City of Ypsilanti

SUSTAINABILITY COMMISSION MEETING

One South Huron Street
Ypsilanti, Michigan 48197

MONDAY, August 13, 2018
7:00 P.M.

I. CALL TO ORDER

II. ROLL CALL

Keith Michalowski	P	A	Brett Zeuner	P	A
Emily Drennen	P	A	Julia Bayha	P	A
Nancy Heine	P	A	Bryan Foley	P	A
Natalie Sampson	P	A	Thomas McKee	P	A

III. AGENDA APPROVAL

IV. PRESENTATIONS

V. AUDIENCE PARTICIPATION

VI. CONSENT AGENDA

A. Approval of July 9th, 2018 minutes 1 2

VII. RESOLUTIONS/MOTIONS/DISCUSSIONS

A. EMU Sustainability Commission liaison and formal communication discussion
B. Public Recycle Bins Resolution 1
C. Transition to Green Energy resolution (Michalowski) 1
D. Resilience discussion 1 2 3 4 5

VIII. LIAISON REPORTS

A. Sustainability Plan subcommittee (Drennen/Michalowski) 1 2 3
B. MGC Challenge subcommittee (Michalowski/Sampson) 1
C. Outreach subcommittee (Bayha/Foley)
D. Housing Affordability & Access Committee of the Planning Commission (Foley)

IX. COMMUNICATIONS

A. Zero Waste events update (Michalowski) 1 2 3
B. Big Belly update (Michalowski) 1 2 3
C. Recycling program status update (Bashert)
D. Peninsular Dam status update (McClary)

X. AUDIENCE PARTICIPATION

XI. PROPOSED BUSINESS

A. Opportunity Zones 1 2 3

XII. NEXT MEETING DATE

Monday, September 10th, 2018

XIII. ADJOURNMENT

Meeting Minutes

City of Ypsilanti
Sustainability Commission

Regular Meeting
City Hall Council Chambers – 1 South Huron St.
Ypsilanti, MI 48197

Monday, July 9, 2018 – 7:00 p.m.

I. CALL TO ORDER: 7:06 p.m.

II. ROLL CALL:

Commissioner Michalowski	Present
Commissioner Drennen	Present
Commissioner Heine	Absent
Commissioner Sampson	Absent
Commissioner Zeuner	Absent
Commissioner Bayha	Present
Commissioner Foley	Present
Commissioner McKee	Present

Also Present: Council Liaison Beth Bashert
Nancy Hare-Dickerson, Commission Secretary

III. AGENDA APPROVAL:

Bayha (Second Foley) moved to approve the Agenda as submitted.
Vote: Unanimous Motion: Carried

IV. PRESENTATIONS:

A. Huron River Watershed Council - Laura Rubin, Executive Director

Council Liaison Bashert indicated that the Huron River Watershed Council [HRWC] has been in existence for 53 years and that the City of Ypsilanti has two seats on their Board of Directors. She expressed that the HRWC is a strong and welcomed partner with the City of Ypsilanti in helping to maintain the health of our river.

Ms. Rubin gave a brief overview of the Huron River Watershed Council and explained that watershed monitoring is basically the foundation of the work they do, which then informs their work about where they need to do

more protection and restoration projects. She explained that our watershed starts in Oakland County and goes through Livingston, Washtenaw, Wayne and the river empties out into Lake Erie.
She further indicated that the HRWC does technical assistance with local governments, parks departments, businesses and individuals, as well as education and outreach programs.

Ms. Rubin explained that although the HRWC works with the City on numerous different projects, that tonight's presentation is specifically to discuss the issue of the Peninsular Paper Dam which the City has been working on with the Watershed Council and will be facing a big decision on in the next few months.

Ms. Rubin explained that the Peninsular Paper Dam, which was constructed in 1867, provided hydro power for paper manufacturing; that it failed, like many dams do and was rebuilt in 1920; that it was eventually decommissioned; that it no longer generates hydro power and that all the electricity-generating equipment was removed. She explained that the dam is ranked by the State as a high hazard dam which is predominantly because it is in a dense urban area and if it were to fail, there could be a loss of life or considerable damage. She explained that the dam was last inspected in 2014 by OHM with the cost of repairs being cost prohibitive to the City at that time; that there was contact from the DEQ dam safety staff in 2016; and that the HRWC was contacted to provide an overview of what removal of the dam would look like in order to assist the City in comparing repair vs removal.

Ms. Rubin gave a synopsis of what a dam does/issues that can occur; briefly talked about free-flowing rivers in relation to water quality improvements, habitat improvements, natural flow patterns and transport of debris; and then detailed the following topics:

Why We Remove Dams
Some Reasons Why a Dam Can't be Removed
Cost – Dam Removal vs Dam Repair
What Are Our Alternatives
Peninsular Park River Revitalization & Redevelopment Scenario [Plans]

In conclusion, Ms. Rubin stated that the dam feasibility study is under way, City Council will be making their decision after completion of the study, and the HRWC will facilitate some community meetings in the fall in an effort to inform people on what is going on.

<u>Commissioner Questions/Comments</u>

Commissioner Bayha asked if it is correct that Ms. Rubin previously stated that the three things that have to be looked at are the infrastructure, ownership and if the sediment is hazardous.

Ms. Rubin confirmed, and stated “and the amount”.

Commissioner Bayha asked for clarification regarding the border-to-border trail.

Council Liaison Bashert responded that there is a border-to-border passage planned for going through Peninsular Park but that the residences around it are not part of that.

Ms. Rubin further responded that the border-to-border trail would not cross over, as it is down by the Geddes dam and St. Joe’s, which is on the south side of the track.

Commissioner Foley asked if the river flow would increase and move at a faster pace if the dam is removed since the dam acts as a resistance.

Ms. Rubin responded to think of it like a bathtub; that, right now, what is coming down the river is still flowing over but it is holding volume and that when you remove it, it is not changing the quantity of flow going down the river, that it is not holding any water back. Therefore, she explained, there would not be more water downstream, there would not be more erosive flows; that it is the same amount of water coming in.

Commissioner Foley asked about the velocity, in that the level would be lower from the dam and that the pond would also be lower.

Ms. Rubin responded that the same amount of water is coming in; that the velocity would not increase.

Commissioner Foley stated that Riverside Park has a high water table.

Ms. Rubin stated that they are working to try and figure out how to prevent that from flooding, but that this would not affect that at all. She explained that there would be approximately two months where the dam is slowly being taken out and that the main and possibly only change that would be seen downriver is some sediment washing through.

Commissioner Foley asked if the sediment washing through would affect the fish hatchery downstream.

Ms. Rubin responded that any effect would be temporary; that, for probably those two months, the river may be murkier downstream.

Commissioner Foley asked about the flow, without the resistance from the dam, with the City of Ann Arbor wastewater plant being upstream.

Ms. Rubin indicated that there is another dam [Superior] in between the wastewater plant but that even if that dam would go, there is no real difference there; that the wastewater treatment plant is not adding sediment, just water and that the volume is not great enough that it really affects the river very much.

Commissioner Michalowski asked if there are recommendations from the HRWC on how the Commission could best help.

Ms. Rubin responded that help is needed in getting information out to the public on this issue. She suggested possibly educational meetings or a commission website where information is shared.

Commissioner Bayha asked if the HRWC had considered having a table at the upcoming Ypsilanti Heritage Festival as a way to provide some educational outreach.

Ms. Rubin confirmed having a table at the Heritage Festival and stated that the HRWC has also been trying to work with some of the media, social media outlets, flyers and community meetings.

Commissioner Bayha suggested possibly contacting science professors at community colleges and universities in the area and asking them to require that some of the student projects be on this subject; that, often, then, that information filters through the community through co-workers, jobs and through families.

Ms. Rubin acknowledged the suggestion and stated that the HRWC will also be working with the parks department on Ypsi River Day in the fall.

Commissioner Foley asked if there is a leaning toward removing the dam or repair.

Ms. Rubin responded that they do not have that comparison yet; that the cost for removal won’t be known until the completion of the study. She stated that, at this point, they just know what the cost was, in 2014, to repair it.

Commissioner Foley asked about any historical attachment to the dam.

Ms. Rubin responded that there seems to be more historic attachment to the building.

Commissioner Bayha asked Ms. Rubin to “like” the Ypsilanti Sustainability Commission Facebook page and to input whatever she would like to have everyone read as another way to share information with the public.

V. AUDIENCE PARTICIPATION:

None

VI. CONSENT AGENDA

A. Approval of June 11, 2018 Minutes

Drennen (Second Bayha) moved to approve the Consent Agenda as follows:
Approval of the June 11, 2018 minutes as submitted.

Vote: Unanimous **Motion: Carried**

VII. LIAISON REPORTS

A. Sustainability Plan Subcommittee
Commissioner Michalowski suggested redoing the poll and possibly meeting on Thursday, July 12th.

B. MGC Challenge Subcommittee
Commissioner Michalowski indicated that they should know soon if the Commission reached the bronze level and that the MGC awards presentation is in September.

Commissioner McKee indicated that the MGC awards presentation is going to be in conjunction with the Planning Michigan Conference this year, which is a joint conference put on by the Michigan Municipal League and the Michigan Association of Planning. He stated that he is working with the Michigan Association of Planning on their conference and will be in attendance.

C. Outreach Subcommittee
Commissioner Foley indicated that he and Commissioner Bayha will meet and discuss what information could be placed at the Heritage Festival and Parkridge Summer Festival which is coming up next month.

Commissioner Bayha stated that having some recycling going on would be a really good educational outreach.

