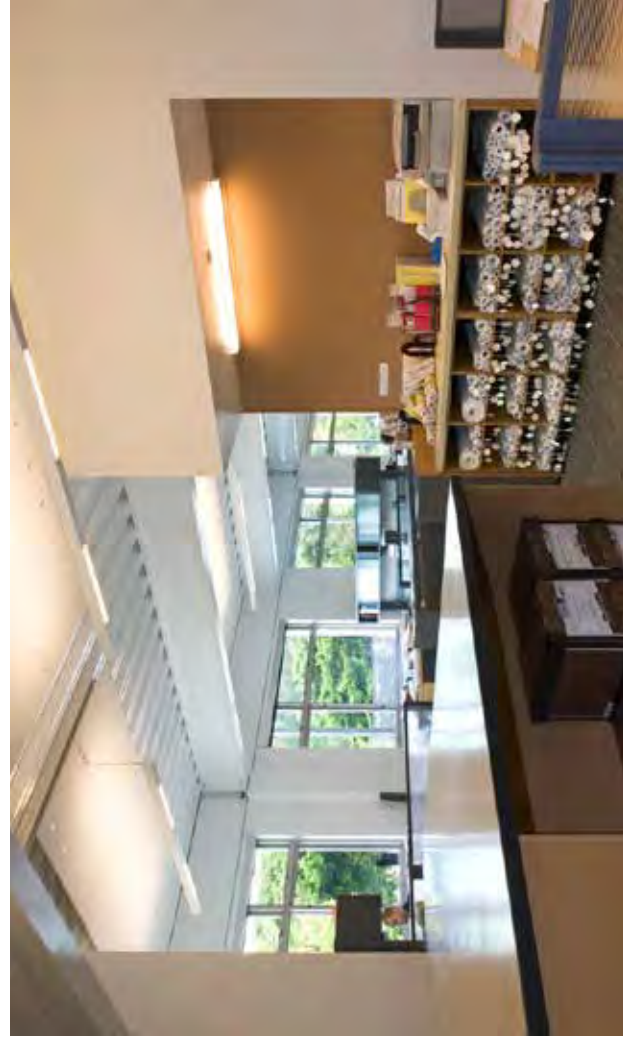
KCLS DUVALL BRANCH, JOHNSTON ARCHITECTS, LEED SILVER

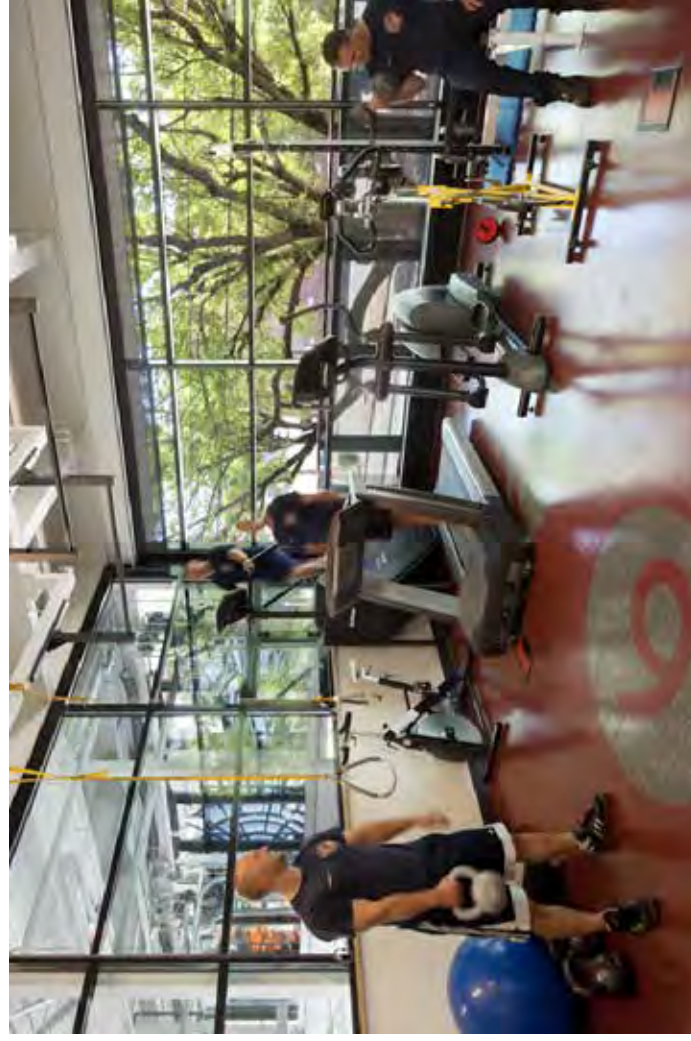
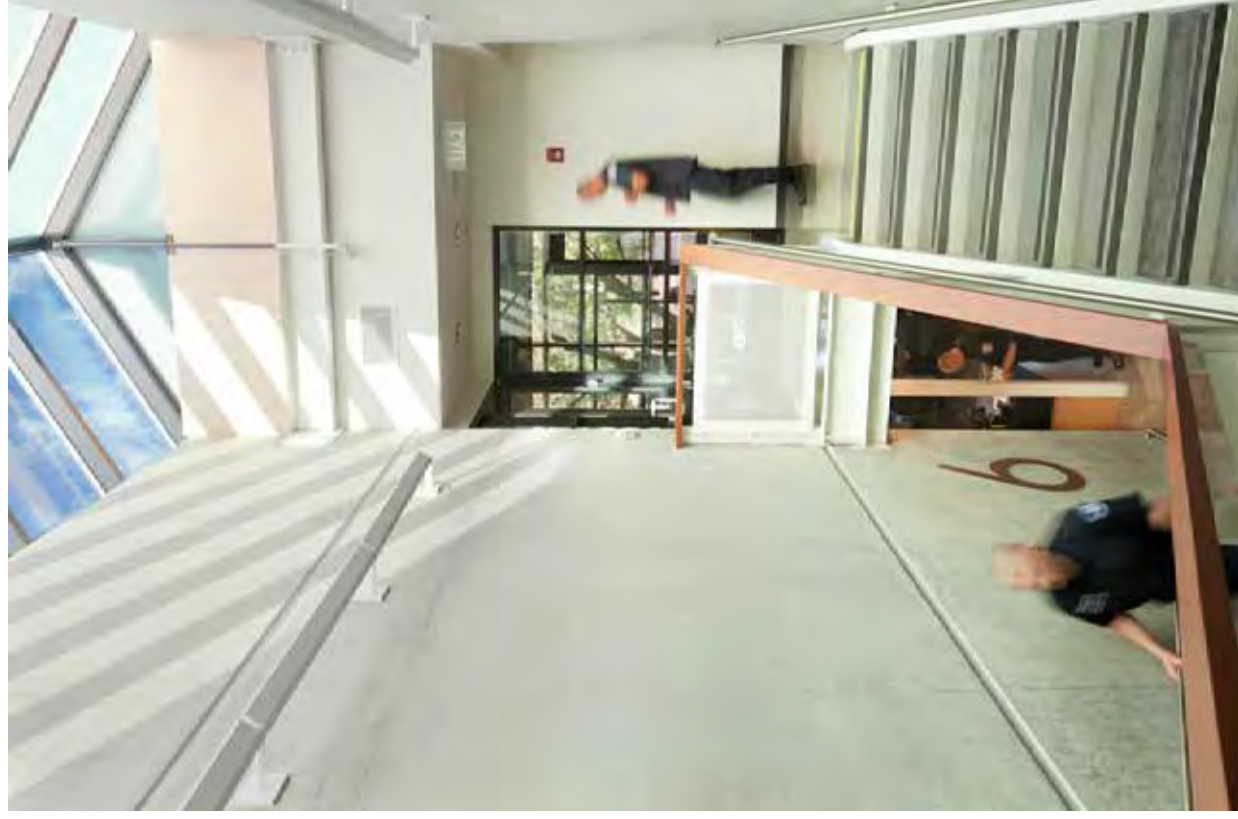


BOTHELL CITY HALL, MILLER HULL, LEED GOLD



BUILDINGS KENMORE CITY HALL, 2010, LEED v2 GOLD





BUILDINGS GRAND COULEE DAM FIRE STATION, 2017, LEED v4 SILVER (PROJECTED)



COMPONENTS BUILDING ORIENTATION + DAYLIGHTING



COMPONENTS BUILDING ORIENTATION + DAYLIGHTING

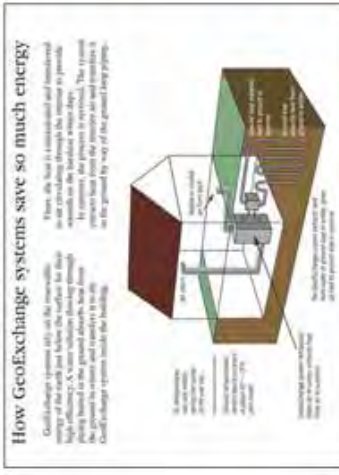


- 1 **Solar Shades** Modulate the direct sunlight entering the space
- 2 **Interior Light Shelves** Reflect sunlight onto the ceiling for additional illumination



- 1 **Thermal Breaks and Air Barriers** Minimize leakage of cold through the envelope //
- 2 **High Performance Insulation and Glazing** Maintain desired interior temperatures, regardless of weather outside

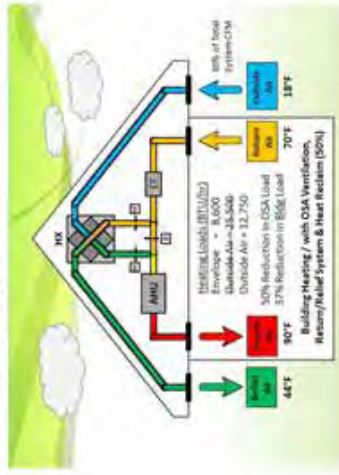
Geothermal System



Radiant Floor



Heat Recovery System



Vacancy Sensor

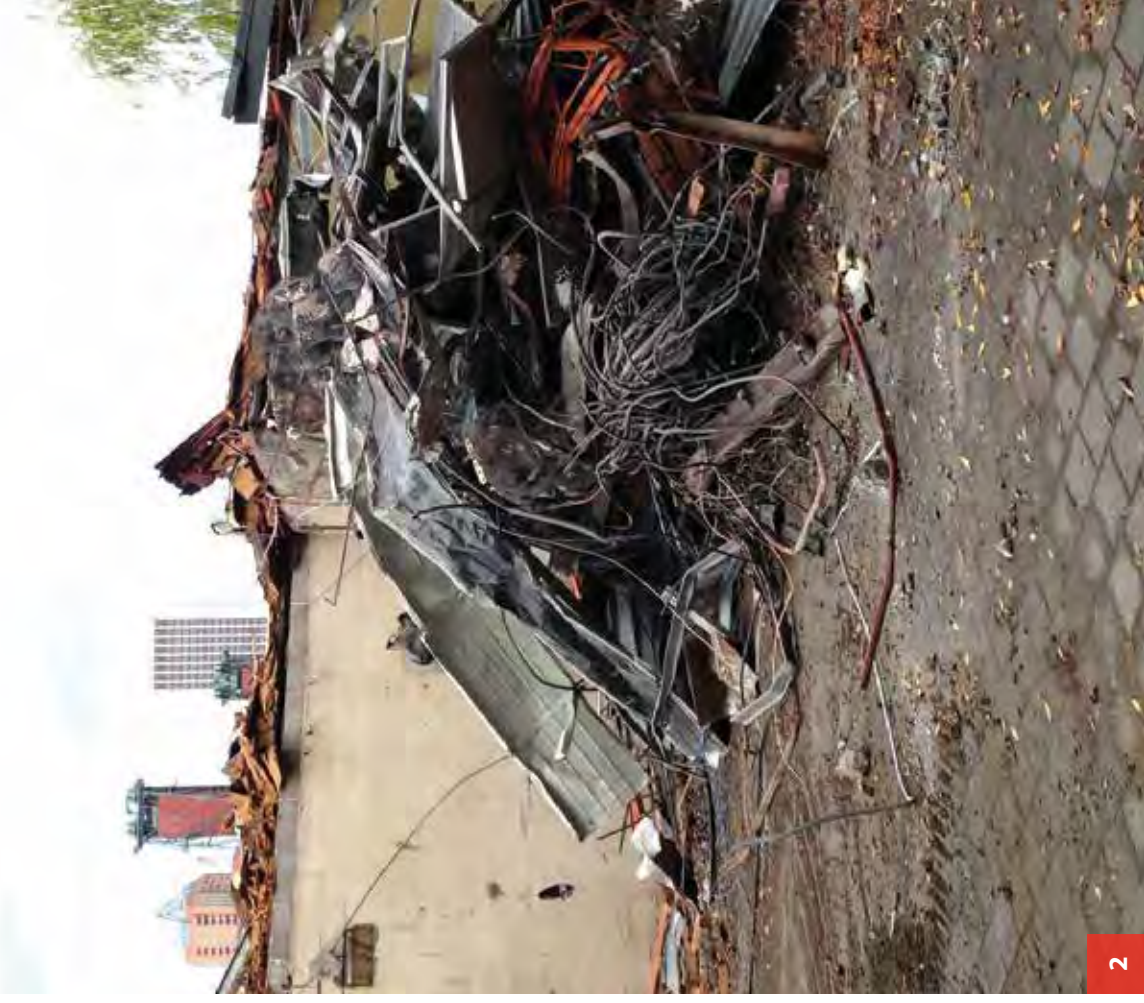




COMPONENTS RECYCLED MATERIALS



1 Material Salvage A fallen tree is transformed into a dynamic sculpture that will grace the project's interior // **2 Material Recycling** Any existing structures on site will be sorted into component parts and recycled or disposed of in a responsible way



