Sustainable Urban Systems Conference Report

Re-Envisioning Urban Infrastructure to Address Climate Change:
A Comprehensive Regional Framework for Sustainability
Boston University
August 5-6, 2019

Many U.S. cities are simultaneously confronting two interrelated, but tragically siloed crises: climate change and access to affordable housing. Central to both is sound land use policy. Where people live, what people build, and what people keep or make green matters not just to a neighborhood, but to the nation. Cities have a political will for climate action and cities have a responsibility to their local constituencies to deliver services and establish sustainable pathways for long-term community prosperity. The question of how to simultaneously encourage affordability, equity, and sustainability in urban development is a grand challenge facing cities across the U.S. and around the world.

The Re-Envisioning Urban Infrastructure conference, hosted by Boston University and the Metropolitan Area Planning Council, laid the groundwork for developing the new science, data, and methods needed to inform integrated urban sustainability outcomes across local-to-regional-to-national scales. It brought together a community of scholars, federal, state, regional and local policymakers, and community groups to define a research agenda that explores integrated sustainability pathways and outcomes considering tradeoffs and co-benefits.

The objective of the conference was to build a shared scientific and community vision for investigating, experimenting with, and developing multiple pathways towards urban sustainability. The proceedings highlighted transformative practices, policies, and technologies that jointly support adapting to and mitigating climate change *and* meeting community affordable housing needs. Over the two days, the driving question of the participants that emerged was: *How do we encourage desperately needed energy efficient, transit accessible, health-promoting residential development while remedying historic inequities, avoiding gentrification & displacement, preserving and expanding green space – all with insufficient public resources?*

Organized as a highly interactive working summit, this conference brought together 176 scholars, community groups, and public officials to examine these multiple objectives holistically. A blend of brief keynote presentations, as well as panel discussions raised core themes. Synthesized in this report are the critical opportunities and barriers identified by the participants for each of the conference themes, building consensus about the priority knowledge and resources needed to promote the development of convergent sustainable pathways for socio-economic, demographic, and infrastructure transitions.

The conference revealed that the goal cannot be simply that an issue be "on the list" for a policymaker. Rather, we in academia and the community, and even lower levels of government, need to seek real champions and partners among upstream policymakers, and ensure she/he/they make an issue a top concern and dedicate staff time to tackle it. As a former government official noted, policymakers are just people juggling multiple concerns and with various biases. They "*aren't emerging from a dark closet with a perfect solution.*" The desired outputs that may emerge from the policymaking process varied, they may include tailored programs, significant financial resources, new policies or simply changes in practice that are routinized if not codified. And all of these shifts need to be continually reevaluated as part of the evidence-gathering process.

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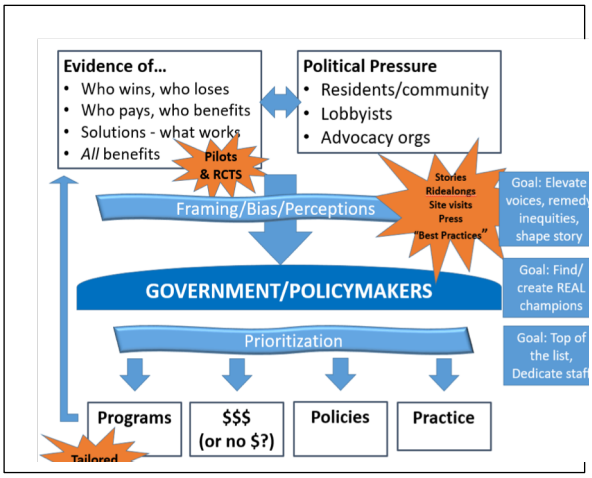
Cross-Cutting Themes

Over the course of the two days a number of key themes and barriers emerged. Sustainable urban transformation does not just require a rethinking and rebalancing of inputs. All the stakeholders – from city officials to academic researchers to community partners – need to refocus and align to achieve equity in outcomes. Systemic barriers, including **structural racism** and **classism**, as well as **historical inequities in investment** have produced grossly unequal communities and unequal decision-making processes in the U.S. As one example, lower income and communities of color are significantly more likely to be exposed to environmental threats such as air pollution or lead, as a result of the quality, state of repair and location of their homes. Meanwhile a radical rethinking of the development and planning process runs up against **status quo bias** –which presumes that the present methods of decision-making and planning, or current systems and programs are adequate. Yet, as the assembled researchers and community leaders shared, current community engagement processes often elevate the voices and priorities of privileged residents and fail to engage marginalized residents. As one speaker shared, insufficient public support is not the problem, rather "*we have broken processes, so we're hearing from the same people."* The speakers and audience members noted that we must prioritize the principles of racial and social equity and justice.