Council Liaison Bashert asked what goals the outreach subcommittee wish to accomplish.

Commissioner Bayha responded that a goal is to look for opportunities to get the word out about the Sustainability Commission and to show some presence.

Commissioner Foley concurred that it is important to reach out and make the community aware of what the Sustainability Commission is all about.

Commissioner Michalowski expressed that one of his thoughts on outreach is education and that one of the education approaches is zero waste. He stated that even the visibility of it is the education; that providing the education gives the Commission exposure.

[Discussion continued re: organizing a Sustainability presence at the two events]

Commissioner Michalowski summarized the discussion with the following: that the Commission will focus on the recycling approach, look into pursuing the "Bigbelly" mentioned by Council Liaison Bashert, and he will work to get information regarding zero waste; that the Commission will have to communicate between meetings in order to get things moving before the two events occur and then, at the August meeting, those conversations can be discussed and voted on.

D. Housing Affordability & Access Committee of the Planning Commission
Commissioner Foley indicated that they are still in subcommittees and that there is nothing new to update at this time that goes beyond what he has previously offered. In response to a question by Commissioner McKee, he stated that the next meeting is Wednesday, July 11th at Spark East.

VIII. RESOLUTIONS/MOTIONS/DISCUSSIONS

A. Sustainability Consultant Update
Commissioner Drennen indicated that work is being done to create a list of what the subcommittee would ask the consultant to do, as suggested by City Manager McClary.

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Commissioner Michalowski stated that the next three items are for the Commission's consideration and would need additional research. He asked that the Commission take a look at the three topics [reference attachments provided in meeting packet] and decide if there is any interest in further pursuing them.

B. Cool Roofs Discussion
Commissioner Michalowski briefly explained that painting the roofs white was an old idea that was dismissed but is now resurging. He stated that then there were studies concerned about the reflection of the light and what effect it may have on the surrounding area; that it would warrant more study and then the Commission deciding whether to pursue it.

C. Sustainability ROI Discussion
Commissioner Michalowski briefly explained that to be able to explain to people how they save money by being sustainable (their return on investment) would possibly make sustainability viable to many people.

D. Urban Resilience Discussion
Commissioner Michalowski briefly explained that resilience is the idea that you can survive unexpected things, critical shocks. He stated that he has been reading more and more about resilience and feels that it will eventually find its way into the Commission's plan of the future.

IX. COMMUNICATIONS

A. Zero Waste Events Update
Commissioner Michalowski stated that he will be reaching out for more information.

B. Recycling Program Update
Council Liaison Bashert provided the following update: that talks are going well with Ypsilanti Township embracing the City for recycling for the next period of time; that once finalized, this will allow the recycling center to be removed and give City residents that don't have recycling pickup, access without fees at the Township. She also indicated that conversations are still going on at Council about how to proceed with increasing recycling access for City residents and solutions as to cost.

X. AUDIENCE PARTICIPATION

None

XI. PROPOSED BUSINESS

Council Liaison Bashert suggested that the Commission add the Peninsular Dam study to its agenda once the study is completed and then possibly consider a resolution to send to City Council depending on the study results.

Commissioner Michalowski stated that the Commission had planned on discussing the study when the information became available and determining where they could contribute their voice on it.

XII. NEXT MEETING DATE:

Monday, August 13, 2018

XIII. ADJOURNMENT:

Commissioner Michalowski adjourned the meeting of the Sustainability Commission at 8:40 p.m.

Action Minutes

City of Ypsilanti
Sustainability Commission

Regular Meeting
City Hall Council Chambers – 1 South Huron St.
Ypsilanti, MI 48197

Monday, July 9, 2018 – 7:00 p.m.

I. CALL TO ORDER: 7:06 p.m.

II. ROLL CALL:

Commissioner Michalowski	Present
Commissioner Drennen	Present
Commissioner Heine	Absent
Commissioner Sampson	Absent
Commissioner Zeuner	Absent
Commissioner Bayha	Present
Commissioner Foley	Present
Commissioner McKee	Present

Also Present: Council Liaison Beth Bashert
Nancy Hare-Dickerson, Commission Secretary

III. AGENDA APPROVAL:

Bayha (Second Foley) moved to approve the Agenda as submitted.
Vote: Unanimous Motion: Carried

IV. PRESENTATIONS:
A. Huron River Watershed Council

V. AUDIENCE PARTICIPATION:

VI. CONSENT AGENDA
A. Approval of June 11, 2018 Minutes

Drennen (Second Bayha) moved to approve the Consent Agenda as follows:
Approval of the June 11, 2018 minutes as submitted.

Vote: Unanimous Motion: Carried

VII. LIAISON REPORTS

A. Sustainability Plan Subcommittee
B. MGC Challenge Subcommittee
C. Outreach Subcommittee
D. Housing Affordability & Access Committee of the Planning Commission

VIII. RESOLUTIONS/MOTIONS/DISCUSSIONS

A. Sustainability Consultant Update
B. Cool Roofs Discussion
C. Sustainability ROI Discussion
D. Urban Resilience Discussion

IX. COMMUNICATIONS

A. Zero Waste Events Update
B. Recycling Program Update

X. AUDIENCE PARTICIPATION

XI. PROPOSED BUSINESS

XII. NEXT MEETING DATE:

Monday, August 13, 2018

XIII. ADJOURNMENT:

Commissioner Michalowski adjourned the meeting of the Sustainability Commission at 8:40 p.m.

CITY OF YPSILANTI SUSTAINABILITY COMMISSION RESOLUTION
FOR THE ADOPTION OF
PUBLIC RECYCLING BINS ADJACENT TO ALL PUBLIC TRASH CANS

AT A MEETING OF THE SUSTAINABILITY COMMISSION OF THE CITY OF YPSILANTI, MICHIGAN, HELD AT CITY HALL, ON AUGUST 13, 2018,

RESOLUTION 2018-08-002 - ADOPTION OF PUBLIC RECYCLING BINS ADJACENT TO ALL PUBLIC TRASH CANS

WHEREAS, to increase the recycling rate of the City of Ypsilanti per the the Climate Action Plan; and

WHEREAS, to increase visibility and education for the City of Ypsilanti recycling program; and

WHEREAS, each ton of waste diverted to recycling rather than to a landfill saves 2.87 metric tons CO2e; and

WHEREAS, reducing the amount of waste landfilled can save the City money; and

THEREFORE, BE IT RESOLVED that the Sustainability Commission urges City Council

1. To direct staff to add and maintain public recycling bins adjacent to all public trash cans;
2. To ensure and provide adequate recycling bins for all public pedestrian spaces.

CITY OF YPSILANTI SUSTAINABILITY COMMISSION RESOLUTION
FOR THE ADOPTION OF THE
TRANSITION TO GREEN ENERGY

AT A MEETING OF THE SUSTAINABILITY COMMISSION OF THE CITY OF YPSILANTI, MICHIGAN, HELD AT CITY HALL, ON AUGUST 13, 2018,

RESOLUTION 2018-08-001 - ADOPTION OF THE TRANSITION TO GREEN ENERGY

WHEREAS, the City of Ypsilanti is working to prevent climate change, improve quality of life, and become a green leader in the region; and

WHEREAS, the vast majority of scientists agree: an unprecedented increase in greenhouse gases, driven by human activity, is causing our climate to change; and

WHEREAS, the City of Ypsilanti has endorsed the Paris Climate Agreement; and

WHEREAS, the Climate Action Plan targets a reduction of Greenhouse gas (GHG) emissions by 50% by 2050, or approximately 12.5% (37,838 mtCO2e) per decade; and

THEREFORE, BE IT RESOLVED that the Sustainability Commission urges City Council

1. To direct staff to participate in the DTE Energy MIGreenPower program;
2. To begin participation at the 15% level;
3. To increase participation by 5% annually.

How to Develop a Resilience Strategy

10.03.2016 | BY BRYNA LIPPER

Cities consist of vast networks of individuals, institutions, and systems. The same networks are shaped by centuries-old structures that make deep collaborations and innovation within government agencies and across sectors all too rare.

In the 21st Century, it is financially and socially imperative for cities to operate differently. The **City Resilience Strategy** is one of the tools that propels 100 Resilient Cities member cities in this holistic and integrated direction. The City Resilience Strategy is the product of a six-to-nine month process during which a city develops a better understanding of the challenges it faces; reviews its ability to address those challenges; and unites people, projects, and priorities, so that cities can collectively act on their resilience challenges.

The document that is produced at the end of this process is not a master plan, but rather an expression of the cities' priorities for building resilience.

Cities around the world, from New York and Medellin to Melbourne and Rotterdam have produced their first-ever resilience strategies. As more and more cities prepare to take this important step, we want to share more about the process of developing a sound resilience strategy, so that other can learn from this work.

The Essential Ingredients

One of the core principles in the Strategy Development Process is to avoid reinventing the wheel, building on the existing activities, processes and projects that are already underway. A city's Chief Resilience Officer can analyze existing efforts and determine ways to integrate the city's activities into a unified agenda that supports resilience-building. Building on existing work also brings together many different public and private stakeholders across the city, which can lend valuable political support and technical expertise to the city's resilience work.

100RC and our partners collaborate with each city to support its ability to customize aspects of the strategy development process to the city's unique challenges and ways of governing. It is not a linear process, but rather an *iterative* one. The city will continually collect new information, synthesize and evaluate it, ask questions to help identify topics of focus, and bring in new partners and stakeholders from across the city.