COMPONENTS NATIVE + DROUGHT-TOLERANT SITE VEGETATION

Green Roof



Bio-Retention Planter



Native, Drought-Tolerant Plants



Mountain Hemlock
Tsuga mertensiana



Sword Fern
Polystichum munifolium

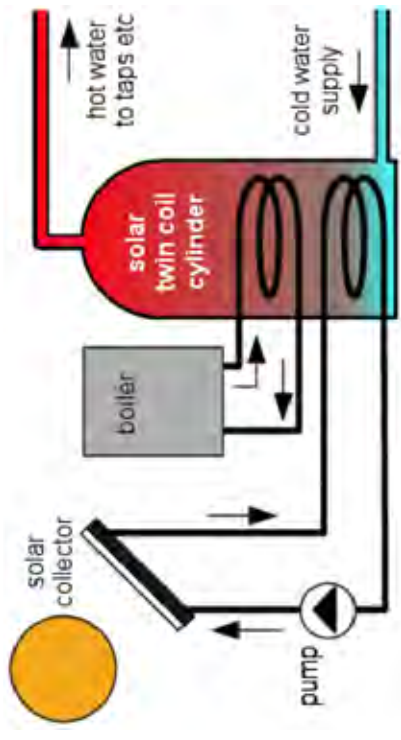


Salal
Gaultheria shallon

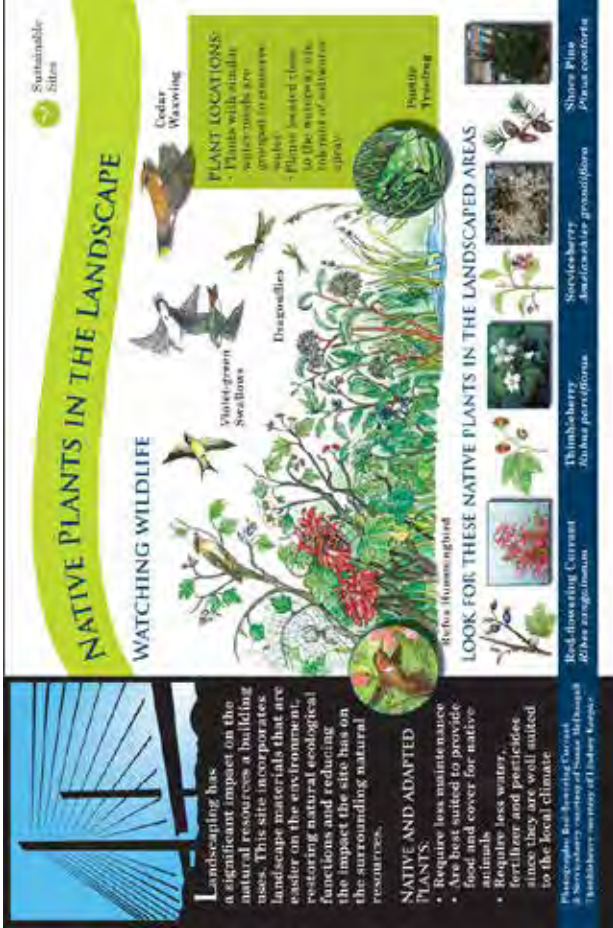


Vine Maple
Acer circinatum

COMPONENTS ON-SITE RENEWABLES



- 1 **Solar Hot Water** Reduces energy costs by pre-heating domestic hot water
- 2 **Photo-voltaic Panels** Reduce building dependence on the energy grid and provide a visual message to the community about sustainability



1

1 Exterior Signage Allows the general public to identify and appreciate sustainable strategies without entering the building // **2 Educational Art** Installations that vary with site or building conditions, or give information about the building's mission or performance can provide ways for people to interact with the building from the outside



2

EDUCATION INTERIOR SIGNAGE



4 TCC Public Safety Subcommittee Meeting
May 15, 2017



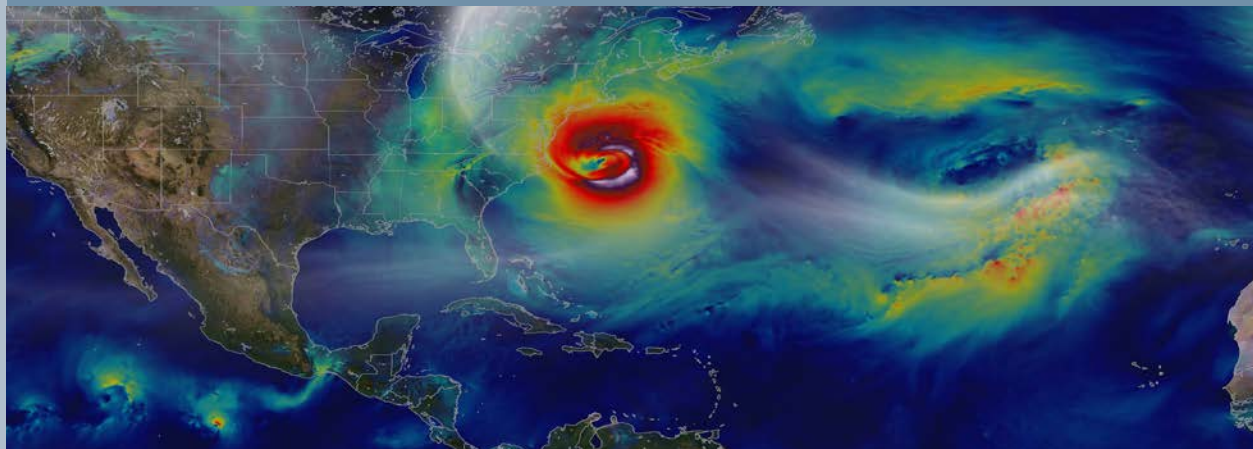
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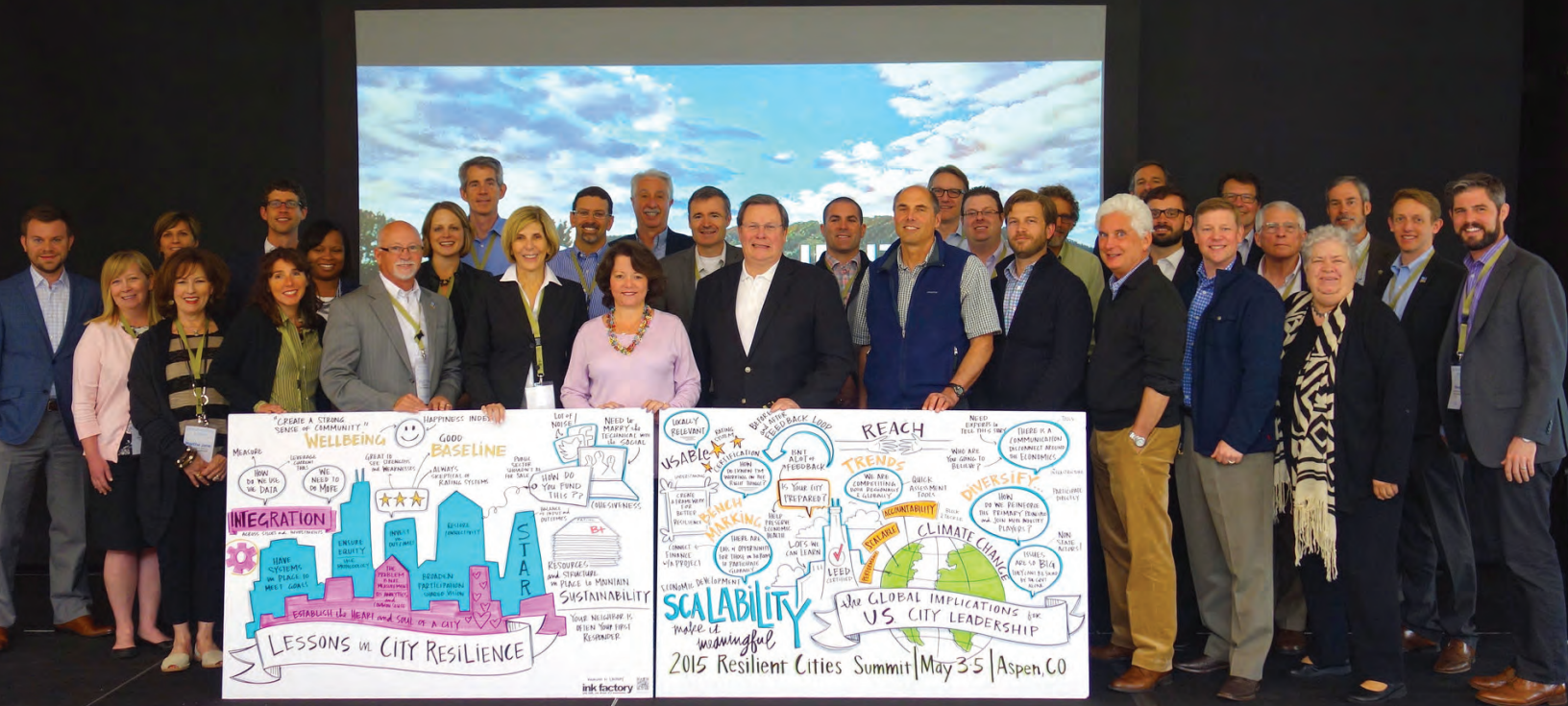
1 Interior Signage Gives the opportunity for deeper learning about building systems for visitors and daily occupants // **2 Digital Displays** Provide real-time data on the performance of the building... and the chance to foster some healthy competition between battalions over who can conserve the most energy on their shift

Resilient Cities Summit

Aspen, Colorado

A REPORT OF THE 2015 SUMMIT





City leaders and resilience experts from across the U.S. gathered in Aspen, Colorado for the 2015 Resilient Cities Summit.



The Resilient Communities for America Campaign is a national effort to mobilize hundreds of U.S. local elected officials to overcome our nation's extreme weather, energy, and economic challenges through enhanced community resilience. The campaign promotes local leadership on resilience, providing local governments that join the campaign with critical resources to help them achieve their goals. The centerpiece of the campaign is the Resilient Communities for America Agreement, a document that hundreds of local elected officials have signed to formalize their commitment and showcase their leadership.

For more information, visit www.ResilientAmerica.org



Brock Environmental Center, Virginia Beach, VA



Bertschi School, Seattle, WA

We build for a better society
by collaborating with customers
to create resilient communities.



Heat Restoration for Homes Affected by Hurricane Sandy, Coney Island, NY



University Medical Center, New Orleans, LA



I 4 Ultimate, Orlando, FL

SKANSKA

www.skanska.com



The National League of Cities (NLC) is the nation's leading advocacy organization devoted to strengthening and promoting cities as centers of opportunity, leadership and governance. Through its membership and partnerships with state municipal leagues, NLC serves as a resource and advocate for more than 19,000 cities and towns and more than 218 million Americans.