As we seek to build transdisciplinary partnerships, the audience participants emphasized the need to acknowledge the underlying challenges faced in pursuing these types of collaborations. To begin, both government and academia are **highly siloed**, and various levels of government must confront jurisdictional boundaries that render regional collaboration – even just among governments - difficult. Academia, government and community must also acknowledge that they have **unique cultures, languages, and reward systems and often face time and resource constraints**. Sustaining collaborations requires trust, **strong governance structures, and financial resources** to support routine convenings, compensate people for their time, and a genuine desire to **approach collaborations as equals**. They may also require investments in **capacity-building**, whether training academics in community organizing or residents as community researchers, alongside **respect for existing "expertise**" in its many forms.

Collectively, the audience agreed to this schematic regarding how to affect change, along with some desired – if generalized - outcomes. Transdisciplinary teams have **two areas of leverage: evidence and political pressure.** Evidence may include rigorous documentation of "winners" and "losers" with regard to a particular policy or program, and assessments of who pays and who benefits. Alternatively, it may put forth rigorously researched solutions to a specific challenge, and/or document *all* benefits of a particular investment such as the health, emissions, resident economic stability and broader economic benefits of a residential energy efficiency program. **Pilots and randomized control trials** were two methods frequently referenced by the audience. Evidence can be coupled with political pressure, wherein residents, lobbyists and advocacy organizations work to elevate marginalized voices, shape the narrative, and ultimately hold elected officials accountable. Speakers noted that **data may be insufficient to change hearts and minds**, and so multiple methods – such as story-telling, personal testimony, and site visits – may need to be considered to foster empathy and understanding among policymakers and inspire them to become champions.



Session 1 Housing Resilient Cities

Many US cities, including Boston, are experiencing a housing availability and affordability crisis, while also facing significant vulnerabilities from climate change. This session explored urban approaches to tackling housing availability, affordability, and equity, while jointly considering the cost of improving infrastructure to mitigate climate change.

Identified Opportunities	*Identified Barriers*
• Reclaim the narrative of social housing, offering a vision of what a strong, healthy, mixed use community looks like. Launch a cultural change campaign to explain the societal and environmental benefits. • Incentivize lower priced housing as well as climate mitigation by (1) Allowing high-density, low income housing units to count towards emission reduction goals; (2) Implementing "sticks" if the city has not met low income housing targets, such as removing state funding for services such as roads, transit, and school funding; (3) Reduce taxes, fees, and permitting requirements for developing energy-efficient, lower priced housing near public transport with limited parking spaces. • Make living in densely populated areas more desirable through (1) Strong, well-funded public schools; (2) Reliable and convenient public transportation; (3) Community events; and (4) Municipal support (financial or physical space) for community groups. • Broadcast Planning and Zoning board meetings to reach a wider audience, via the radio, social media or live stream. Provide stipends to underrepresented groups, incentivizing them to attend. • Sharing resources between municipalities is currently effectively impossible. The proposed regional approach might catalyze a change in this "restrictive" policy. • Where feasible, allow existing housing units to build an additional floor on top. Reshuffle existing apartments into micro-units increasing the number of units per building. Spatially pair public housing investments with public transportation investments.	• Coordination and collaboration across a metropolitan area is difficult when all key decisions are made within individual towns. No empowered level of intermediate scale government between town and state. • Public participation in planning and zoning decisions causes slowdowns in the approval process. • Current case-by-case development approval systems hinder the speed of progress. Decisions become political, further slowing progress. • Attendees of Planning and Zoning board meetings are not representative of the whole community. A disproportionate share of participants in these forums are white homeowners. Most places, including Massachusetts, value local control over land use, so the makeup of the participants at these meetings can make a real impact on the production of new housing, especially affordable housing. • Communities with open spaces are generally sought after and densely populated areas are typically viewed as less desirable. It is difficult to persuade individuals to be a part of the solution if they perceive it will adversely affect their communities and property values. • The current public transportation infrastructure is already overcrowded and unreliable, additional development will increase pressures. • New housing developments can increase demands for public services, like schools. Finding funding and land for these schools is difficult. New schools are typically built on park or vacant lands, exacerbating the preexisting problem of limited open green spaces. Social and political issues typically arise as families relocate to places with the "best schools", or commute across the city to attend a better one. • Building housing next to industrial areas can create issues such as poor air quality, increased noise, and potentially negative health outcomes.