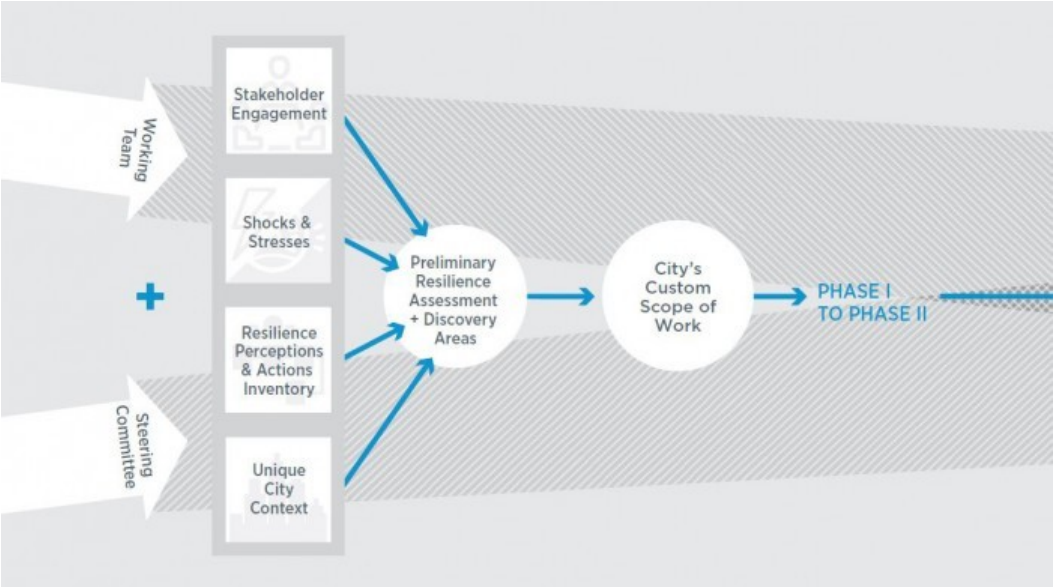
City leaders, community leaders, and partners attend the city of Atlanta's recent agenda-setting workshop, an opportunity to evaluate the city's challenges and begin to set resilience-building priorities.

Each city's strategy process culminates with the release of a **Resilience Strategy**, a concrete action plan that outlines projects and initiatives specifically tailored to the city's strengths and vulnerabilities. This Strategy gives the city a strong foundation to build resilience and triggers action: spurring coordination, integration, prioritization, and resilience thinking; connecting the city to private sector solution providers that will help them address their challenges, and signaling to the market what additional tools need to be created; and establishing an ongoing global practice of resilience.

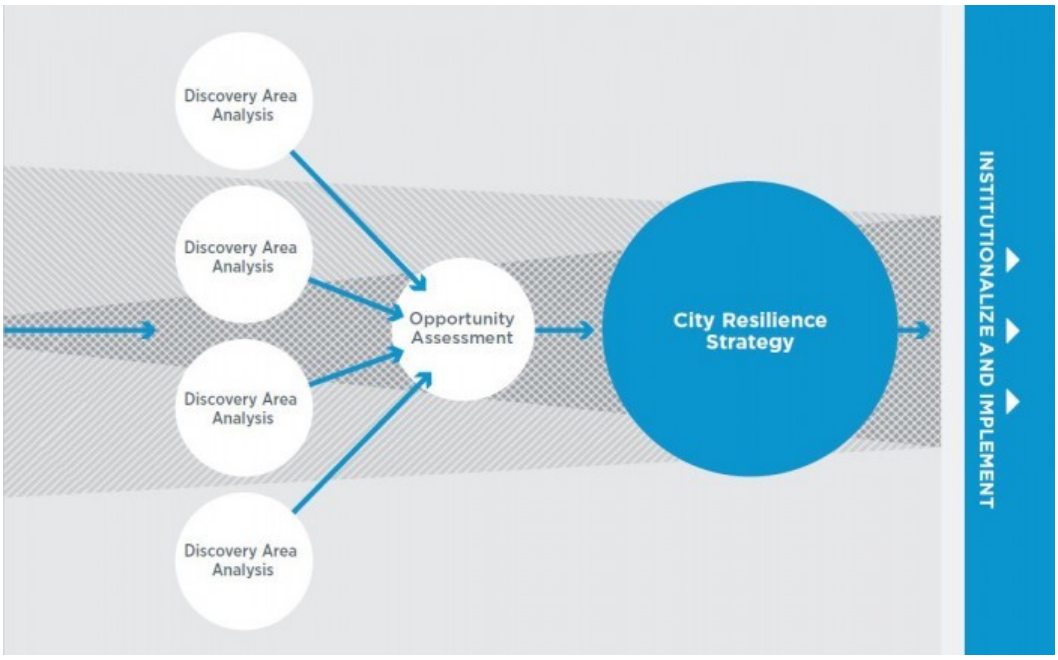
How Does It Work?

The development of the City Resilience Strategy is made up of two phases, which are led by the CRO and 100RC with significant stakeholder engagement and input, support from Platform Partners, and peer learning with other cities in the 100RC Network.

In the first phase of the strategy development process, the city's focus is to gather data, engage the community and stakeholders, understand how the city is already functioning, and create a preliminary work plan outlining where the city will focus and why.



In the second phase of the strategy development process, the city turns these diagnostics and assessments into actionable initiatives and projects. Exploring and analyzing each focus area, the city can evaluate its opportunities, and initiate workshops and closer study of areas such as financing or risk modeling.



The final step is to implement the city's Resilience Strategy. The strategy serves as a guide, articulating the city's priorities and the specific initiatives to reach them in both the near and long-term. Rather than a static road map, the resilience strategy is a living document to be continuously fine-tuned as priorities are addressed and initiatives are implemented.

What Comes Next?

As the first cities to release Resilience Strategies commemorate one year of implementation, cities such as Mexico City, Oakland, and Paris are beginning the next phase of their resilience journeys. 100RC now works with 100 cities around the world. More than half of the cities in our network have hired CROs and dozens have held their agenda-setting workshops, beginning the process of setting critical resilience priorities for their cities. Nearly a dozen cities have committed to funding offices dedicated to resilience, ensuring that this crucial work is carried forward long-term.

Our work is far from over and the resilience strategy process is a critical first step. We are thrilled to see how cities around the world move toward a more resilient future.

What a Chief Resilience Officer Does

03.18.2015 | BY MICHAEL BERKOWITZ

One critical step cities can take to facilitate their resilience building is to hire a **Chief Resilience Officer** (CRO). The CRO is an innovative position in city government that ideally reports directly to the city's chief executive, and acts as the city's point person for resilience building, helping to coordinate all of the city's resilience efforts. But what exactly does that mean? With so many cities' CROs getting to work, we want to go into a little more detail about what makes a CRO.

CROs are an important part of how we're trying to solve two major problems cities face:

- First, cities are complex systems made of an array of smaller, distinct actors like government agencies, local businesses, and offices of international organizations; and they often don't communicate or interact with one another as much as they should;
- Second, the solutions cities develop are often not treated as scalable knowledge. Cities regularly solve problems that already have been addressed by other cities, when instead they could be modifying solutions and lessons learned in other cities, tailoring them to be more cost-efficient and effective.

The Chief Resilience Officer is the centerpiece of 100RC's vision for helping cities deal with both of these challenges, while empowering them to develop improved urban resilience. Here are the main responsibilities of a CRO in this instrumental role.

1. Works across government departments to help a city improve internal communications, and to address its own complexities. By facilitating communication that reaches across sometimes-significant internal divisions, the CRO

promotes new collaboration; makes sure that offices aren't wasting resources doing duplicative work; and promotes synergy between the various projects and the plans that agencies are drafting.

2. Brings together a wide array of stakeholders to learn about the city's challenges and help build support for individual initiatives, and for resilience building in general. These stakeholders include government officials, and it is critical that representatives from the private sector, non-profits, and civil society are also included.
3. Leads the resilience strategy, a six-to-nine-month process during which the CRO brings in a wide variety of stakeholders, to help identify the city's resilience challenges, its capabilities and plans to address them, and then to identify the gaps between these two. At the end of this process, the CRO will have a series of resilience-building initiatives that he or she will then work to put in to action, with assistance from 100RC and our platform partners.
4. At the same time, the CRO acts as the "resilience point person," ensuring that the city applies a resilience lens so that resources are leveraged holistically and projects planned for synergy. This lets the city get the most "bang for its buck" on its projects, potentially achieving multiple resilience goals with one project. This could include, for example, a flood barrier also serves as a bike path, promoting healthy citizens and cohesive communities.

Effective CROs perform all these functions, helping their cities manage their own complexities to make resilience efforts more impactful, and collaborating externally to identify and integrate lessons other cities have learned, so solutions scale globally.

The CRO is instrumental to how 100 Resilient Cities is helping cities address the challenges of complexity and scalability, and thus how they will contribute to the evolution of a long-lasting global community of practice around urban resilience. This is why 100RC provides financial support to fund the position of the CRO for two years. As we look forward to selecting our next 33 cities, (link to challenge) we are eager to see what the next cohort of CROs brings to the network and to the local and global practice of urban resilience.

Planning for Resilience: Innovative Land Use Policies for Building a Resilient City

12.08.2016 | BY AMY ARMSTRONG

On December 8, Amy is in Santa Fe, New Mexico (USA), where she is facilitating the Resilient Cities Summit hosted by the National League of Cities, the Urban Land Institute and the U.S. Green Building Council, and where she is sharing some of these findings with Mayors from across the United States.