NLC's Center for City Solutions and Applied Research provides research and analysis on key topics and trends important to cities, creative solutions to improve the quality of life in communities, inspiration and ideas for local officials to use in tackling tough issues and opportunities for city leaders to connect with peers, share experiences and learn about innovative approaches in cities.

nlc.org



The Urban Land Institute (ULI) is a non-profit education and research institute supported by its members. Its mission is to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide. Established in 1936, the Institute has more than 36,000 members worldwide representing all aspects of land use and development disciplines. It is through member involvement and information resources that ULI has been able to set standards of excellence in development practice.

The ULI Center for Sustainability is dedicated to creating healthy, resilient, and high-performance communities around the world. Through the work of ULI's Greenprint Center for Building Performance and Urban Resilience Program, the Center advances knowledge and catalyzes adoption of transformative market practices and policies that lead to improved energy performance and portfolio resilience while reducing risks due to a changing climate.

uli.org



The U.S. Green Building Council (USGBC) is committed to a prosperous and sustainable future through cost-efficient and energy-saving green buildings. USGBC works toward its mission of market transformation through its LEED green building program, robust educational offerings, a nationwide network of chapters and affiliates, the annual Greenbuild International Conference & Expo, the Center for Green Schools and advocacy supporting public policy that encourages and enables green buildings and communities. For more information explore the **Green Building Information Gateway (GBIG)** and connect on **Twitter**, **Facebook** and **LinkedIn**.

usgbc.org

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Acknowledgments

We are grateful for the leadership of our nation's mayors and local government leaders, and for this opportunity to elevate their outstanding work. We would like to extend a special thank-you to **Mayor Ralph Becker** and **Mayor Frank Cownie** for their outstanding leadership on these issues, and for motivating this group of NGOs, businesses and city leaders from across the U.S. to convene on this important topic.

In addition, the following staff contributed extensively to the program and report.

Paul Angelone, Manager at ULI Washington, DC

Katharine Burgess, Director of Urban Resilience at ULI

Jason Hercules, LEED technical manager for neighborhoods at USGBC

Joe Hergert, Sponsorship & Exhibition Associate at USGBC

Sarene Marshall, Executive Director of ULI's Center for Sustainability

Cooper Martin, Program Director for the NLC's Sustainable Cities Institute

Brenden McEneaney, Executive Director, USGBC-Northern California Chapter

Jessica Pinkston, Event Manager at USGBC

Brooks Rainwater, Center Director in NLC's Center for City Solutions & Applied Research

Jeremy Sigmon, Director of Technical Policy at USGBC

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TRANSFORMING CITY RESILIENCE THROUGH IMAGES AND DATA ANALYTICS

To accomplish resiliency, governments require properly planned infrastructure and programs to quickly assess impacts caused by major events. With the mobile imaging and remote sensing technologies of Trimble® Unmanned Aircraft Systems (UAS), governments can quickly accomplish change or damage assessments to prioritize planning and response efforts from macro to micro scale. The Trimble UX5 UAS provides rapid images for mapping and analysis. Coupled with Trimble eCognition® software, city staff can import, fuse, interpret, and analyze data from the UX5 as well as other sources to achieve a greater understanding of their environments. Combining powerful images and analytics improves accuracy in taxation, aids effective transportation and infrastructure design, and promotes healthier environments more in balance with nature—all resulting in greater city resilience.

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-  Comprehensive geospatial deliverables for resiliency planning and monitoring
-  Trimble is a 100 Resilient Cities Platform Partner

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PREFACE

FEW THINGS ARE MORE INSPIRING THAN A GROUP OF MAYORS GATHERED together to collaboratively take on a challenge. The U.S. Green Building Council and the National League of Cities are not the first to facilitate such a meeting, but the May 2015 Resilient Cities Summit was a fantastic event, and an important milestone in the emergence of community resilience as a central challenge for 21st century cities.

Traveling the country today, it is not hard to find glowing examples of local government leadership on climate mitigation, disaster preparedness, hazard adaptation and sustainability. These and other efforts are now finding a new brand as part of what makes a community stronger, more sustainable and more resilient. Part of our challenge is to find a new language to communicate the critical risks and rewards of resilience. Another part of our challenge is to help share the innovative local solutions broadly and to connect city needs with those organizations and programs that can help.

As community resilience emerges as a field of professional study, community leaders are among the first to take notice. Already, resilience has become an essential part of federal grant-making and regulation as well as a risk management priority for American businesses, compelling local governments to sharpen their focus on how their existing and future projects can best incorporate resilience thinking and action. In just a few short years, the subject has rapidly begun weaving into multiple fields, including emergency response, municipal planning, economic development engineering, environmental policy and public health, among others. Cities must adapt to this emerging context and adopt a new language to meet public interest and investor priority.

Convening is the easy part. Thanks to the 2015 Summit, city leaders have begun unpacking this new language and landscape, and developing connections with business, philanthropic and non-profit perspectives. It is a long road ahead, requiring both a continual focus on elevating the importance of a resilience agenda and also an ongoing commitment to collective learning.

This document seeks to capture the spirit and passion of the ideas that were shared over the course of the two days of the 2015 Resilient Cities Summit. While there is much work left to do, we will be most effective if the private, public and civic sectors tackle these challenges together.

Whether you participated in the Summit, are concerned about these issues in your own community, or have expertise to share on this topic, we look forward to working with you on our common journey towards a more resilient America.



Clarence Anthony
Executive Director
National League of Cities



Roger Platt
Senior Vice President,
Strategic Planning
Green Business
Certification, Inc.

SUMMIT OVERVIEW

“...resilience is still not widely understood among local government officials or the public.”

INTRODUCTION

In May of 2015, the National League of Cities (NLC) and the U.S. Green Building Council (USGBC) partnered to host the first Resilient Cities Summit. The Summit was hosted at the Aspen Institute in Aspen, Colorado, which provided a fitting venue for the discussion. The surrounding community is well-known as a resort destination, but even here the impacts of changing weather patterns are being felt as the ski season shortens, causing ripple effects throughout the tourism-based economy. Communities in the region also face varied and growing threats that include wildfire, flash flooding, and a spike in the presence of the emerald ash borer, a non-native insect.

For some, the idea of fostering resilience is not new. Hurricane Katrina, in 2005, is considered by many to mark the birth of ‘resilience’ as both a term and call to action in the urban context. The event marked a shift in federal priorities that had previously been focused on preparing for and mitigating terrorist threats and other manmade hazards, and emphasized that natural disasters still pose the greatest threat to the majority of Americans. It also underscored the inadequacies of a “response-only” approach to such extreme natural events. That same year, the National Institute of Building Sciences (NIBS) published a widely cited report that documented how every \$1 spent on disaster mitigation saves an average of \$4 in averted recovery and rebuilding costs.¹ An ounce of prevention really was worth a pound of cure.

Since that time, a significant amount of progress has been made. Within the federal government, two presidential policy directives have been issued regarding resilience and preparedness (PPD 8 and 21), the Office of Sustainable Communities within the Department of Housing and Urban Development has been renamed the Office of Economic Resilience, and the recovery package passed by Congress in the aftermath of Superstorm Sandy was significantly influenced by a desire to build back better.^{2,3} Professionals in environmental, risk management, urban development, and homeland security fields have increasingly worked together to recognize and pursue mutual goals.

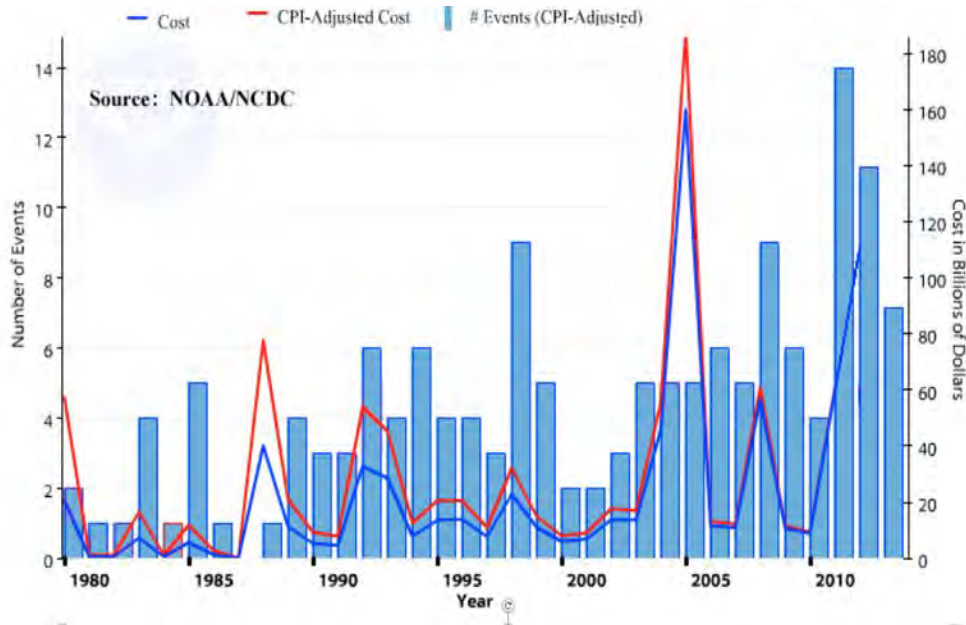
However, even as practitioners point to these achievements, resilience is still not widely understood among local government officials or the public. Concepts embedded in resilience—and related terms like mitigation, preparedness, and adaptation—are not quick to explain and do not make for rousing applause lines on the campaign trail. Additionally, success stories have predominantly originated from large cities or from areas that have recently experienced disaster. Smaller cities, cities with fewer resources, and cities with different hazards can feel that resilience efforts amount to little more than an unfunded luxury.

Risks to the economic and environmental assets—whether in coastal cities like New Orleans and New York or small mountain towns like Aspen—was one of the many themes that was explored at the Summit, transcending city location and size.

As the figures on this page clearly demonstrate, both the frequency and severity of disasters has dramatically increased in recent decades. There is growing certainty that climate change will exacerbate many of these hazards, but even without these effects it is clear that communities in the United States are poorly prepared to respond and recover from the disaster events they face today. It is these risks, and others like it, that professionals who work in community resilience seek to reduce.

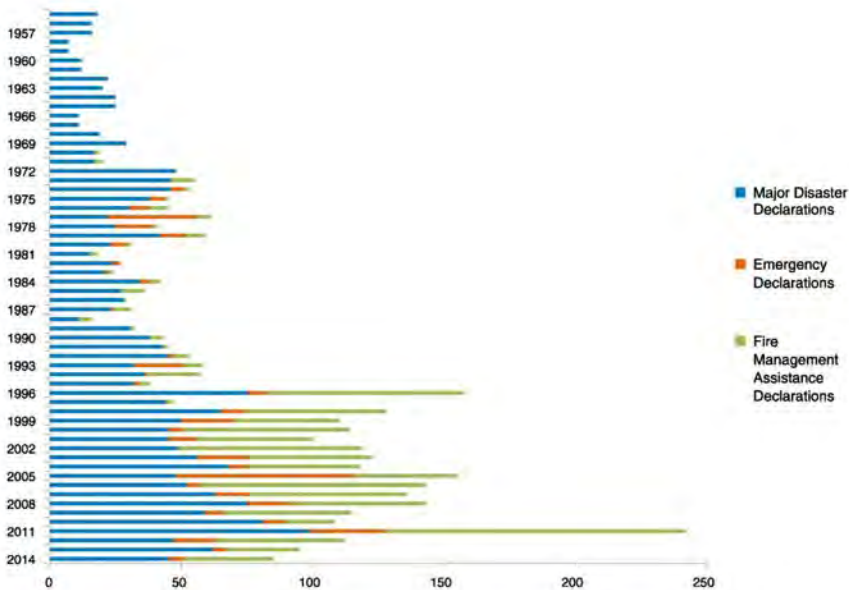
With this backdrop, the 2015 Resilient Cities Summit sought to achieve two main objectives: to share knowledge, foster greater connections and to set these and other local leaders up for more clearly and confidently tackling resilience in the future.