Session 2 Old Homes, New Ideas

Achieving ambitious sustainability goals requires the large-scale retrofit of the existing building stock and construction of "net zero" buildings to support growth. This session evaluated the physical, social and financial elements of the retrofit process with the aim of identifying key performance metrics, and frameworks that could lower barriers to energy retrofits.

Identified Opportunities	*Identified Barriers*
• Infrastructure and efficiency should be evaluated at the time of property sale. Fire escapes, septic systems, and belowground infrastructure (e.g. water and gas lines) should required to meet minimum standards. Conducting an energy audit at the time of sale could identify specific efficiency improvement opportunities. • A broader range of rebate programs could incentivize adopting energy efficient practices. Rent reimbursement to landlords during energy retrofits could incentivize efficiency improvements. • Programs for smaller landlords need to be tailored to offer technical assistance alongside financing – support in finding & managing contractors. • Tax benefits for landlords who upgrade and rebate programs for high efficiency appliances could improve adoption. • Offer tax breaks to landlords to keep units more affordable to potentially slow gentrification. • Contractors should be educated about best practices for energy efficiency. The free flow of information between those working on these projects, public officials, and the scientific community might expedite the trial and error periods experienced by organizations participating in these practices. • Change the narrative of what a healthy, thriving residential community looks like. Individuals should take pride in being energy efficient, recycling water, closing windows, and taking shorter showers. • Educate the housing, environmental and political experts, encouraging them all to break out of their narrowly focused "silos" of knowledge. • Consider all the benefits of an intervention: Evidence suggests energy efficiency upgrades in low income properties may promote housing security, by making it easier for low income residents to cover both utility bills and rent.	• There is a tradeoff between speed of development to alleviate the housing crisis, and the need to build carefully designed energy efficient dwellings, retrofits and upgrades. • We often associate the phrase "cost effectiveness" with positive or neutral financial outcomes. However, social, environmental and health costs should be discussed when considering true cost effectiveness. • Retrofits and housing upgrades are expensive up front, acting as a barrier for too many. Costs are financial, but also include a large time investment in planning and coordination, can be emotionally draining, and can be physically disruptive. Securing alternative living arrangements for the duration of the retrofit could be a challenge. • "Virtue" is not enough to drive the change needed. Policy changes that financially incentivize these upgrades may be the only way to see real change. Decarbonization efforts have been targeted at the "Low Hanging Fruit" i.e. the commercial sector. But 70-80% of Boston GHG emissions come from the 80,000 Boston residences. • Higher income individuals may not consider efficiency upgrades because energy costs are a low percentage of their income. The initial cost and time investment to upgrade might outweigh the long-term savings. • Adding an additional floor to an existing home creates issues for those living in the house already. Temporary relocation is a challenge. Given the age of the infrastructure, structural integrity of the building post retrofit is a concern. Highlighting successful examples and their structural engineering requirements will be key for wide spread adoption. • Apartment building owners are not created equal – small landlords may lack expertise to find and manage qualified contractors

Session 3 Moving from Old Streets to New Mobility

We know what we want from a sustainable urban transportation system – safety, low-to-zero emissions of greenhouse gases, promotion of physical activity, good accessibility, low-to-no cost shared modes of travel, & last mile transit solutions. This session explored emerging technologies and proactive policies for sustainable urban transportation systems that serve the needs of the evolving and diverse urban population.