Many cities in the 100RC network have begun to explore new and creative approaches to land use planning for achieving their holistic resilience goals. Precisely because management of the built environment has the potential for significant economic, social, and political consequences, cities are—and should be—crafting their land use policies to achieve a “resilience dividend,” which provides multiple benefits for the city and its citizens, and jointly addresses social, environmental and economic challenges.

For municipalities with serious financial constraints, land use tools—from comprehensive plans to zoning, incentives and building codes—can present a path toward great impact at relatively little cost. Thoughtful attention to the location, type, density and timing of land use through regulations, public infrastructure investments, market incentives, and conservation of natural resources, make land use planning one of the most powerful tools a city has for regulating day-to-day activities and setting a vision for the future.

100RC’s global network of cities provides a valuable vantage point for understanding the variety of challenges and solutions its cities present. From this global vantage point, we have identified three emerging themes of creative ways to apply land use tools to advance resilience goals. They include designing and deploying land use to:

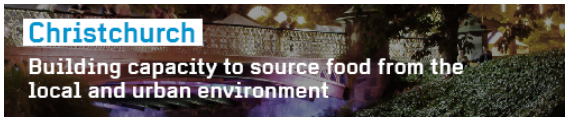
- Realize multiple benefits
- Share risk and responsibility between all city stakeholders
- Rethink scales of influence

Below we profile projects from several cities that illustrate the kind of creative planning that addresses these themes. They present solutions that may resonate with other cities in our network, and beyond.

We recognize this as an important body of work for the future and plan to continue to engage our member cities as well as you, our broader community of readers, in the dialogue of how to best utilize land use tools to plan for a city’s resilient future.

REALIZE MULTIPLE BENEFITS

Land use tools regulate the use of physical spaces, often in pursuit of larger economic, social, or quality of life goals. As such, cities commonly manage development by restricting height and density, shifting development out of coastal zones or seismic areas to reduce risk of flood and erosion, and creating commercial and retail centers to target investment. Creative design of a city’s physical plans can engender both the explicit outcome of the plan, as well as realize other types of multiple benefits through single regulatory actions.



Christchurch, NZ wants to renew its relationship to the natural environment while making use of properties left vacant after the 2011 earthquake. The plan—released in concert with the city's resilience strategy—stimulates development on still derelict lots (both public and private), to cultivate community gardens, edible forests, and rongoa (medicine gardens). In rethinking how to use vacant properties, the city hopes to stimulate a re-emergence of local food supply chains and a local food economy. The resulting large scale communal gardening will foster greater social cohesion, with the community garden as an emerging social hub, ensuring that sustainable return to nature includes the engagement of the community and their central part in it. The work has already begun, with Ōtākaro, the city's first community garden and food hub, built with the support of Christchurch City Council and the Canterbury Earthquake Recovery Authority.

In Mexico City, several projects currently underway plan for flood prevention alongside the creation of green public space. They include various green and blue infrastructure methodologies and technologies that can capture rainwater, retain it for later use, and infiltrate it into aquifers. By building public space in concert with flood protection measures, the city is achieving the multiple benefit of creating the key public good of open space while also advancing flood mitigation. One example is the development of "Parque de la Viga," a blue green infrastructure project that aims to utilize the park for flood prevention, storing and reusing rainwater, recreation and public health, greater social cohesion, and spreading awareness of water conversation issues in cities.

SHARE RISK AND RESPONSIBILITY

There are limits to what city governments can do on their own. To build a more resilient future, stakeholders from across the city need to commit to resilience goals. Cities can help achieve this through land use policies that encourage co-investment between the public, private and non-profit sectors, and incentivize certain behaviors while discouraging risky ones.

Land use policy that distributes and shares risk with other city stakeholders helps institutionalize resilience by integrating it into the planning and policy of various sectors across the city, not keeping it the preserve of public authorities. Fortunately, planning that leverages land use to shift and share risk and responsibility with a variety of stakeholders is gaining traction across the globe.

In New Orleans, USA the City Planning Commission recently updated its Comprehensive Zoning Ordinance (CZO) to better reflect the city's resilience goals. A key update to the CZO was requiring most new development projects to manage the first 1.25" of stormwater on their site (and to submit their design plan for managing stormwater with their development permits). By making stormwater management a regular requirement of private parcels of land, the city is sharing the risk and responsibility of effectively managing stormwater—building additional redundant capacity citywide and resulting in a more effective approach to managing one of the city's key threats.

The City of Medellin, Colombia is urbanizing at a rate faster than the city can plan or build appropriate infrastructure. In response, it is designing new ways to share risk and responsibility for new developments through collaborative self-management in informal communities. These communities predominantly settle on the high parts of the city's hillsides which are particularly prone to natural disasters, like landslides and earthquakes. The

City wants to mitigate risk and prepare for housing in these high-risk areas through the implementation of green infrastructure and the consolidation of a green landscape—providing community amenities while reducing the amount of risky areas available for building. The plan places the community as the central agent in the implementation process, investing in the belief that the communities' control and governance of its land ensures the future sustainability of the interventions and also the communities' own empowerment. To further mitigate risk, Medellin has formed a partnership with Build Change to pilot earthquake retrofits for at least 600 houses. This leverages the earlier work of Build Change in Bogota, where it succeeded in seeking modifications to the national building code that would permit this work.

RETHINK SCALES OF INFLUENCE

100RC member cities acknowledge that the resilience challenges they face often extend beyond jurisdictional borders. These range from regional watershed issues, to heat waves that affect migration patterns across a large area, to economic downturns at the national level. In response, cities have begun to reconsider how resilient land use policies and practices can cross natural and political boundaries, respond to a variety of physical scales, and consider different time horizons to assess future risk.

In Da Nang, Vietnam, rapid urbanization has outpaced plans to maintain flood corridors, with urban growth extending to the riverbanks. This development has had an impact on flooding within and outside of the city boundaries. As part of its resilience strategy, the city has developed several initiatives to address this challenge. One initiative involves the development and expansion of floodwater drainage corridors and the increase of drainage capacity of the Vua Gia-Han river basin beyond city boundaries.

After the destructive floods of 2016, Paris recognized the need to rethink its relationship to the Seine. 100RC Platform Partner Amec Foster Wheeler is working with the city to assist it in understanding the characteristics of its natural watershed, which exist well outside the city boundaries. Through a satellite mapping and analysis of land use and topography, they will identify places where they can restore land upstream of Paris back to a more natural state in order to store water and reduce the flow of water into the city to reduce the impact of floods.

THE FUTURE OF RESILIENT LAND USE

Unlike disaster preparedness, urban resilience accounts for more than planning for a specific event. It entails strengthening a city's systems to better manage any disruption that may occur.

Traditional land use planning attempts to address known disruptions, and operates on assumptions about a future state, from population growth, to car use, to demand for certain kinds of development. However, the introduction of any number of chronic stresses or acute shocks could significantly change the trajectory of those assumptions.

Innovative land use should better account for this uncertainty, and build adaptable methods that can respond to changes in assumptions about the city's physical, economic or social conditions.

One of our member cities, Norfolk USA, has shown leadership in answering this challenge of uncertainty and formulating land use plans that better advance its broader resilience goals. Last month, the coastal city unveiled

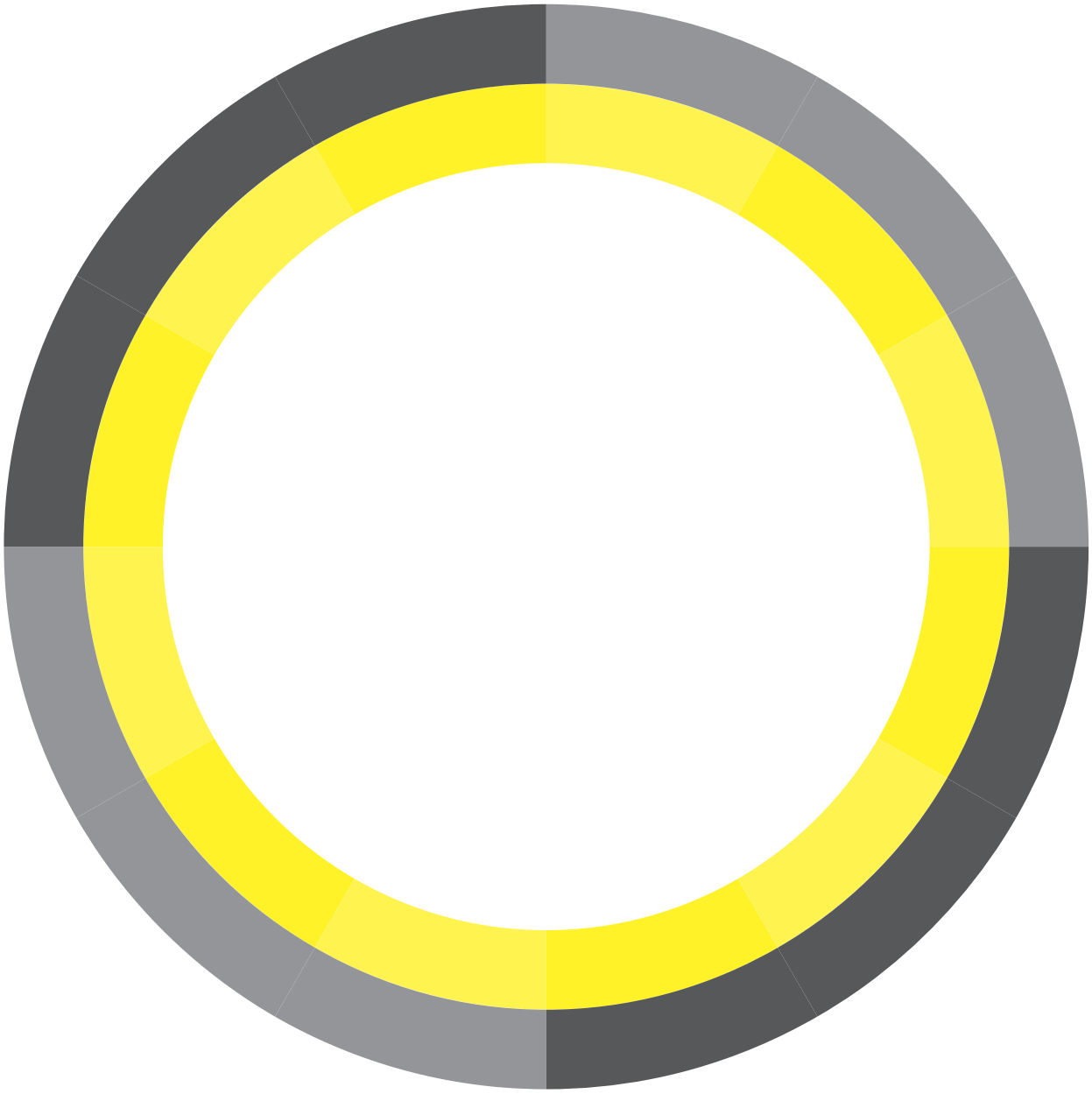
its Vision 2100, an initiative of its resilience strategy, that sets forth a plan for how the city can adapt itself for the 22nd century while being a model for other coastal cities.