Billion-Dollar U.S. Weather Disasters, 1980 - 2013



This chart from the National Oceanic and Atmospheric Administration (NOAA) demonstrates the rising cost of disasters. Total cost of US disasters is tracked in both inflation adjusted and consumer price index adjusted numbers. Additionally, bars count the total number of disasters that exceed \$1 billion each year.⁴

Federal Disaster Declarations, 1957-2014



"The Research Basis for Disaster Resilience." The U.S. Department of Housing and Urban Development displays the increase of federal disaster declarations from 1955-2014.⁵

This report seeks to capture some of the most inspiring and insightful pieces of the conversation that took place, and to link those ideas with additional resources and case studies from across the country.



Council Member Ann Mullins
City of Aspen, CO



Mayor Brad Hill
Town of Edgewood, NM

From left to right: Cleveland,
Ohio Councilman Matt Zone;
NLC Center Director, Brooks
Rainwater; Salt Lake City, Utah
Mayor Ralph Becker; Meridian
Institute Senior Partner,
Mike Lesnick.

LIST OF ATTENDEES

City Leaders

- Mayor Matthew Appelbaum**, City of Boulder, Colorado
- Commissioner Jules Bailey**, Multnomah County, Oregon
- Mayor Bruce Bassett**, City of Mercer Island, Washington
- Mayor Ralph Becker**, Salt Lake City, Utah
- Mayor Frank Cownie**, Des Moines, Iowa
- Laurel Creech**, Director of Sustainability, Office of the Mayor, Nashville, Tennessee
- Mayor Brad Hill**, Town of Edgewood, New Mexico
- Mayor Pro Tem Gerry Horak**, City of Fort Collins, Colorado
- Mayor Matthew Larson**, City of Snoqualmie, Washington
- Mayor Cindy Lerner**, Village of Pinecrest, Florida
- Councilmember Ann Mullins**, City of Aspen, Colorado
- Mayor Jeri Muoio**, City of West Palm Beach, Florida
- Councilmember Pam O'Connor**, City of Santa Monica, California
- Patrick Otellini**, Chief Resilience Officer, City and County of San Francisco, California
- Mayor Shawn Reilly**, City of Waukesha, Wisconsin
- Mayor Steve Skadron**, City of Aspen, Colorado
- Mayor Mark Stodola**, City of Little Rock, Arkansas
- Mayor Peter Swiderski**, Hastings-on-Hudson, New York City
- Councilmember Matt Zone**, City of Cleveland, Ohio



LIST OF ATTENDEES *continued*

Experts

- Sam Adams**, Director, Climate Initiative, World Resources Institute
- Julie Buffenbarger**, Chairman, Concrete Joint Sustainability Initiative
- Kevin Bush**, Senior Analyst, U.S. Department of Housing and Urban Development
- Ryan Colker**, Presidential Advisor, National Institute of Building Sciences
- Joan Card**, Senior Policy Advisor, U.S. Environmental Protection Agency
- John Coster**, Green Business Officer, Skanska USA
- Jad Daley**, Director, Climate-Smart Cities, The Trust for Public Land
- Warren Edwards**, Executive Director, Community and Regional Resilience Institute
- Angie Fyfe**, Director, Resource Efficiency and Renewable Energy, ICLEI Local Governments for Sustainability, USA
- Rick Gosalvez**, Market Manager, Trimble
- Jeremy Gregory**, Executive Director, Concrete Sustainability Hub, Massachusetts Institute of Technology
- Jason Hartke**, Program Manager, Commercial Buildings Integration, U.S. Department of Energy
- Michael Lesnick**, Senior Partner, Meridian Institute
- YaLonda Lockett**, Executive Director, Federal & State, Constellation
- Jamie Mandel**, Principal, Snowmass, Rocky Mountain Institute
- Martha Jane Murray**, Program Manager, Clinton Foundation
- James Newcomb**, Managing Director, Boulder, Rocky Mountain Institute
- Ashley Perl**, Climate Action Manager, City of Aspen, Colorado
- Roger Platt**, Senior Vice President, Strategic Planning, Green Business Certification, Inc.
- Stephanie Rico**, Senior Vice President, Environmental Affairs, Wells Fargo
- Joanne Rodriguez**, Director, Sustainable and Strategic Initiatives, Tremco, Inc.
- Brendan Shane**, Regional Director, North America, C40 Cities Climate Leadership Group
- Dan Slone**, Partner, McGuireWoods LLP
- Erika Smith**, Vice President, Ecosystem and Strategic Alliances, Socrata
- Hilari Varnadore**, Executive Director, STAR Communities
- Walker Wells**, Vice President of Programs, Global Green
- Justin Wiley**, Vice President, Government Relations, International Code Council
- Alex Wilson**, President, Resilient Design Institute
- Brenda Wolfe**, Industry Manager, Esri
- Roy Wright**, Deputy Associate Administrator for Mitigation, FIMA/FEMA



Jason Hartke
U.S. Department of Energy



Alex Wilson
Resilient Design Institute

LIST OF ATTENDEES *continued*

U.S. GREEN BUILDING COUNCIL, NATIONAL LEAGUE OF CITIES AND URBAN LAND INSTITUTE ATTENDEES

Joe Hergert, Associate, Sponsorship, U.S. Green Building Council

Kate Hurst, Vice President, U.S. Green Building Council

Sarene Marshall, Executive Director, Center for Sustainability, Urban Land Institute

Cooper Martin, Program Director, Sustainable Cities Institute, National League of Cities

Tom Martin, Senior Associate, Strategic Communications, National League of Cities

Brenden McEneaney, Director, Urban Resilience, Urban Land Institute

Jessica Pinkston, Event Manager, U.S. Green Building Council

Brooks Rainwater, Director, Center Director, National League of Cities

Lindsay Roffe, Artist, InkFactory

Jeremy Sigmon, Director, Technical Policy, U.S. Green Building Council

SUMMIT OVERVIEW *continued*

SESSION RECAP

THE EVENT BROUGHT TOGETHER MORE THAN 50 PARTICIPANTS FROM A CROSS-SECTION OF ORGANIZATIONS, SECTORS, AND GEOGRAPHIES, AND PROVIDED A UNIQUE OPPORTUNITY TO EVALUATE THE IMPACT THAT THE RESILIENCE IMPERATIVE IS HAVING ON IN CITIES, TOWNS AND VILLAGES THROUGHOUT AMERICA.

To guide the discussion between elected officials, non-profit experts and private sector practitioners, the Summit was organized into six facilitated sessions:

1. The Complexity of Resilience
2. Resilience as a Leadership Opportunity
3. Lessons in City Resilience
4. Making the Next Resilience Investment
5. Transforming Conversation into Action
6. The Global Implications of U.S. City Leadership



Mayor Matthew Larson
City of Snoqualmie, WA

A graphic artist captured visual notes of the dialogue.



ink factory
you talk. we draw. it's awesome.

“Clear, consistent, and actionable measurement of resilience outcomes is still emerging.”

“The inertia of complacency can be difficult to overcome when trying to plan for future disruptions.”

The complexity of resilience

Introductory speaker: Jason Hartke, Program Manager, Commercial Buildings Integration, U.S. Department of Energy

City leaders and Summit participants dove deep into challenges facing U.S. cities as they begin to tackle resilience. The group quickly identified how terms are often misunderstood (mitigation, adaptation, resilience and sustainability) and cited examples of how state and federal government programs can stand in the way of progress if not carefully aligned and coordinated. Some expressed concerns that resilience might be, at best, “old wine in new bottles” and, at worst, diverting energy away from critical efforts to address resource use and drive efficiencies. While some efforts are successfully weaving resilience thinking into policy, programs and funding in order to better ensure that money and effort is not expended twice to overcome the same challenge, participants agreed that clear, consistent and actionable measurement of resilience outcomes is still emerging. A central finding concluded that city leaders will be most successful at earning buy-in if a new, more compelling language is adopted—one that focuses on local context, optimism and engagement—and that leverages bottom-up ideas with top-down implementation.

Resilience as a leadership opportunity

Introductory speaker: [Major General, Retired] Warren Edwards, Director, Community and Regional Resilience Institute

City leaders agreed that, as politicians, there is a limit to how far elected officials can go on resilience planning and action without the support of their electorate. Again, the language of resilience surfaced as a central theme. In isolation, communities can be overwhelmed with myriad, seemingly disconnected risks. Resilience can provide a useful lens for connecting many efforts in a more coherent narrative. Unfortunately, far too often there are examples of lessons observed, but not learned. Several pointed out the importance of leveraging diversity to imagine and implement better solutions. City representatives agreed that leadership includes identifying the challenge, communicating it effectively to garner critical buy-in, critically leveraging the power of the private sector, leading through government and individual examples, setting things in motion for short- and long-term outcomes and measuring and communicating progress and ongoing needs. Successful municipalities will focus on services that the public expects government to deliver, harness more and better data and create tools to put it to use in agile ways.

Lessons in city resilience

Introductory speaker: Hilari Varnadore, Executive Director, STAR Communities

Every community represented at the Summit had a story to tell about resilience challenges they had experienced or are facing. City leaders spoke of their disaster experiences as opportunities to understand strengths and weaknesses, and acknowledged that the inertia of complacency can be difficult to overcome when planning for future disruptions. While often expensive and challenging to deploy, experts and city leaders agreed that many of the technical solutions for more resilient communities (e.g. redundancies in transport, power and water systems; stronger flood and seismic protections; policy instruments and infrastructure to maintain a thriving economy, etc.) are fairly well known. Much more difficult, however, is how to design and nurture resilience within the social fabric of the community so that neighbors are more effective first responders, serving as distributed social infrastructure that can support disaster preparedness and response. Participants pointed out that the non-governmental organization (NGO) community could be better coordinated to support these outcomes and also to help cities cultivate more participatory resilience decision-making. Again, a theme of careful measurement and communications emerged, as did a word of caution to ensure that data be interpreted and acted upon with an additional, and sometimes under-appreciated layer of practical, common sense.

Making the next resilience investment

Introductory speakers: Martha Jane Murray, Program Manager, Clinton Climate Initiative and Alex Wilson, President, Resilient Design Institute

After provocative introductory presentations about lessons learned from past resilience investments, Summit participants broke into groups to discuss this topic in greater detail. Once reconvened, several themes emerged. Because of its multi-disciplinary nature, city leaders have found it much more effective to weave in resilience thinking and action into all municipally developed or funded projects rather than creating stand-alone resilience projects. That said, participants acknowledged that the biggest weaknesses must be addressed, recognizing that communities will likely only put up with so much intervention for the sake of preparedness. Many are making their next resilience investment now, but they are not without cost. Those that can be creative in using sustainable financing and support mechanisms—especially leveraging the private sector—will be most successful. “While it’s tough to be on the bleeding edge,” one participant noted, “it is important to be ahead of the curve.” Participants added that rating systems and measurement tools, which are beginning to more directly address resilience, can help guide and assess these investments.

Transforming conversation into action

Introductory speaker: Walker Wells, Vice President of Programs, Global Green USA

To date, much of the resilience work in the U.S. has been in direct response to disasters and a lot of talk about how to plan, prepare, organize, communicate and implement more effectively. To do so, community leaders will need a supportive constituency which, in their experience, is not sustainable using language that emphasizes a crisis. Recognizing that government may not always be nimble enough to act at the needed pace in a moment of crisis, community leaders are turning to the private sector. Some have set up local NGOs to focus on community resilience, with local government support. Others are partnering with the existing NGO community and exploring ways of critically enabling their aid in times of crisis. Others highlighted the deep-rooted interest of the business community—and especially the real estate sector—in the strength and solvency of cities. Participants reiterated the importance of integration of municipal departments and perspectives for optimal success, and again revisited the topic of communicating the need for resilience investments, especially using lifecycle thinking. Some emphasized to be ambitious in resilience planning because philanthropy will respond favorably. “A plan can be much more important than money,” one participant noted, “because money with no plan is money wasted.”

The global implications of US city leadership

Introductory speaker: Roger Platt, Senior Vice President, Strategic Planning, Green Business Certification, Inc.

The final segment of the Summit dialogue challenged participants to think about their local contexts and work and how it could both contribute to and learn from global resilience efforts. In many ways, the group noted, there has been a faulty premise that national governments will be able to solve these problems. Of course, there is a role for national governments, but municipalities, the private sector, NGOs and individuals are also deeply important in the equation. More than ever, the U.N. climate talks are open to looking at non-national actors and local governments have so much to offer. A potential outcome of collaborations like the Summit is the ability to collaborate and put ideas into action at scale and to test performance. Importantly, communities cannot get to resilience with just a few discrete activities—it’s a far more holistic undertaking that requires time and long-term buy-in. Whereas most resilience actions to date have been inspired by tragedy or adversity, communities (and the world) have much to gain if resilience can be framed as an uplifting opportunity that is good for business, community cohesion, growth and prosperity. A wide array of local, regional, national and international actors stand ready to help and to learn from local government leadership.