Identified Opportunities	*Identified Barriers*
• The research on autonomous vehicles, electric charging stations, and micro-mobility is prolific, but there is a need for more real-world application and widely publicized pilots. Funding and political support for innovation and demonstration projects is needed. • We need to move away from the current formulation of single occupancy ride through ride share apps. Evidence from Boston shows their cruising, parking, and rides result in more congestion and tend to reduce public transit ridership. • Community and planning meeting on transportation need broad participation from people using all modes of transit. Lower income perspectives are critical for equity and efficacy. • Improved science communication beyond technical papers is needed. Broadcast easy to understand, scientifically backed, messages about transport and environmental impacts via social media, television and radio. • Minimize "the last mile" problem. Invest in shuttles, bike racks and bike share programs that make the last mile more manageable for workers. • Require housing developers to include communal indoor bike storage spaces in apartment building designs. • Improved transit tracking mobile applications to improve predictability and increase public transit use. Create a mobile application that spatially shows where trains and buses are and lists arrival times. • Encourage commuters to consider the environmental impacts that their choices have, a better informed populous might make different choices. • Conduct RCTs or identify natural experiments to evaluate which policy interventions actually reduce car ownership as well as vehicle miles travelled.	• Car culture is entrenched in American ideas of freedom and mobility. • The political will needed to change mobility infrastructure and accessibility is missing. • Those making transportation decisions should consider factors and needs from a broad cross-section of constituents and users. • Public transit in the Greater Boston area is unreliable and underfunded, leaving people to rely on other modes. • Research in the academic sphere does not focus on implementation strategies. Therefore, many good ideas involving mass transit go unexplored and untested. • There is a perception that electric cars are still too expensive for most. State incentives for plug-in electric hybrids and electric vehicles have become more restrictive in recent months, further dampening adoption rates. • Access to a charging station is a major problem in space limited cities. Over 50% of car owners might not have a driveway or garage to install a charging station. • The desire to avoid walking "the last mile" from the station to the work place prevents many from taking public transport. The winter and extreme weather across the seasons is a further challenge. • There are many policies that may reduce car ownership, but there seems to be little rigorous evidence to support them.

Session 4 Integrating Ecosystems

Human well-being depends on ecosystem services such as the provisioning of clean air and water, yet climate action plans for cities often exclude the role of ecosystems. This session discussed the state of ecosystem science in cities and how ecosystem services can be better integrated into planning and policy making.

Identified Opportunities	*Identified Barriers*

• Encourage towns and cities to account for growth or loss of greenspace during development.
• Establish volunteer programs and community events to build community, educate, and empower community members to care for public trees.
• Improve visibility of community and volunteer opportunities through social media or television to advertise what a space could look like if an area becomes greener and more trees are planted.
• Capture the public's imagination through visual representations and virtual reality. Evidence suggests greenery in building renderings makes people more amenable to density and height.
• Require new housing to include open space requirements, and create monitoring and enforcement mechanisms to ensure developers deliver on promised investments
• Adapt existing public spaces with biodiversity & health goals, such as playgrounds
• Provide social and political support to promote integrating ecosystems throughout urban areas.
• Create campaigns to emphasize greenspace benefits across sectors of society. For example, green spaces are known to:
  • promote ecosystem services such as biodiversity preservation and improved air quality and mental health
  • increase job opportunities in recreation, maintenance, and outdoor education
  • decrease crime rates
	• Planting trees, cleaning, and maintaining green spaces can be inexpensive if volunteers are used. Many people are motivated to help, but they might not know where and when their support can be utilized.
	• Aims for alleviating the housing crisis may directly conflict with maximizing ecosystem services and biodiversity in these two main ways:
	  • More housing requires land to build. Undeveloped spaces that currently have trees and shrubs are convenient places to build new housing.
	  • Adding trees and green spaces around existing housing might unintentionally increase gentrification.
	• Building rates were once higher regionally. Space has become scarce in recent years and it is difficult to redesign for higher densities without major funding and complex remodeling projects.
	• A better public transportation system requires massive building efforts. For many, clearing land to build trains and roads is more important than preserving green spaces.
	• There is a lack of political will. Many politicians rank green space efforts as low priority. Funding might be diverted toward other "high priority" issues.
	• Grassy spaces are typically preferred to wooded areas when designing recreational parks, even though lawns provide fewer ecosystem service benefits than native trees.
	• Low income housing rules often do not include open space requirements.

Session 5 Inclusive Community Engagement

Although universities and governmental agencies strive to engage community members in local, state and/or regional initiatives, the practice often falls short of this ideal. Here we discussed the norms, practices, tools, and resources that can be used to work collectively and promote a more equitable distribution or investment in resources in relation to population health.