Norfolk's Vision 2100 applies new planning tools to advance the city's holistic resilience strategy; it advances integrated thinking on the interplay between shocks and stresses, and applies a risk and asset lens to how the city should manage its land. A particularly innovative approach is the creation of four "vision" areas, which look at the city's neighborhoods through both a risk and asset lens. The plan organizes the city based on neighborhoods' risk and asset profiles and proposes distinct strategies for each, including for example: transferable development rights for homeowners in chronic flood areas; reduced development in high risk areas; and re-focusing investment in "high and dry" areas that have the potential to increase economic opportunity for the city's poorest residents. While other cities continue to rebuild in the same high risk areas, Norfolk has outlined a more thoughtful approach, that is honest about the risks and opportunities for the city's future.

This remapping of the city's intentions, both literally and figuratively, presents a bold example for how a city can plan for resilience, incorporating each of the above principles: achieving multiple benefits, sharing risk and responsibility, and rethinking scales of influence.

City Resilience Framework

April 2014 (Updated December 2015)



The ROCKEFELLER FOUNDATION

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Foreword

In 1958, Jane Jacobs, a community activist, received a Rockefeller Foundation grant to expand upon her ideas about how a city should look, feel, and work. The book she published three years later − The Death and Life of Great American Cities − transformed how city dwellers, urban academics and policy-makers think about cities and urban planning. Jacobs challenged the prevailing assumptions of what makes a city thrive. Over the past five decades, the values and ideas put forward by Jacobs and others have been profoundly important as questions of identity, voice, inclusion, access and opportunity have been negotiated in the context of dynamic urban growth and globalisation.

This legacy of progressive urban thinking becomes even more crucial as we look to the future. Just as cities are hubs for innovations and investments that expand opportunities, they are also living laboratories forced to confront challenges of increasing complexity. Indeed, the role of cities has become central in debates around our planetary boundaries, economic futures, social stability and climate change. What and who makes a city resilient – and not just liveable now or sustainable for the long term – has become an increasingly critical question, one we set out to answer in late 2012 with our partners at Arup through the creation of a City Resilience Index.

The Rockefeller Foundation has been pioneering work on climate resilience in both rural and urban regions for more than a decade. By 2012, the idea of resilience as the critical lens through which to consider not only climate change, but also disaster risk reduction more generally, including financial shocks, terrorism and slow-moving chronic stresses, was gaining traction globally. But, producing a meaningful index for something as complex as the resilience of a city is fraught with reputational, conceptual and execution risk. We stumbled again and again on major conceptual and practical challenges.

We found potential partners ready to jump into the metrics and indicators, but few with the experience to work with us to understand what does and does not contribute to urban resilience. We risked investing in an index that measured and compared cities based on available data, but did not necessarily help cities better understand and assess their own resilience.

We found perspectives were siloed, shaped by experience and expertise in one or another aspect of resilience, disaster risk reduction, infrastructure resilience, climate change, national security or business continuity. What Arup has been able to bring is thought leadership and the capacity to create a comprehensive framework that reflects reality. A city's resilience depends on its physical assets as well as its policies, social capital and institutions.

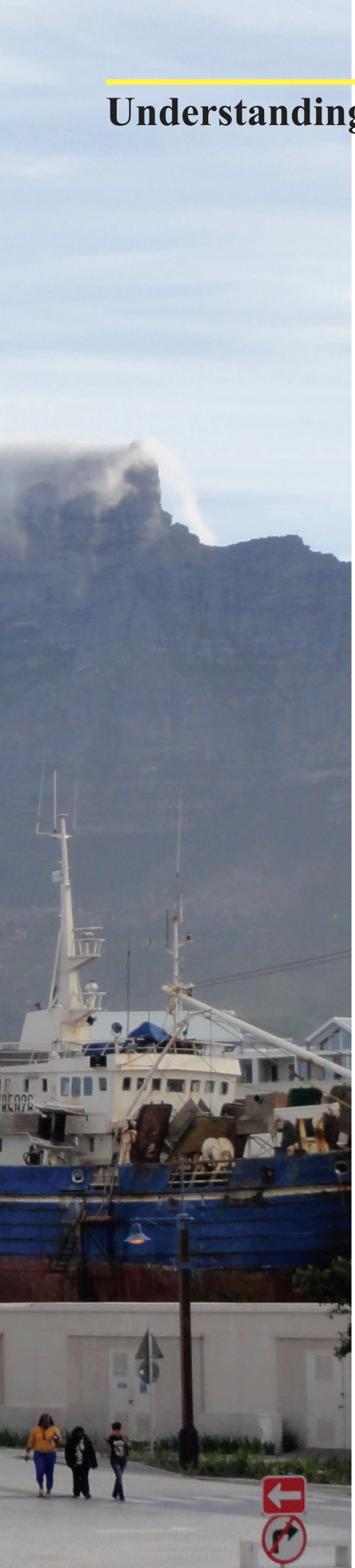
This report presents the inclusive framework for articulating city resilience that the Foundation was looking for, to underpin the City Resilience Index. It has already proven useful in the agenda-setting workshops in cities across the globe that are participating in the 100 Resilient Cities Challenge. These workshops, in turn, have helped and will continue to help shape the framework and contribute to the final phase, developing the indicators and variables that will comprise the City Resilience Index.

This framework will form the basis of a tool that should enable all of us interested in city resilience to convene around a common understanding of that idea, and begin to 'baseline' what matters most for making cities more resilient. Both the framework and the index are intended to facilitate a process of engagement with and within cities that generates dialogue and deeper understanding. Ultimately, this will lead to new ideas and opportunities to engage new actors in civil society, government and business on what makes a city resilient.

Dr. Nancy Kete
Managing Director
The Rockefeller Foundation

"In order to get a grip on it, one must be able to relate resilience to other properties that one has some means of ascertaining, through observation."

Martin-Breen & Andries (2011) Resilience: A literature review. The Rockefeller Foundation: New York City, p. 11



Understanding city resilience

"By April 2014, to articulate urban resilience in a measurable, evidence-based and accessible way that can inform urban planning, practice, and investment patterns which better enable urban communities (e.g. poor and vulnerable, businesses, coastal) to survive and thrive multiple shocks and stresses."
Opportunity statement (Rockefeller Grantee Workshop, New York City, February 2013)

Why city resilience?

As the 21st century unfolds, an increasing majority of the world's population will live in cities. Human wellbeing in cities relies on a complex web of interconnected institutions, infrastructure and information. People are drawn to cities as centres of economic activity, opportunity and innovation. But cities are also places where stresses accumulate or sudden shocks occur that may result in social breakdown, physical collapse or economic deprivation. That is, unless a city is resilient.

Cities have always faced risks, and many cities that have existed for centuries have demonstrated their resilience in the face of resource shortages, natural hazards, and conflict. In the 21st century, global pressures that play out at a city scale − such as climate change, disease pandemics, economic fluctuations, and terrorism − pose new challenges. The scale of urban risk is increasing due to the number of people living in cities. Risk is also increasingly unpredictable due to the complexity of city systems and the uncertainty associated with many hazards – notably climate change.

Risk assessments and measures to reduce specific foreseeable risks will continue to play an important role in urban planning. In addition, cities need to ensure that their development strategies and investment decisions enhance, rather than undermine, the city's resilience. If governments, donors, investors, policy-makers, and the private sector are to collectively support and foster more resilient cities, there needs to be a common understanding of what constitutes a resilient city and how it can be achieved.

The City Resilience Framework responds to this challenge by providing an accessible, evidence-based articulation of city resilience. Over the coming months, it will be further developed to create the City Resilience Index, which will introduce variables that provide a robust basis for measuring resilience at the city scale. The primary audience for this tool is municipal governments. But, the framework, indicators and variables are also intended to support dialogue between other stakeholders who contribute to building more resilient cities globally.

What is city resilience?

Definition | City resilience describes the capacity of cities to function, so that the people living and working in cities – particularly the poor and vulnerable – survive and thrive no matter what stresses or shocks they encounter.