Mayor Shawn Reilly
City of Waukesha, WI



Mayor Jeri Muoio
City of West Palm Beach, FL

“Some highlighted the deep-rooted interest of the business community—and especially the real estate sector—in the strength and solvency of cities.”



Mayor Bruce Bassett
City of Mercer Island, WA

Across the Summit sessions and discussions, several key themes emerged. The next section, Key Discussion Themes, provides more thorough analysis of these topics, and provides examples of how the leaders are pursuing resilience in their communities. Taken together, they offer an outline of issues and activities that other cities can replicate as they strengthen their communities and reduce risk.



Roger Platt, Senior Vice President, GBCI, kicks off a lively discussion. (Also pictured at left, Brooks Rainwater, NLC; and at center, Mike Lesnick, Meridian Institute).

“...relating to these day-to-day issues is the key to move resilience from an abstract concept to a common concern.”

What is Resilience?

From the outset of the discussion on “the complexity of resilience,” it was clear that attendees brought many different perspectives on the topic to the Resilient Cities Summit. According to the American Planning Association (APA), the American Institute of Architects (AIA), the Urban Land Institute (ULI) and other membership organizations totaling 750,000 professionals, “resilience” refers to “the ability to prepare and plan for, absorb, recover from and more successfully adapt to adverse events.” However, the local leaders at the Summit had simpler and more practical ways of expressing and applying resilience in their communities.

Whether or not a city faces a federally declared disaster, they frequently deal with disruptions or stressors. Problems in schools, businesses and infrastructure are visible, and nearly everyone agreed that relating to these day-to-day issues is the key to move resilience from an abstract concept to a common concern.

Many in the group also agreed that resilience is about not just responding, but bouncing back better. Doing this requires that a community find projects or programs that offer multiple co-benefits in economic, environmental, and social terms. These three sectors make up the triple bottom line—also known as “profit, planet and people.”

Finally, leaders were quick to point out that some of their most important victories had been stopping something that would have been counter-productive. Focusing on one marquee project can yield terrific results, but the explosion in disaster costs makes it clear that business-as-usual approaches could be compounding problems elsewhere. One mayor summed it up, saying “the first thing we have to do is stop making things worse.”

SUMMIT OVERVIEW *continued*

CITY NEEDS AND NEXT STEPS

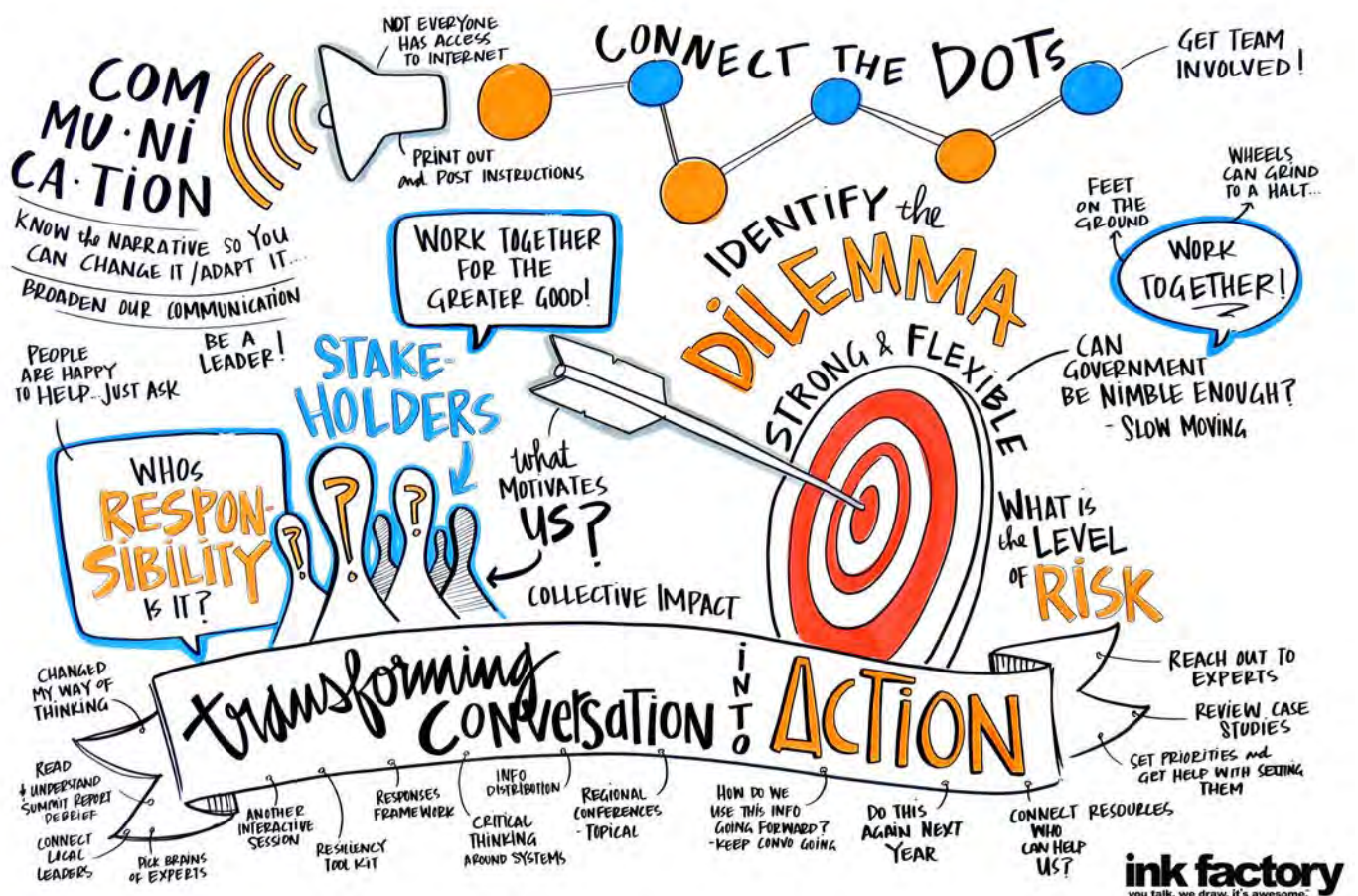
DISCUSSIONS PIVOTED TO WHAT CITY LEADERS MOST NEED TO BE ABLE TO ADDRESS RESILIENCE IN THEIR COMMUNITIES, AND HOW TO GET ASSISTANCE WITH THOSE ENDEAVORS.

In summing up what they learned from the event, several participants referenced the usefulness of resilience as a frame for understanding environmental, economic and social vulnerabilities and interdependencies. In other words, resilience can be an attitude or lens that is addressed while planning and evaluating policies, programs and projects in a city. While some cities have dedicated staff focused on resilience, others were relieved to find that resilience may not necessarily need its own plan or to be treated as something entirely new. That said, measurement tools that can help cities understand where they are now, and what progress they are making, would be useful. In particular, data and case studies to help prove the business case for investments in resilience measures would drive more action.

As several cities conveyed their own experiences and case examples of both resilience challenges and approaches, it was clear that success would rest on the strong involvement of many stakeholders. Or, as one participant put it, "Whose job is a city's resilience? Everyone's." Local government should provide leadership, vision, and local context, and serve as a catalyst for bringing key participants together. But ultimately, the entire community would need to be

“Whose job is a city's resilience? Everyone's.”

A graphic artist captured visual notes of the dialogue.





Mayor Peter Swiderski
Hastings-on-Hudson, NY

“It’s almost impossible to keep track of the various federal programs that cities can take advantage of.”

brought in—from private business to volunteers, faith-based groups and civic organizations—to represent diverse interests, and draw on a diversity of skills and perspectives.

Given the breadth of experts assembled at the Summit, representing different sectors and specialties, one key conclusion of the group was that “there are a lot of government programs, NGO projects, philanthropic activities, and private sector initiatives.” Yet, given how many questions participants asked about where and how to find help, it was clear that these resources “are not yet well-coordinated, and are not as accessible or well-known to cities and city leaders as might be desirable.” One city leader put a fine point on the challenge: “It’s almost impossible to keep track of the various federal programs that cities can take advantage of.” Several city leaders expressed interest in and desire for a “clearinghouse” of sorts for resilience resources. While certainly not comprehensive, the event itself and the resources provided in this report (see: **Resilience Resources for Cities, page 34**) attempt to make some progress at illuminating places cities can turn for help.

For future activities, participants revealed a variety of ideas about event formats and locales that would be useful—ranging from regional gatherings (where cities might face similar climatological challenges and policy/social contexts), to activities organized more around city size or specific types of resilience issues. There was a widespread sense that smaller group discussions would foster particularly useful exchanges, including the ability to dig into real-world scenarios, and address them with some of the particular expertise assembled.

Regardless of the format, it was clear that the city leaders and experts found value in the opportunity to learn from one another, exchange ideas and identify opportunities for support. In that respect, the Summit lived up to its goals, in keeping with the Aspen Institute mission, to “foster enlightened leadership through open-minded dialogue.”

SUMMIT OVERVIEW *continued*

PARTICIPANT REFLECTIONS

I ATTENDED THE RESILIENT CITIES SUMMIT TO:

“learn more about the trends and innovations around resilience; to see how city leaders were talking about it.”

“hear opinions from a great diversity of cities and partner NGOs and companies.”

“gain and share knowledge on practical applications and planning affecting buildings.”

I WOULD LIKE TO SEE:

“a deeper-dive into the challenges and solutions—maybe like mini case problems.”

“examples of how disaster was handled—both the good and the bad.”

“focus on several effective approaches in a city; connect and ask how these could be supported/promoted by the mix of partner organizations and businesses.”

MY MOST VALUABLE TAKEAWAY FROM THE RESILIENT CITIES SUMMIT WAS:

“that, as a Mayor, I should always be thinking about how today’s decisions will affect the City’s ability (or lack of ability) to respond to disasters.”

“this is an integrated issue that will require integrated resources. [We will need to] step out of the silos and leverage non-traditional knowledge and resources.”

“new insight into seeing all we do through a resiliency lens.”

“excellent contacts, and a new sense of challenge for leaders.”

KEY DISCUSSION THEMES

RESILIENCE IS: REGIONAL COORDINATION

ONE OF THE CENTRAL THEMES AND CHALLENGES THAT THE SUMMIT CONTINUED TO REINFORCE IS THAT RESILIENCE IS REGIONAL IN NATURE.

Whether due to the size and scope of natural events like Superstorm Sandy or because of the regional nature of transportation, energy and other infrastructure, the physical and economic health of one community depends on how resources are managed and decisions are made by dozens of communities nearby, as well as the cooperation of state and federal governments.

At the Summit, participants agreed that regional, intergovernmental cooperation is common sense not just for resilience, but for good government in general. Still, discussion revealed that barriers to coordinating on resilience are unique and often surprising. For instance, in Washington State, there was no intrastate mutual aid agreement in place until 2011. This meant that a city or county experiencing a disaster could not ask its nearest neighbors for assistance, but would have to wait for aid to be provided from the state. Sharing costs or revenues between governments is at the heart of many of these disagreements.

One proposal that could start to change that is currently being pursued is the Cleveland metro area. Councilman Matt Zone, from Cleveland's 15th Ward, described their ongoing effort to establish the Regional Prosperity Initiative (RPI)⁶, a potential agreement among the local governments in a 16-county region of northeastern Ohio.

According to Dr. Tom Bier of Cleveland State University, the idea for the RPI came from Mayor William Currin of Hudson, Ohio. After a major business left a neighboring community, Dr. Bier says, some of Hudson's residents also relocated. Mayor Currin was struck by the degree to which communities depended on one another to succeed in a global economy. He reasoned that if one community landed a major company then it would benefit the whole region and wanted governments to work collaboratively to toward that goal.

To promote this cooperation, the primary feature of the RPI involves sharing tax revenues between governments. Under the proposal, when a municipality grows its own income tax base above a certain threshold, a portion is collected and shared with neighbors. By directly sharing the benefits and losses of business development, the arrangement would help the region compete more effectively.