Identified Opportunities	*Identified Barriers*
• Promote the principle that policy and decisionmakers should be representative of diverse populations or communities in which they serve or are engaged. • Develop and implement inclusive outreach strategies to ensure a diversity of voices at all stages of the project, from inception to implementation. • Adopt communication strategies that promote accessibility and inclusion (i.e., language, literacy, disability), including delivery platforms (i.e., in person, web-based, CCTV, neighborhood meetings) and modes (i.e., visuals, interactive, video). • Define the social problem or project's mission relevancy in terms of the community members' lived experiences. Community members can be highly motivated to get involved and improve the towns and communities that they live in. • Value the anecdotal knowledge that local residents can provide on a place and its history and culture. • Promote collaborations between experts from various disciplines as well as different spheres of the community to develop a holistic understanding of pressing social problems. • Educate different stakeholder groups to understand how historical discrimination contributes to present structural inequities and lack of trust in marginalized communities. • Adopt community engagement or community participatory models promote leadership roles for community members across all stages of the project (problem definition, garnering resources, implementation, and evaluation). • Engage in evaluation of community engagement strategies and use this feedback to adapt your approach to better fit your own community; there is no one-size-fits all model for an effective process. • Work to not only gain initial community buy-in, but to sustain it over time; community change projects are often multi-year ventures.	• Human and capital resources needed to drive substantial community change currently are inadequate in most regions. • Building strong relationships is important to this work, but relationships and trust take time. Many nonprofits have high staff turnover rates, that hinder their ability to create trusting relationships in the communities they work. • Governments face election cycles that can lead to shifts in agency leadership as well as some frontline staff. • Outside input can be misguided or have ulterior motives. • "Elites" making the policy or program decisions are typically less directly affected by inequities. • The communities in greatest need are often those that are most marginalized and lacking voice (i.e., racial minorities, lower socio-economic status). • Non-governmental organizations are often hindered in making stronger connection to diverse racial and ethnic communities due to lack of employee linguistic diversity. • The incentive system in the academy often does not support long-term university investments in local communities. Research grant funding priorities and funding cycles do not always align well with community's priorities, budget cycle, and "real life" challenges of implementation. The pressure to publish, a driver for faculty, is typically not relevant to communities. • Community-university collaborations are often complex, including multiple organizations and individual stakeholders. It takes significant time and dedication to bring these different parties together in a structured, routinized manner. • Building projects typically face a bureaucratic process that slows progress. A streamlined process to increase efficiency and transparency, such as an "express authorization policy" for community engaged projects, is needed.

Session 6 Improving Health Outcomes

Local health can be influenced in multiple ways by building and land use decisions, including direct influences of the built environment on health as well as indirect influences related to air pollution, climate extremes, green space, and opportunities for active transportation. This session focused on the twin challenges of affordability and carbon emission reductions, and the potential implications for health of vulnerable populations.

Identified Opportunities	*Identified Barriers*

• Innovative solutions can be used to combat multiple health, climate, and sustainability challenges simultaneously.
• More efficient heating, cooling and ventilation systems exist which use radiant floors, large windows, cooled beams and smaller more efficient vents. In addition to providing clean energy, solar panels can be used to shade hot areas. Widespread adoption of these new innovations should be encouraged.
• Educate community members, housing developers and inspectors about indoor air quality concerns and best practices via workshops and community outreach.
• Embed researchers in design and decision-making processes to ensure health considerations are addressed by developers
• Encourage adaptive comfort. When people are exposed to a wider range of temperatures they develop higher tolerance for fluctuations. Increased energy efficiency can be achieved while maintaining thermal comfort.
• Discuss these issues of health and clean air with a wide range of experts. Experts from different sectors will have diverse views and possible solutions. A holistic understanding is needed to develop innovative and inclusive solutions to these complex problems.
• Health and wellness outcomes alone may justify investment into greenhouse gas mitigation strategies such as mode shifting, EV adoption, and energy efficiency.
	• The goal of reducing GHG emissions directly conflicts with improving health in the home environment in two major ways:
	  • Improving air quality in residences is integral to improving health outcomes. Some air quality problems can be alleviated by improving ventilation systems. Utilizing these systems effectively may require a comprehensive retrofit.
	  • Air conditioning is often needed to control the thermal comfort of a space. Thermal comfort is more of a health concern than many might think. Air conditioning, however, consumes more electricity and emits waste heat into the local environment.
	• Structural racism needs to be recognized as a factor impacting health outcomes. A one size fits all solution will not work for all groups in all communities.
	• Current building codes allow developers to do the bare minimum when building new housing. A policy change is needed in order to ensure that new housing is designed addressing issues of clean air.
	• You cannot see or smell many types of air contaminants, and the problem is hard to address when many individuals may not be aware there is a problem.
	• An upfront financial cost required for residential upgrades to improve health outcomes act as a barrier to lower income households.