Resilience is a term that emerged from the field of ecology in the 1970s, to describe the capacity of a system to maintain or recover functionality in the event of disruption or disturbance. It is applicable to cities because they are complex systems that are constantly adapting to changing circumstances. The notion of a resilient city becomes conceptually relevant when chronic stresses or sudden shocks threaten widespread disruption or the collapse of physical or social systems. The conceptual limitation of resilience is that it does not necessarily account for the power dynamics that are inherent in the way cities function and cope with disruptions.

In the context of cities, resilience has helped to bridge the gap between disaster risk reduction and climate change adaptation. It moves away from traditional disaster risk management, which is founded on risk assessments that relate to specific hazards. Instead, it accepts the possibility that a wide range of disruptive events – both stresses and shocks – may occur but are not necessarily predictable. Resilience focuses on enhancing the performance of a system in the face of multiple hazards, rather than preventing or mitigating the loss of assets due to specific events.

(Image opposite)
Area of redevelopment in the Silo District, Cape Town.

Surat

Concepción
© Municipality of Concepción

New Orleans

Semarang

Cali

Learning from literature

Approaches | Various approaches have been taken to framing or assessing resilience. They focus either on urban assets or systems, and, to varying degrees, consider man-made infrastructure, the natural environment, urban management and human behaviour. Asset-based approaches tend to focus on physical assets, rather than considering intangible assets that influence human behaviour, such as culture, social networks and knowledge. They neglect the role that assets play in city systems, and, therefore, overlook the importance of assets outside the city boundary; for example, a reservoir that may be a critical part of the water supply or flood management system.

System-based approaches align more closely with the concept of resilience, and the long-standing notion of cities as 'systems of systems'. Social systems determine human behaviour, which is also influenced by physical systems in the urban environment. Various approaches exist, but they mostly examine the resilience of individual sub-systems rather than attempting to consider the resilience of the city as a system in itself. This promotes a sectoral approach and means that interdependencies between different systems at different scales, and the governing structures that influence the way systems work, are not easily considered.

Finally, empirical evidence throughout the literature suggests that urban systems that exhibit particular qualities (or characteristics) are more likely to be resilient. The seven qualities summarised opposite are derived from published literature, including the set of characteristics developed previously by Arup and the Institute for Social and Environmental Transition, as used by the Asian Cities Climate Change Resilience Network. These qualities apply at a city scale and to individual systems.

We concluded that what was missing is a comprehensive, holistic framework that combines the physical aspects of cities with the less tangible aspects associated with human behaviour; that is relevant in the context of economic, physical and social disruption; and that applies at the city scale rather than to individual systems within a city. Finally, it needs to incorporate the qualities that describe a resilient city (or system).

Learning from case studies

Functions and failure | A performance-based approach, which defines resilience in terms of a city's ability to fulfil and sustain its core functions, offers a more comprehensive and holistic approach. As a city's functions rely on a combination of assets, systems, practices and actions undertaken by multiple actors, a performance-based approach has greater potential to address questions of interdependency, power dynamics and scale.

Based on the literature review, a draft hypothesis was developed which proposed that urban resilience could be framed in relation to seven critical functions of a city. This was tested through a desk-based analysis of the 'factors' of resilience identified from more than 150 sources, which examined cities experiencing shocks or stresses, together with recent guidance on urban resilience.

This analysis resulted in a refined list of eight city functions that are critical to resilience. The functions propose that a resilient city: delivers basic needs; safeguards human life; protects, maintains and enhances assets; facilitates human relationships and identity; promotes knowledge; defends the rule of law, justice and equity; supports livelihoods; stimulates economic prosperity. The city's ability to perform these functions determines whether the city is resilient or not. Resilience could be perceived as good health, a safe environment, social harmony and prosperity. Conversely, a city that is not resilient would be identified by ill-health or insecurity, an unsafe environment, conflict and deprivation.

Learning from cities

Fieldwork | To ensure the framework is widely applicable and grounded in the experiences of cities, the second stage of research involved fieldwork in six cities: Cali, Colombia; Concepción, Chile; New Orleans, USA; Cape Town, South Africa; Surat, India; and Semarang, Indonesia. These cities were selected as they had either recently experienced a major shock or are suffering chronic stresses, and as a group are geographically diverse.

The primary purpose of the fieldwork was to understand what contributes to resilience in cities, and how resilience is understood from the perspective of different city stakeholder groups in different contexts. In each city, we carried out workshops, focus groups and key informant interviews with people from the municipal government, utility providers, business and civil society. Across the six cities, we collected data from 450 consultees and identified 1546 factors. Factors are defined as things (physical) or practices/procedures or behaviours (non-physical) that, in the opinion of the consultees, contribute to the resilience of their cities.

A detailed analysis of the factors identified 12 key themes: essential needs; health management; livelihood support; law enforcement; social harmonisation; information and knowledge management; capacity and coordination; critical infrastructure management; environmental management; urban strategy and planning; economic sustainability; accessibility. These themes represent what the city stakeholders perceived to be the key city functions relevant to improving resilience. They map very closely to the functions that were derived from the desk-top analysis, with the following exceptions:

Infrastructure + environment | Physical assets were least mentioned by consultees in the field, whereas they feature very strongly in the literature review. In the fieldwork research, emphasis was placed on proactive management and maintenance of infrastructure and the environment, rather

Cape Town

than its presence. Consultees also talked about connecting people and enabling flows of information, goods, and services as a result of integrated transport and communications infrastructure.

Two new aspects of resilience were identified:

Leadership + coordination | Consultees emphasised the critical importance of leadership, in the form of a committed city government that takes decisions on the basis of sound evidence; engages with business, citizens and civil society groups; and aligns with other governing bodies at the regional and national level.

Urban planning + strategy | Consultees proposed that cities should have a holistic cross-sectoral city vision, strategy or plan underpinned by appropriate data and delivered via policy, regulations, standards and codes.

Every city perceived resilience-building to be an integrated, ongoing process involving a multitude of actions at different scales. Across the six cities, there was a clear distinction between those cities which had experienced shocks, and those which had not. Different groups within the same city had different perspectives on, and priorities for, what makes their city resilient. This highlights the importance of inclusive consultation in resilience planning. Further research is needed to specifically understand the factors that contribute to the resilience of lower income groups. Our research suggested that their concerns and priorities were very different to those of the government and the private sector.

Further information on our journey to understand city resilience is captured in the research reports:

• City Resilience Index: Research Report Volume I: Desk Study (Arup, April 2014)
• City Resilience Index: Research Report Volume II: Fieldwork and Primary Data Analysis (Arup, April 2014)

These are available on www.arup.com/cri

Qualities of resilient systems

Reflective
Reflective systems are accepting of the inherent and ever-increasing uncertainty and change in today's world. They have mechanisms to continuously evolve, and will modify standards or norms based on emerging evidence, rather than seeking permanent solutions based on the status quo. As a result, people and institutions examine and systematically learn from their past experiences, and leverage this learning to inform future decision-making.

Robust
Robust systems include well-conceived, constructed and managed physical assets, so that they can withstand the impacts of hazard events without significant damage or loss of function. Robust design anticipates potential failures in systems, making provision to ensure failure is predictable, safe, and not disproportionate to the cause. Over-reliance on a single asset, cascading failure and design thresholds that might lead to catastrophic collapse if exceeded are actively avoided.

Redundant
Redundancy refers to spare capacity purposely created within systems so that they can accommodate disruption, extreme pressures or surges in demand. It includes diversity: the presence of multiple ways to achieve a given need or fulfil a particular function. Examples include distributed infrastructure networks and resource reserves. Redundancies should be intentional, cost-effective and prioritised at a city-wide scale, and should not be an externality of inefficient design.

Flexible
Flexibility implies that systems can change, evolve and adapt in response to changing circumstances. This may favour decentralised and modular approaches to infrastructure or ecosystem management. Flexibility can be achieved through the introduction of new knowledge and technologies, as needed. It also means considering and incorporating indigenous or traditional knowledge and practices in new ways.

Resourceful
Resourcefulness implies that people and institutions are able to rapidly find different ways to achieve their goals or meet their needs during a shock or when under stress. This may include investing in capacity to anticipate future conditions, set priorities, and respond, for example, by mobilising and coordinating wider human, financial and physical resources. Resourcefulness is instrumental to a city's ability to restore functionality of critical systems, potentially under severely constrained conditions.

Inclusive
Inclusion emphasises the need for broad consultation and engagement of communities, including the most vulnerable groups. Addressing the shocks or stresses faced by one sector, location, or community in isolation of others is an anathema to the notion of resilience. An inclusive approach contributes to a sense of shared ownership or a joint vision to build city resilience.

Integrated
Integration and alignment between city systems promotes consistency in decision-making and ensures that all investments are mutually supportive to a common outcome. Integration is evident within and between resilient systems, and across different scales of their operation. Exchange of information between systems enables them to function collectively and respond rapidly through shorter feedback loops throughout the city.

City Resilience Framework

Every city is unique. The way resilience manifests itself plays out differently in different places. The City Resilience 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 goals that describe the fundamental outcomes of a resilient city.

Structure of the City Resilience Index

Categories
4

Goals
12

Indicators
52

Variables
156

A resilient city is a city where there is or are…

1. Minimal human vulnerability
Indicated by the extent to which everyone's basic needs are met.

2. Diverse livelihoods and employment
Facilitated by access to finance, ability to accrue savings, skills training, business support and social welfare.