The idea isn't entirely unprecedented. A similar regional compact in the Minneapolis/Saint Paul region, known as the Twin Cities Fiscal Disparities Program⁷, pools and redistributes portions of property taxes from participating municipalities. In the Twin Cities, it is estimated that revenue sharing has reduced overall property tax inequality by 20 percent⁸. Models, using historical revenue data, suggest that similar results could be expected through the Cleveland area's RPI. Most importantly, it is not a simple matter of the wealthier communities subsidizing the rest. The contributors and recipients within the model shift quite frequently. Dr. Bier even helped organize a group of Cleveland area lawmakers to travel to Minnesota to hear first-hand about the success of the program from local officials.

Unfortunately, the primary obstacle to implementation in Ohio has nothing to do with the local governments. Instead, legislation enabling the transfer payments between cities must be approved at the state level where it has taken several years to develop interest and support. In spite of the impasse, Dr. Bier and others are encouraged that interest among local government officials persists. "After a while it could get disheartening that the state hasn't allowed this," he says, "but when the mayor of Cleveland sends his top advisors it shows that local officials are committed. We have now developed draft legislation with sponsors from both parties and we're optimistic about the next session."



Councilman Matt Zone
Cleveland, OH

“... regional, intergovernmental cooperation is common sense not just for resilience, but for good government in general. ...”

Regional Resilience in the Mountain West

The Western Adaptation Alliance offers a model for regional collaboration based on peer-learning. Facilitated by the Institute for Sustainable Communities, the network is made up of 13 cities across six states in the southwestern United States, including Summit attendees from Salt Lake City, Aspen, Boulder and Fort Collins. The goal of the network is to identify and begin to replicate strategies that can help cities deal with the effects of continued urban growth under the constraints of an arid climate. By maintaining this network over time, participants are able to gain familiarity and trust with one another, allowing them to pilot or expand new programs with a more coordinated approach.

Learn more at www.iscvt.org/program/western-adaptation-alliance-waa



Mayor Pro Tem Gerry Horak
Fort Collins, CO

KEY DISCUSSION THEMES *continued*

RESILIENCE IS: ENVIRONMENTAL PROTECTION

MORE OFTEN THAN NOT, CITY LEADERS ARE CHALLENGED TO THINK ABOUT RESILIENCE AS IT RELATES TO BUILT INFRASTRUCTURE.

Will the power stay on? Will the roads be passable? Will the floodwalls stay strong? These are no doubt first-tier resilience challenges in need of careful focus and attention.

At the Summit, city leaders and experts also frequently spoke about how the health and vitality of their local communities depends on a thriving natural environment that, in turn, provides resilience risks and opportunities. For example, Aspen Mayor Steve Skadron and Council Member Ann Mullins highlighted how deeply dependent their ski-town community is on snowpack resulting from local climate and hydrology. Nationwide, the outdoor recreation economy is a \$650 billion industry that supports more than 6 million jobs and generates \$40 billion in state and local tax revenue.⁹ Among other things, the outdoor recreation economy requires the beaches to be clean, the rivers to be healthy, the mountains to be snow-covered in the winter and the deer and fowl to be plenty in season.

Left to its own devices, nature has a way of taking care of these systems by itself. But as cities grow (as they should and must), so can the impacts of cities on nature and natural systems. Today, America's air, lands and waters and the wildlife that depend on them are under tremendous pressure from development of all kinds—urban, suburban and rural—among a variety of other stresses.

The decline of America's wonderful natural places—both big and small—poses a threat to much more than the tourism industry. Agriculture, too, relies on healthy soils, pollinators and water cycles that are under increasing stress. Destabilized American agriculture is a threat to rural economies and livelihoods and to the affordability and availability of the nation's food supply. Nature also provides an important escape and respite, enjoyed by millions of Americans and tourists year after year.

It is possible that the largest area of potential risks and costs of the deterioration of America's air, water and soils is public health. Santa Monica Councilmember Pam O'Connor spoke of rising temperatures in the Los Angeles River basin due to climate change, urban heat island effect, and the challenges even their coastal community faces with air pollution. The U.S. EPA predicts that American families will gain up to four dollars in health benefits for every dollar invested in soot and smog reduction efforts through the Clean Power Plan, a new effort to significantly reduce carbon dioxide pollution from the nation's power plants. The full range of public health benefits from the Clean Power Plan are expected to total \$34-\$54 billion.¹⁰

Of course, cities and city residents directly benefit from cleaner air and water, and also from healthy natural systems that can absorb storm impacts, mitigate flooding, keep summers cool, absorb pollution and serve as support infrastructure for wildlife and recreation.

Recognizing its acute dependence on climate and natural resources for a thriving economy, Aspen, CO, launched its "Canary Initiative" in 2007 as a comprehensive environmental leadership effort for the Roaring Fork Valley and the region. Aspen and other high alpine mountain towns are among the first to witness the effects of climate change, thus these "canaries in the mineshaft" are leading voices on climate impacts and what cities can do to slow or reverse its effects.¹¹



Mayor Steve Skadron
Aspen, CO

“High alpine mountain towns are among the first to witness the effects of climate change, thus [they] are leading voices on... what cities can do to slow or reverse its effects.”

Salt Lake City: where resilience and sustainability meet



Embedded in Salt Lake City's origin as a haven in the desert west is a connection with the landscape and its generous, but limited, resources. The city's sustainability roots are strong and substantial progress has been made in the past ten years. Importantly, sustainability milestones in alternative transportation, air quality, clean energy, water resource management, urban agriculture and more have been often framed in a community resilience lens.

Most notably, the city's Public Safety Building, a landmark structure that has earned LEED Platinum certification and is designed to use zero net energy (ZNE) per year, is a beacon of resilience in practice. The building houses emergency services—including police, fire and the regional 911 center—and includes critical back-up power supplies, stormwater management, community gathering spaces and superior seismic measures to ensure post-quake functionality. The building, a statement all by itself, is emblematic of the city's careful efforts to position resilience as central to city planning and a part of the way of life in the Salt Lake Valley.

Learn more at slcgov.com/slcgreen



Mayor Ralph Becker
Salt Lake City, UT

KEY DISCUSSION THEMES *continued*

RESILIENCE IS: CITY PREPAREDNESS, CITY RESPONSE



Commissioner Jules Bailey
Multnomah County, OR

“When you discover you’re in a hole,” a city leader said, “the first rule is to stop digging.”

THE COLOSSAL 2005 IMPACTS OF HURRICANES KATRINA AND RITA ACROSS THE GULF COAST PROVIDED A RUDE AWAKENING TO OUR VULNERABILITY, SOUNDING AMERICA’S CALL TO CITY RESILIENCE AND HIGHLIGHTING THE ESSENTIAL NEED FOR CITIES TO BE PREPARED.

At the Summit, Laurel Creech, Chief Resiliency Officer of Nashville, TN, talked about the devastating floods that struck the Cumberland River Valley in May of 2010. Tennessee communities are still recovering from the 1,000 year floods. Jason Hartke, Commercial Buildings Integration Program Manager at the U.S. Department of Energy (DOE), reminded the group of the three 100-year floods that Mayor Frank Cownie’s city of Des Moines, Iowa endured within a five year period. Mayor Peter Swiderski also told of how Superstorm Sandy ravaged his town of Hastings-on-Hudson, New York, just north of New York City.

Of course, natural hazards have always been present—from wildfire to earthquakes and flooding and damaging winds. In an increasingly developed world, our communities may be in the path of these recurring threats more frequently and have more to lose. In addition, in a world with a changing climate, historical trends for frequency and magnitude of many of these hazards are no longer accurate predictions of what’s to come.¹²

“When you discover you’re in a hole,” a city leader said, “the first rule is to stop digging.”

At the core of city resilience is identifying what the risks are, designing to reduce these risks, setting up infrastructure for rapid response and enabling the community to take part in leading their way through it. City leaders were quick to point out that a resilient community is prepared for the eventual arrival of far more than natural hazards—other economic, social or disruptions. The loss of a major employer, the outbreak of social unrest or other events can wreak just as much if not more damage. Another participant added that a major risk in Maine, for example, is that warmer waters are expected to destabilize lobster populations, a critical base to the state’s economy.

Cities are now researching their full spectrum of vulnerabilities and developing related plans of action. Multnomah County, Oregon, spent 2014 and 2015 drafting a climate action plan¹³ intended to build a ‘climate-resilient’ county. Summit participant Commissioner Jules Bailey chaired the effort. Many urban anchored counties are challenged by the uneven spread of infrastructure redundancies, particularly given the disparities between rural and urban areas. Hundreds of other communities are undertaking their own efforts to understand their weaknesses, prepare for the worst, and hope for the best. As one participant put it, “You mitigate, you adapt or you suffer. Those are the three available options!”

In any of these scenarios, plans are helpful, but infrequently read, and measurement for measurement’s sake may not be as helpful as what one city leader called “the common sense test.” When it comes to community response to these disruptions or disasters, your neighbor, one participant added, is your best ally and most likely to be your first responder. Whether a community is ready or not, the group agreed that the public expects mayors and local government officials to have the answers to how to respond quickly, fairly, and effectively.

San Francisco Takes Early Steps toward Resilience



The 1906 earthquake and fire that leveled much of San Francisco gave the West Coast city an early lesson in community resilience. It turns out that a lot can go wrong on a seismically active peninsula with limited access to freshwater, the risk of landslides and vulnerable public and private infrastructure. Decades of focus on building and fire safety as well as regional energy and water management and sustainability initiatives has often put San Francisco ahead of the pack on these interconnected issues. The city was the first in the world to install a Chief Resilience Officer, a position that is integrated within the General Services Agency's existing efforts around disaster preparedness and response and is enabled to harness key, cross-functional opportunities across city government. With the support of the Rockefeller Foundation's 100 Resilient Cities program, the City and County of San Francisco are working intensely to leverage policy, programs, public awareness, thought leadership and optimized city services to meet today's fast-evolving set of resilience challenges.

Learn more at: www.sfgsa.org/index.aspx?page=6726



Patrick Otellini
Chief Resilience Officer
San Francisco, CA

KEY DISCUSSION THEMES *continued*

RESILIENCE IS: SOCIAL COHESION



Councilmember Pam O'Connor
Santa Monica, CA

“social capital is the ability of a community to withstand disaster and rebuild both the infrastructure and the ties that are at the foundation of any community.”

AT THE SUMMIT AND IN THE NEWS MEDIA, “COMMUNITY RESILIENCE” HAS OFTEN BEEN DISCUSSED AS A TOPIC, OFTEN WITHOUT A FIRM GRASP OF ONE OF THESE TWO WORDS.

No set of buildings, infrastructure and policies is a “community” without the social fabric of people. The field of social work proposes a positive, people-oriented definition of the other word, “resilience.” Resilience, social workers say, “encompasses not merely surviving; but in addition, it includes both thriving and having benefited from the stressor experience.”¹⁴

It is within this framework that the importance of a strong social fabric both created by and housed within the built environment can be identified. If cities can focus on what helps people and communities function in the face of adversity, then there is opportunity to nurture and grow this capacity.

Fortunately, an emerging set of tools to begin understanding this critical dimension already exists. The STAR Community Rating System and EcoDistricts help community leaders identify capacity for growth in such areas as civic engagement, civil & human rights and environmental justice; and equitable development, health & wellbeing, and community identity.^{15,16} The LEED for Neighborhood Development rating system provides quantifiable metrics for built environment performance that help cities assess performance and guide smarter, greener, stronger development. Fulfilling credits such as ‘Access to Quality Transit’ can ensure that community members have transportation options in instances where disaster makes one mode of transportation infeasible. And the Access to Public Space credit guides projects to provide community members with convenient and adequate spaces for social interaction helping increase cohesion and social capital.

Of course, cities are leading the way. Santa Monica has developed a Well-Being Index (see sidebar).

The presence of varied social capital is one measure of how resilient a given community can be. Social scientists have identified how social capital plays a role in community resilience, stating that, “social capital is the ability of a community to withstand disaster and rebuild both the infrastructure and the ties that are at the foundation of any community.”¹⁷ Social cohesion allows people to leverage their strengths and help their community maintain normal operations during strife. Indeed, this indicates that wealth within the built environment alone is not enough to produce resilience, and that the connections throughout the community play a vital role.

Simply by changing the way we measure wealth (as Santa Monica’s new index proposes), there may be new ways of understanding the strength of a community’s social fabric, and therefore the potential for how resilient a community can become. There is a growing recognition that, “GDP is not the best index. It only measures the richness of a [community], and does not tell you anything about how this richness is distributed. Which, in time of rising inequality, might be a problem.”¹⁸

Of course, a well-knit community alone will not stop a tsunami, prevent a drought or keep the local mill from shutting down. City leaders at the Summit and across the world know, however, that strong social ties and a distributed network of relationships, services, and neighborly support help a great deal.

A New Way of Measuring Community Cohesion

OUTLOOK	Personal, sentimental and emotional health
COMMUNITY	Connectedness, support and safety
PLACE	Natural, built and social environments
LEARNING	Education, enrichment, and life-long knowledge building
HEALTH	Physical and mental health and behaviors
OPPORTUNITY	Affordability, economic security and business diversity

Launched in April 2015, Santa Monica’s Well-Being Index takes initial steps toward measuring some of the hard-to-quantify metrics related to strong communities and social cohesion. The tool recognizes that, “people seem to find more satisfaction in human relationships, being healthy, [having] a nice place to live, and having access to opportunities, than in money itself.”¹⁹

Recognition is only the first step, and measurement and action are necessary next steps. It is important to measure only what is measurable, Summit participants said, especially if the data can lead to constructive outcomes.



In order to develop a robust understanding of well-being, the city collected quantifiable data readily available to cities on crime and disease rates, park acreage, etc.; conducted an online survey to gather subjective information directly from residents (such as sleep and exercise patterns); and mined publicly available comments on social media. Metrics

included: overall stress level; social interaction; the ability of the next generation to afford living in the community in the future; and more.

As a result of the information gathered from the Well-Being Index, the city was able to promote or design programs specifically geared toward certain populations to address their needs. Armed with this information, local governments are better equipped to make decisions on how to enhance this critical social component of community resilience.

Learn more at wellbeing.smgov.net

“People seem to find more satisfaction in human relationships, being healthy, [having] a nice place to live, and having access to opportunities, than in money itself.”

KEY DISCUSSION THEMES *continued*

RESILIENCE IS: VALUE CREATION

IN THE NATURAL WORLD, SYSTEMS AND INDIVIDUALS THAT ARE HEALTHY AND STRONG ARE MOST ABLE TO WITHSTAND DISRUPTIONS FROM PESTS, ILLNESSES OR SEVERE WEATHER.

In the city context, communities with strong economies—where citizens have steady jobs, sufficient income, and the ability to save, invest and borrow—are better able to overcome adverse events. These macro and micro economic issues are always among the top concerns of city leaders and their constituents, and rightly so. Against these basic “pocketbook” issues, efforts to address slow-moving threats like sea-level rise or punctuated (but infrequent) impacts from severe storms usually fall off the priority list. But addressing economic strength and resilience does not need to come at the expense of being prepared in other ways for challenges to come, including natural disasters. In fact, there are opportunities to do both simultaneously, and evidence of positive financial returns from strategies to enhance resilience and sustainability is mounting.

These issues can be tackled from a variety of angles, as revealed by many Summit participants who shared their experiences. Aspen, CO—whose ski-based economy is feeling the stress of reduced and highly unpredictable snow levels—has launched an economic diversification strategy. Such diversification will help insulate the community both against environmental shocks and economic ones.

In other cases, the focus has been on the savings possible through energy and resource reduction. Such strategies can lead to an immediate economic boost, by putting more disposable income in the hands of citizens and businesses. Lower income residents, who often spend a disproportionate amount on utilities and are most vulnerable to the shocks of extreme weather, power outages and employment disruptions, can especially benefit from these investments.

The challenge of aging infrastructure was highlighted as something that creates numerous resilience risks. While failure of infrastructure under adverse conditions (e.g., storms, floods) is a typical concern, inadequate infrastructure can undercut growth by being a deterrent to business investment. Rather than simply maintaining yesterday’s infrastructure, future-looking upgrades that address coming threats can simultaneously help protect a community while attracting new investment.

Moving private sector money towards these ends is critical. Ultimately, success rests on making the case for how investments in resilience generate multiple benefits, including financial returns. On this front, progress is being made. As one city leader put it: “We really started to have success with LEED when we translated [the certification] into operational savings and real estate value.” Recognizing this need, experts around the room cited additional efforts to study and quantify economic benefits—including the payback period of solar developments.



Mayor Matthew Appelbaum
City of Boulder, CO

“Ultimately, success rests on making the case for how investments in resilience generates multiple benefits, including financial returns.”

A Multiple-Win Approach in Little Rock, Arkansas



Like many cities, Little Rock, AR, saw its Main Street decline over recent decades, but Little Rock has a new plan to turn things around: a “creative corridor” that will retrofit a four-block segment of the city’s endangered historic Main Street and drive economic development catalyzed by the cultural arts. The project integrates a tree-lined allée, bioswales and rain gardens that are designed to absorb stormwater and filter run-off pollutants, but also double to create a pedestrian promenade and other spaces for shaded outdoor dining, public art displays and social gatherings. By blending funding from the National Endowment of the Arts (for creative place-making and city design) and the U.S. Environmental Protection Agency (EPA) —for greening cities and addressing water quality and storm water management—Little Rock is implementing a unified approach to simultaneously enhance its economic and environmental resilience. Or, as the city says: “to preserve and rehabilitate Main Street is prudent and farsighted stewardship, regardless of whether one is following an economic, social or ecological bottom line.”

Learn more at www.littlerock.org/lid/



Mayor Mark Stodola
Little Rock, Arkansas

KEY DISCUSSION THEMES *continued*

RESILIENCE IS: GLOBAL LEADERSHIP



Mayor Cindy Lerner
Pinecrest, Florida

“By demonstrating what is possible at the local level, cities are not only spurring healthy competition amongst one another, they are also beginning to influence reduction targets at higher levels of government.”

IT IS NOW CLEAR THAT GREENHOUSE GAS EMISSIONS ARE CONTRIBUTING TO GLOBAL CLIMATE CHANGE.

Many of the anticipated effects are already observed in communities throughout the world. It is sometimes difficult to see how local government can make a significant difference in the face of such a massive challenge, but action at the local level seems to be an essential precursor to the action at higher levels of government. Cities and towns are working to create increasingly accurate emissions inventories, set ambitious reduction targets and adopt specific plans to achieve those reductions.

A recent analysis by ICLEI-USA and the World Wildlife Fund identified 116 communities, representing 14 percent of the U.S. population that have set emissions reduction targets and are reporting progress through open data platforms.²⁰ Of these communities, the report found that 62 had set targets “equal to or greater than the U.S. target of 26 to 28 percent reduction below 2005 levels by 2025.” By demonstrating what is possible at the local level, cities are not only spurring healthy competition amongst one another, they are also beginning to influence reduction targets at higher levels of government.

Mayor Cindy Lerner, of Pinecrest, FL recognized both of these benefits at the Summit when she discussed the development of her own city’s reduction plan. First, she noted that the Pinecrest plan is deliberately modeled after the reduction plan from Seattle. Pinecrest is a small village of 18,000 people and Mayor Lerner knew that the city would have a very difficult time creating a plan from scratch. Although Seattle is a very different community with very different targets, she believed that the city’s plan offered a structure and process that could easily be replicated by her staff. Second, there are relatively few small communities that have adopted climate reduction plans. When states or nations are considering policy, they must consider how it will be implemented in communities of any size. Communities like Pinecrest, FL; Keene, NH; and Janesville, WI, are taking important steps to prove that smaller communities can meet and exceed many of the targets currently being discussed by larger cities.

The most visible and important example of this effect in 2015 is the preparation for the U.N. Framework Convention on Climate Change, known as COP-21, taking place in Paris. Although the actual negotiations will be held between the nations of the world, it is expected that hundreds of mayors and other local government officials will also descend on the event to showcase their success and urge negotiators to set a global target. Several mayors in attendance at the Resilient Cities Summit have joined a delegation of U.S. mayors to the Paris talks, coordinated by the NLC, USGBC, and other partners.²¹ As of this writing, more than 400 cities worldwide have committed to take action to reduce emissions by at least 2020.²² Without these commitments and the tangible efforts cities are already undertaking to achieve them, a national reduction target would be much less grounded and much less credible.

The Compact of Mayors



Today, cities throughout the world are able to track and report their greenhouse gas emissions using standard methodology. To date, nine of the communities represented at the Resilient Cities Summit have joined the Compact of Mayors. The Compact was launched by U.N. Secretary-General Ban Ki-moon and his Special Envoy for Cities and Climate Change, Michael R. Bloomberg, and is supported by C40 Cities Climate Leadership Group (C40), ICLEI and the United Cities and Local Governments (UCLG).

In the absence of a global climate agreement, the Compact gathers commitments and data from cities of all size, all over the world. Aggregating this data enables cities to directly compare their own emissions and reduction targets with other cities of similar size and economic output. It also ensures every commitment on the platform not only benefits its own community, but challenges others to join and do more.

Learn more at compactofmayors.org



Mayor Frank Cownie
City of Des Moines, IA

RESILIENCE RESOURCES FOR CITIES

FEATURED RESOURCES

National League of Cities.

The Sustainable Cities Institute at NLC seeks to catalyze, inform and celebrate the sustainability and resilience related initiatives of local governments. Whether your city is just getting started or has an experienced history and commitment to sustainability, the robust collections of city profiles, case studies, model policies and communication tools found here will provide elected leaders, staff, and engaged stakeholders with a set of resources to guide your activities. Information is available on climate resilience, as well as related topics such as land use, energy policy, water and local food systems.

More information about the Sustainable Cities Institute is available at SustainableCitiesInstitute.org

Urban Land Institute.

ULI's Urban Resilience Program works to help communities prepare for increased climate risk in ways that allow a quicker, safer return to normalcy after an event and enable them to thrive going forward. ULI relies heavily on the experience of its members. ULI relies heavily on the experience of its members and through its nearly 36,000 members, it works to engage, inform and inspire positive change to the built environment. With generous support of The Kresge Foundation, ULI is working around the country to:

- **Advise Communities in Need.** From Duluth, MN, to Norfolk, VA, to Seattle, WA, expert panels of our members have counseled cities on resilient development.
- **Conduct Research and Produce Reports.** From issue whitepapers on insurance to case studies on resilient buildings, ULI seeks to raise awareness and drive industry practice on the ground.
- **Host Convenings.** From large conferences to intimate issue-specific forums, ULI brings people together from different disciplines and geographies to troubleshoot and learn from one another.
- **Support our District Council network.** From Boston to San Francisco to Fort Lauderdale, local staff and members innovate and carry out programming tailored to the needs of their regions.

More information about the ULI's Urban Resilience Program can be found at uli.org/resilience

U.S. Green Building Council.

The nexus between sustainability and resilience is constantly evolving. Leading this movement is the U.S. Green Building Council (USGBC), with its 12,000+ member organizations, 200,000+ credentialed professionals worldwide, volunteer network throughout the world and the LEED (Leadership in Energy and Environment Design) green building rating system. Through a growing suite of tools that apply sustainability principles to save energy, water and money, USGBC and its sister organization, Green Business Certification, Inc. (GBCI) are catalyzing investment in communities and infrastructure that are healthy, efficient and have a minimal impact on the environment.

USGBC works with government leaders at every level to support the development, adoption, and implementation of policy and programs that support and advance greener buildings and communities. Through research, standards development, education and advocacy, USGBC's work and networks are well positioned to help government play an important role in enabling a greener, more resilient, equitable and prosperous future.