3. Effective safeguards to human health and life
Relying on integrated health facilities and services, and responsive emergency services.

4. Collective identity and community support
Observed as active community engagement, strong social networks and social integration.

5. Comprehensive security and rule of law
Including law enforcement, crime prevention, justice, and emergency management.

6. Sustainable economy
Observed as sound financial management, diverse revenue streams, the ability to attract business investment, adequate investment, and emergency funds.

7. Reduced exposure and fragility
Indicated by environmental stewardship; appropriate infrastructure; effective land use planning; and enforcement of planning regulations.

8. Effective provision of critical services
Indicated by diverse provision and active management; maintenance of ecosystems and infrastructure; and contingency planning

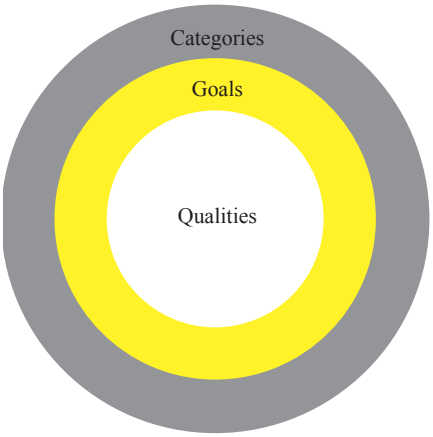
9. Reliable communications and mobility
Indicated by diverse and affordable multi-modal transport systems and information and communication technology (ICT) networks; and contingency planning.

10. Effective leadership and management
Involving government, business and civil society, and indicated by trusted individuals; multi-stakeholder consultation; and evidence-based decision-making.

11. Empowered stakeholders
Indicated by education for all, and access to up-to-date information and knowledge to enable people and organisations to take appropriate action.

12. Integrated development planning
Indicated by the presence of a city vision; an integrated development strategy; and plans that are regularly reviewed and updated by cross-departmental working groups.

(Image across)
View of Cali, Colombia.



Categories

The 12 goals fall into four categories: the health and wellbeing of individuals (people); urban systems and services (place); economy and society (organisation); and, finally, leadership and strategy (knowledge). For each, it is possible to envisage a best case which represents a resilient city, and a worst case which equates to breakdown or collapse. A city characterised by poverty, social conflict, poor quality infrastructure and weak governance is not resilient. This is evident in Port au Prince, Haiti, where recovery following the devastation caused by an earthquake on 12 January 2010 has proven particularly challenging.

The categories can be used to explain New York City's resilience, as demonstrated following Superstorm Sandy in 2012, and, previously, after the 9/11 terrorist attack in 2001. This was due to the city's relative prosperity, but also to collective identity and effective city leadership. These factors meant that people were willing to help each other and unite around the common goal of getting the city back to normal as quickly as possible. Emergency plans were in place that meant that urban systems and services were rapidly reinstated and civil order was maintained.

Wealthier cities are not necessarily more resilient, as demonstrated by the decline of the US city of Detroit, which became overly dependent on a single industry, or the flooding which brought Bangkok, Thailand, to a standstill in 2010, affecting supply chains globally. Conversely, relatively poor cities can make choices that build resilience. Gorakhpur, India, is working to build resilience at the ward level in response to annual waterlogging in poorer parts of the city. By improving solid waste management practices to unblock drains, and increasing drainage of waterlogged areas, the city has reduced incidences of diseases such as malaria and Japanese encephalitis, which are spread by vectors that breed in waterlogged areas.

Goals

The relative importance of the 12 goals is likely to depend on the urban context and the challenges a city faces. However, our research tells us that, generally, these factors are what matter most when a city faces a wide range of chronic problems or a sudden catastrophe. They represent the backbone of a resilient city. They are what enable people to survive and thrive and businesses to prosper despite adverse circumstances.

The 12 goals provide a holistic articulation of resilience which equates to the elements of a city's immune system. A weakness in one area may compromise the city's resilience overall, unless it is compensated for by strength elsewhere. In Guangzhou, China, public squares were redesigned to encourage social interaction between migrant workers as part of an integrated approach to urban planning. In Surat, India, there has been substantial investment in health services to offset the lack of family support and social networks among migrant workers.

The goals are focused on performance; they describe the outcome of actions to build resilience, not the actions themselves. This acknowledges that resilience results from individual and collective action at various levels, delivered by multiple stakeholders ranging from households to municipal government. In Cape Town, South Africa, emergency response in some townships has fallen to community groups, as the city police force is unwilling to operate in these areas due to concerns for their safety. In the Philippines, the efficacy of a community-based early warning system in Metro Manila has been strengthened through access to data and knowledge as a result of a partnership between a local non-governmental agency and the university.

Qualities

The 12 goals are complemented by qualities that distinguish a resilient city from one that is simply liveable, sustainable or prosperous. These qualities are considered to be important in preventing breakdown or failure; or enabling appropriate and timely action to be taken. They can be observed in relation to the various assets, systems, behaviours and practices that collectively contribute to achieving the 12 outcomes (or goals). For example, health services that are flexible can reallocate staff to deal with an outbreak of disease. Protective infrastructure that is robust will not fail catastrophically when design thresholds are exceeded. Energy systems with redundancy can accommodate surges in demand or disruption to supply networks. Planning processes that are reflective are better placed to respond to changing circumstances. Families that are resourceful will have put aside savings or invested in insurance. Early warning systems that are inclusive will minimise loss of life and property.

City resilience is complex. The three layers of the City Resilience Framework – categories, goals and qualities – each contribute to a richer articulation of resilience. The framework can be used to facilitate a common understanding of resilience amongst diverse stakeholders. It can also be used to identify where there are critical gaps, where action and investment to build resilience will be most effective, or where deeper analysis or understanding is required. The final layer will be the variables and metrics that result in the City Resilience Index. This will enable cities to carry out an objective assessment of their resilience and measure progress against an initial baseline.

"Resilience is based on the shifting relationship between scales, and between autonomy on the one hand and connectivity on the other."

Allan, P. & Bryant, M. (2011) 'Resilience as a framework for urbanism and recovery'. Journal of Landscape Architecture 6(2), p. 43

1. Minimal human vulnerability

This relates to the extent to which everyone's basic needs are met.

Minimising underlying human vulnerabilities enables individuals and households to achieve a standard of living which goes beyond mere survival. A basic level of wellbeing also allows people to deal with unforeseen circumstances. This is only possible once their physiological needs are met through a basic level of provision of food, water and sanitation, energy and shelter.

The focus of this goal is on providing an adequate and dependable supply of essential services to a city's whole population. Access to shelter and food – particularly for vulnerable groups – as well as sufficient, safe, and reliable citywide water, sanitation and energy networks are key to achieving this goal. Evidence from cities suggests that the affordability of these services is also critical to ensuring the whole population has daily access, including during times of disruption.

The robustness of essential city networks becomes particularly important in severe environmental events. For example: electricity power lines may be damaged by storms. If failure occurs, resourceful city utility companies are able to respond quickly in line with coordinated and pre-prepared emergency plans. Inclusive plans are also essential to ensure that all communities receive a minimum supply of basic assets, notably water and food, particularly in extreme circumstances.

Specific indicators that underpin this goal include: Housing; Energy supply; Drinking water; Sanitation; Food supply.

2. Diverse livelihoods and employment

This is facilitated by access to finance, ability to accrue savings, skills training, business support, and social welfare.

Diverse livelihood opportunities and support mechanisms allow citizens to proactively respond to changing conditions within their city without undermining their wellbeing. Access to finance, skills training and business support enables individuals to pursue a range of options to secure the critical assets necessary to meet their basic needs. Long-term, secure livelihoods allow people to accrue personal savings that will support their development, as well as their survival during times of crisis.

Mechanisms through which diverse livelihood and employment opportunities can be generated include training and skills development, microfinance, incentive and innovation programmes, as well as a living wage. Financial resources for business development and incentives for innovation allow individuals to seek diverse employment options during times of economic constraint or change. Contingency measures, such as insurance and social welfare, contribute to supporting households through challenging circumstances.

An inclusive approach to livelihoods ensures that all citizens in a city have unrestricted access to legitimate occupations, regardless of race, ethnicity, gender or sexual orientation. A range of dynamic small, medium and large businesses in different economic sectors helps people to access job opportunities, even during challenging macro-economic circumstances. In the long term, microfinance, savings, training, business support and social welfare form a safety net that enables people to be flexible during times of stress.

Specific indicators that underpin this goal include: Labour policies; Skills and training; Business development and innovation; Financing mechanisms; Protection of livelihoods.

3. Effective safeguards to human health and life

This relies on integrated health facilities and services, and responsive emergency services.

Health systems are critical to the day-to-day prevention of illness and the spread of disease, as well as protecting the population during emergencies. They comprise a diverse suite of practices and infrastructure, which help to maintain public health and treat chronic and acute health problems.

Health services encompass a variety of practices, including: education; sanitation; epidemiological surveillance; vaccination; and provision of healthcare services. These are focused on ensuring both physical and mental health. Accessible and affordable day-to-day individual healthcare, as well as appropriate population-based interventions (i.e. targeted at the community or city level), are key features of a functioning city health system.

Measures to address injuries and addiction are also important to reduce the burden of ill-health in urban settings. Effective, inclusive and well-prepared medical staff and procedures ensure that all individuals have access to health services before, as well as during, emergencies. Responsive emergency services provide surge capacity to support peak demand during a crisis. In order to achieve the above, appropriate health infrastructure is critical.