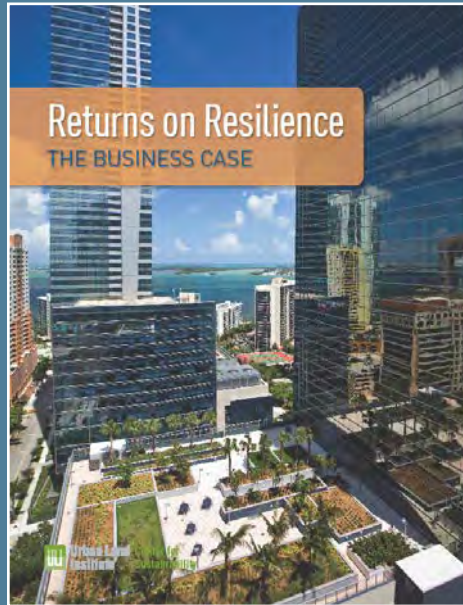
Learn more at usgbc.org/advocacy/priorities/resiliency

The Business Case: Building For Resilience

The Urban Land Institute's Building for Resilience: The Business Case, funded by a grant from the Kresge Foundation, includes ten case studies based on interviews with developers and property owners about their motivation to protect buildings and sites against climate-related threats. It also covers the resilience strategies they implemented to address risks, and the financial returns they saw or anticipate.

The case studies span a diverse range of geographical locations and climate-change risks, from flooding and earthquakes in San Francisco, to heat and drought in Tucson, to hurricane wind and storm surge on the coasts of Boston and Miami. Financial benefits were created through a variety of means, from decreased insurance premiums to faster lease-up and higher rental prices. Others pointed to the asset value protected in the case of future adverse events.

Learn more at <http://uli.org/wp-content/uploads/ULI-Documents/Returns-on-Resilience-The-Business-Case.pdf>



ADDITIONAL RESOURCES

While certainly not comprehensive, the event itself and the resources provided in this report attempt to make some progress at illuminating places cities can turn for help.

Federal Agencies

Qualified Energy Conservation Bonds. The U.S. Department of Energy (DOE) offers bonds (not grants) that enable qualified state, tribal, and local government issuers to borrow money at attractive rates to fund energy conservation projects. Summit participants highlighted that many states are not maximizing use of these bonds. (DOE)

<http://energy.gov/eere/slsc/qualified-energy-conservation-bonds>

Green Infrastructure for Climate Resiliency. This page hosted by the U.S. Environmental Protection Agency (EPA) features tools and tips for managing flooding, preparing for drought, reducing urban heat islands, and lowering building energy intensity—all essential aspects of climate resiliency. (EPA)

http://water.epa.gov/infrastructure/greeninfrastructure/climate_res.cfm

Smart Growth. This page features information that helps communities grow in ways that expand economic opportunity while protecting human health and the environment. (EPA)

<http://www2.epa.gov/smartgrowth>

Community Planning and Capacity Building. This Federal Emergency Management Agency (FEMA) resource intends to support and build the recovery capacities and community planning resources of local, state and tribal governments that are needed to effectively plan for, manage, and implement disaster recovery activities in large, unique or catastrophic incidents. (FEMA)

<https://www.fema.gov/community-planning-and-capacity-building>

Whole Community. This agency resource outlines the principles of a whole community approach to emergency management, which highlights FEMA as a part of a much larger “collective emergency management team,” including government and non-government actors, faith based organizations, private citizens and more. (FEMA)

<http://www.fema.gov/whole-community>

Community Resilience Portal. The U.S. Department of Housing & Urban Development (HUD) hosts a resource page dedicated to resilience that has information on resources on planning, implementation, natural hazards, and much more. (HUD)

<https://www.hudexchange.info/manage-a-program/community-resilience/>

Sustainable Communities Initiative (SCI) Resource Library. The U.S. Department of Housing & Urban Development hosts a resource library that includes tools, reports, fact sheets, and case studies developed by SCI grantees, HUD, and its Capacity Building partners. (HUD)

<https://www.hudexchange.info/programs/sci/resources/>

High Performance and Integrated Design Resilience Program. The U.S. Department of Homeland Security (DHS) site provides publications, software, and tools to support the protection of the nation’s physical infrastructure. Its overall goal is to better prepare buildings and infrastructure to recover from manmade and natural disasters.

(DHS) <http://www.dhs.gov/high-performance-and-integrated-design-resilience-program>

National Climate Assessment: Response Strategies. Explore actions to reduce emissions and adapt to a changing climate. Many of these actions can also improve public health, the economy, and quality of life. (U.S. Global Change Research Program)

<http://nca2014.globalchange.gov/report#section-1949>

Facilities Standards for the Public Buildings Service. This outlines the building design standards and construction criteria for the federal government and the nation's largest landlord—the U.S. General Services Administration (GSA). These leading practices outline design philosophy; priority elements like efficiency, accessibility, and life-cycle costing; and provide guidance for many other elements—from landscape and community design to structural, mechanical and security—and the relevant codes and standards. (GSA)

<http://www.gsa.gov/portal/category/21050>

Non-profit Organizations

Resilient Cities Resource Library. The library contains over 100 documents, publications, tools, and strategies on adaptation and resilience, with a focus on urban areas. (ICLEI)

<http://resilient-cities.iclei.org/resilient-cities-hub-site/resilience-resource-point/resilience-library/>

Climate-Smart Cities. The Trust for Public Land's Climate-Smart Cities initiative helps cities meet the climate challenge through conservation and design—from protecting waterfront parks and wetlands to creating green alleys and water smart playgrounds. (Trust for Public Land)

<https://www.tpl.org/services/climate-smart-cities>

Integrated Resilient Design Program. This program fosters innovative approaches to the design, construction, and operation of buildings and infrastructures that are resilient to natural and manmade disasters. The program's page highlights reports and other resources geared around resiliency. (National Institute of Building Sciences)

<https://www.nibs.org/?page=irdp>

Knowledge Center. Rocky Mountain Institute's (RMI) Knowledge Center is a collection of over 30 years of applied research and collaboration with businesses, communities, individuals, and governments in the field of energy efficiency and renewable energy. (RMI)

<http://www.rmi.org/Knowledge-Center/Library>

Protecting our Capital: How climate adaptation in cities creates a resilient place for business. This report focuses on the evolving role cities are playing in protecting citizens and the economy leads to greater resiliency for business (CDP, Bloomberg Philanthropies, and C40)

<https://www.cdp.net/CDPResults/CDP-global-cities-report-2014.pdf>

PREP: Value Chain Climate Resilience. This guide has been developed by companies and organizations engaged in the Partnership for Resilience and Environmental Preparedness (PREP)—a pilot partnership formed to address the risks and opportunities that climate change impacts pose to businesses and the communities on which they depend. (Oxfam America)

<http://www.oxfamamerica.org/static/oa4/valuechainclimateresilience.pdf>

RELI Resiliency Action List & Credit Catalog. A comprehensive listing of resilient design criteria with the latest in proven integrative process for developing next generation communities, neighborhoods, buildings, homes, and infrastructure. (C3 Living Design Project)

http://c3livingdesign.org/?page_id=5110

Future Proofing Cities Toolkit. This toolkit outlines six approaches to increasing resilience capacity that planners and designers can deploy to build more resilient cities. (Resilient City)

http://www.resilientcity.org/site/ywd_craigapplegath/assets/pdf/future_proofing_cities_toolkit_by_craig_applegath_2012-03-01sm.pdf

ADDITIONAL RESOURCES *continued*

Non-profit Organizations

Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments. This document is intended to inform decision-making in all levels of government around preparing for climate change by recommending a detailed, easy-to-understand process for preparedness based on familiar resources and tools. (King County & ICLEI)

<http://cses.washington.edu/db/pdf/snoveretalgb574.pdf>

City Resilience Index: City Resilience Framework. This framework provides a lens through which the complexity of cities and the numerous factors that contribute to a city's resilience can be understood. It comprises 12 key indicators that describe the fundamental attributes of a resilient city. (Rockefeller Foundation)

<https://www.rockefellerfoundation.org/app/uploads/City-Resilience-Framework1.pdf>

Whole Building Design Guide: Secure / Safe Design Guidance: The WBDG is a web-based portal providing government and industry practitioners with one-stop access to up-to-date information on a wide range of building-related guidance, criteria and technology from a 'whole buildings' perspective. (National Institute of Building Sciences)

https://www.wbdg.org/design/secure_safe.php

Sustainability & Resilience Post-Katrina: The New Orleans Principles

In the wake of the 2005 devastation that struck the Gulf Coast, a group of more than 160 experts and area community leaders contributed to an effort that imagined a culturally-sensitive, more sustainable way of rebuilding the Crescent City. This document, organized by USGBC and partners including the Trust for Public Land, would spur what would later become known as resiliency thinking at the center of the broader movement toward sustainability.

In hindsight, the New Orleans Principles is an elegant look at a very complex set of issues. For communities in their planning stages, the 10 principles and 50+ detailed policy recommendations and actions may be a useful tool for how to build better today and build back better tomorrow.

Learn more at <http://tinyurl.com/NOLAprinciples>

Private Sector

Resilient Communities Portal. ESRI's Resilient Communities page offers guidance and helpful links resiliency in areas such as food, transportation, infrastructure, economy, disasters, climate, public safety, and public health. (ESRI)

<http://www.esri.com/industries/government/resilient-communities>

Road to Resilience. A helpful infographic that looks at how to reach a resilient outcome in decision making. (Rand Corporation)

<http://www.rand.org/content/dam/rand/pubs/infographics/IG100/IG114/IG114-road-to-resilience-1000.png>

Concrete: Results. More concrete is produced than any other material on Earth. Find a collection of innovative, understandable and actionable research and results about concrete and sustainability. (Massachusetts Institute of Technology Concrete Sustainability Hub)

<https://cshub.mit.edu/results>

International

A Toolkit for Local Governments. This website provides local government leaders with a generic framework for disaster risk reduction. It points to good practices and tools that are already being applied for that purpose and offers practical guidance creating a resilient city. (United Nations Office for Disaster Risk Reduction)

<http://www.unisdr.org/campaign/resilientcities/toolkit>

Unlocking the Triple Dividend of Resilience. This policy note argues that investments in Disaster Risk Management can reduce pre-disaster losses and unlock significant development potential in vulnerable areas by generating a dividend even if no disasters strike for a long time. (Overseas Development Institute)

<http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9501.pdf>

Resilience Resources. This page contains publications, tools, and multimedia products geared towards increasing resiliency in the built environment. (Resilience Research Centre)

<http://resilienceresearch.org/research/resources>

The Skanska logo is displayed in a white box with a blue border. The word "SKANSKA" is written in a bold, blue, sans-serif font.

Skanska believes that, to deliver on our purpose—Building for a better society—it is important to act and build projects sustainably. Growing cities must seek to build in ways that minimize the already great strain on resources while also helping promote a business and social environment that can thrive for years. For more than a decade, Skanska has been a leading voice in the construction and development communities for practices that contribute to sustainability.

Learn more at usa.skanska.com

ADDITIONAL RESOURCES *continued*

Building Resilience: Integrating Climate and Disaster Risk into Development. This report presents the World Bank's experience in climate and disaster resilient development, and contends that such development is essential to eliminating extreme poverty and achieving shared prosperity by 2030. (World Bank)

http://www.worldbank.org/content/dam/Worldbank/document/SDN/Full_Report_Building_Resilience_Integrating_Climate_Disaster_Risk_Development.pdf

Academia

Cooling the Public Realm: Climate-Resilient Urban Design. This paper discusses the need for planning and design practitioners to expand their scope to implement desired ecological outcomes across spatial scales that comprise urban systems and physical networks. (University of Cambridge)

<http://www.usgbc.org/resources/cooling-public-realm-climate-resilient-urban-design>

Green Building and Climate Resilience: Understanding Impacts and Preparing for Changing Conditions. This report summarizes the most recent research on the likely impacts of climate change at various scales: regional, neighborhood, and site or building. (University of Michigan & USGBC)

<http://www.usgbc.org/resources/green-building-and-climate-resilience-understanding-impacts-and-preparing-changing-conditi>



At Trimble Navigation we strive to use technology as a means for advancing resilience. Using Trimble® eCognition® Essentials software, cities can leverage readily available satellite and aerial imagery from manned or unmanned aerial systems (UAS) to produce timely, accurate land use and mapping information that can be used with a Geographic Information System (GIS). The software enables cities to transform images into quantifiable, actionable information about land use that can be applied to enhance a city's resilience building efforts.

Learn more at trimble.com

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22. Launched by the Peruvian Presidency of COP20/CMP10, alongside the Lima Paris Action Agenda in 2014, the Non-State Actor Zone for Climate Action (NAZCA) showcases commitments to action by companies, cities, subnational regions and investors to address climate change. See NAZCA at <http://climateaction.unfccc.int/>



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