Learning and future planning ensure that public health practices − such as prevention through education − are appropriate for the social and physical context of a given city. Services or facilities that target vulnerable groups ensure that preventive and responsive strategies are inclusive and able to reach the entire population. In emergencies, a diverse network of medical practitioners and facilities throughout the city ensures the availability of additional resources (redundancy) that can be deployed immediately wherever they are needed.

Specific indicators that underpin this goal include: Public health systems; Quality healthcare; Medical care; Emergency response.

Health & wellbeing

Economy & society

4. Collective identity and community support

This is observed as active community engagement, strong social networks and social integration.

Communities that are active, appropriately supported by the city government and well-connected with one another contribute to the bottom-up creation of a city with a strong identity and culture. This enables individuals, communities and the city government to trust and support each other, and face unforeseen circumstances together without civil unrest or violence.

Creating cohesive cities has both social and physical dimensions. Reinforcing local identity and culture contributes to positive relationships between individuals while reinforcing their collective ability to improve the environment where they live, work, create and play. These relationships are supported by a number of practices, including social networks and community organisations, artistic expression and the preservation of cultural heritage, including religion, language and traditions. Ideally, these practices are underpinned by spatial interventions that shape the places where communities develop and connect. Provision of communal facilities, public spaces and physical accessibility can help to strengthen community cohesion and avoid isolation.

Inclusivity is promoted by community participation. For example: processes that encourage civic engagement in planning and decision-making processes. Social practices are reinforced by physical interventions that foster resourcefulness and integration, such as the provision of communal meeting places; and the development of mixed neighbourhoods that offer a range of housing opportunities to different social/income groups.

Specific indicators that underpin this goal include: Community support; Community cohesion; Identity and culture; Engaged Citizens.

5. Comprehensive security and rule of law

This includes law enforcement, crime prevention, justice, and emergency management.

A comprehensive and contextually appropriate approach to law enforcement facilitates the reduction and prevention of crime and corruption in a city. By instituting a transparent justice system based on ethical principles, cities can uphold the rule of law and promote citizenship in daily life. These norms are critical to maintaining order during times of stress. Well planned and resourced law enforcement facilitates peaceful recovery, and ensures a healthy population by reducing crime-related injury, fatality and stress.

An integrated approach to law enforcement combines deterrents with effective policing, emergency capacity, a transparent judicial system, and measures to reduce corruption. An effective judicial system promotes civic education as a preventive measure, as well as responsive action through fair justice. Sufficiently resourced policing practices that promote safety and security are a feature of daily life in a resilient city, and continue during times of unrest. Trust and transparency are identified as key attributes of policing, which can be achieved by reducing corruption and by involving other relevant actors in law enforcement, such as community leaders. Trust in city authorities and legal institutions is achieved by appropriate enforcement of laws and avoiding discrimination or violence in law enforcement.

Laws are upheld by resourceful and inclusive systems of policing, which actively involve city agencies, businesses and civil society. Social stability and security is also facilitated by inclusive public space design, which helps to avoid creating places where crime may proliferate, while maximising the safety and security of individuals.

Specific indicators that underpin this goal include: Systems to deter crime; Corruption prevention; Policing; Criminal and civil justice.

6. Sustainable economy

This is observed in sound management of city finances, diverse revenue streams, and the ability to attract business investment, allocate capital, and build emergency funds.

A robust economic system is critical to sustaining the investment that a city needs to maintain its infrastructure and provide for its communities. It helps to create contingency funds that both the private and public sectors can use to respond to emergencies and unforeseen events. As a result, cities are better able to respond to changing economic conditions and pursue long-term prosperity.

A sustainable city economy is developed by aligning fiscal procedures in government, and the ability of the private sector to function despite shocks and stresses. A careful structuring of city budgets will consider the availability of funds to regularly invest in infrastructure and to respond to emergencies. This is supported by a robust revenue base, supplemented by the city's ability to attract inward investment.

The private sector has a complementary responsibility to develop business continuity plans to ensure that businesses can also function during, and recover from, emergencies. City government can contribute to the sustainability of private economic activities by empowering different sectors within the economy and strengthening trade relationships beyond the city.

Resourcefulness is identified as a key quality for a healthy city economy. A diverse economy can absorb the impacts of sector-based shocks without major impact on the city's revenue streams. Resilient cities also optimise revenues and expenditures, and leverage funds from non-government and business sources where appropriate. For example: public-private partnerships, direct investment and grant funding.

Specific indicators that underpin this goal include: Public finances; Business continuity planning; Economic base; Business environment; Integration with regional and global economies.

Infrastructure & environment

7. Reduced exposure and fragility

This relies on environmental stewardship, appropriate infrastructure, effective land use planning and enforcement of planning regulations.

Conservation of environmental assets preserves the natural protection afforded to cities by ecosystems. Among other things, this might include the absorption of tidal surges by coastal wetlands or fluvial flooding by upstream woodlands. The protective function of infrastructure relies on appropriate design and construction. This is as important for homes, offices and other day-to-day infrastructure as it is for specific defences, like flood barriers. Working together, both natural and man-made assets help to improve protection against severe conditions, avoiding injury, damage or loss.

Ecosystems and built infrastructure designed as integrated urban systems effectively contribute to reducing physical exposure and vulnerability. For example: river basins, forests, drains and sewers all play a role in protecting cities from flooding. In coastal areas, for example, robustness can be better achieved by using natural wetlands and man-made dykes as part of an integrated approach to coastal flooding.

A resilient city values ecosystem services and has in place robust environmental policies to protect ecosystems in situ. In resilient cities, man-made infrastructure and buildings are well-conceived, well-constructed and safeguarded against known hazards. Building codes and standards promote long-term robustness, flexibility to adapt in the future and safe failure mechanisms in the event of a shock.

Cities in seismic zones can be better prepared for earthquakes by updating and enforcing building codes on the basis of reflective learning and new understanding of future conditions.

Specific indicators that underpin this goal include: Hazard exposure and mapping; Codes, standards and enforcement; Protective ecosystems; Protective infrastructure.

8. Effective provision of critical services

This results from diversity of provision, redundancy, active management and maintenance of ecosystems and infrastructure, and contingency planning.

Ecosystems and infrastructure both provide critical services to urban populations. However, these services depend on more than just the presence of assets; their quality and performance are only maintained through proactive management. During times of stress, some ecosystem services and infrastructure become central to the city functioning. Well-maintained systems are better able to accommodate abnormal demand, withstand unusual pressures and continue functioning. Well-established management practices create enhanced knowledge of system components, so that infrastructure managers are better prepared to restore disrupted services.

Educating communities and businesses is essential to ensuring that ecosystem services of importance to urban populations – such as natural drainage capacity and flood defences – remain robust and are not undermined by careless or unwise actions, such as natural resource extraction or destruction of coastal dunes and mangroves. The management of man-made infrastructure includes frequent monitoring together with regular plans for upgrade and renewal. Demand management is critical in the continuity of critical services, ensuring that neither built nor natural systems are overloaded, and can maintain sufficient redundancy to absorb surges in demand. A resilient city also implements continuity plans to ensure that infrastructure managers are ready to maintain service provision and avoid disruption during extreme events.

Active management of ecosystem services and infrastructure ensures long-term robustness and flexibility in changing conditions. For example: through monitoring and maintenance programmes. Reflective approaches may use intelligent technologies and education to monitor the integrity of assets and disseminate alerts in the event of declining performance.

Specific indicators that underpin this goal include: Stewardship of ecosystems; Infrastructure services; Spare capacity; Maintenance; Continuity for critical assets and services.

9. Reliable mobility and communications

This is enabled by diverse and affordable multi-modal transport systems and information and communication technology (ICT) networks, and contingency planning.

Reliable communications and mobility create daily connectivity between places, people and services. This fosters a positive environment for everyday working and living, builds social cohesion, and also supports rapid mass evacuation and widespread communication during emergencies.

A combination of transport links and the provision of ICT are fundamental to connectivity in contemporary cities. Transport links enable physical mobility and should be characterised by a wide coverage of the city, as well as good service quality and affordability. Good infrastructure capacity, safety and efficiency are essential for the effective operation of transport networks. Business logistics and freight infrastructure are an important consideration to support the city's economic functioning.

Consultations undertaken in this research suggest that communication technologies are also critical for a city's connectivity. These include a diverse range of technologies, such as radio networks, internet and mobile phone services, as well as specific channels such as social media. The availability of reliable and inclusive forms of communication is critical to disseminate information during emergencies – particularly to the most vulnerable residents of a city, such as the poor and the elderly.

Inclusive multi-modal transport networks allow safe and affordable travel between all neighbourhoods and key facilities across the city. Multi-modal systems incorporate redundancy and flexibility by providing alternative options in the event of failure or surges in demand. Robust and redundant ICT services enable safe communication and access to information, including coordination of emergency services.

Specific indicators that underpin this goal include:Transport networks; Transport operations and maintenance; Communications technology; Technology networks.

Leadership & strategy

10. Effective leadership and management

This relates to government, business and civil society and is recognisable in trusted individuals, multi-stakeholder consultation, and evidence-based decision-making.

Clear and purposeful leadership promotes trust, unity and a shared understanding of a city's trajectory. Leadership is a key ingredient in encouraging individuals and communities to take action during challenging times. A committed city government that takes decisions on the basis of sound evidence enables a city to thrive from day to day, and to respond to shocks and stresses.

Cross-sector collaboration that challenges 'siloed' approaches in government is critical to effective decision-making. Multi-stakeholder alignment and consultations with communities, including the private sector, are measures that support relevant and effective decision-making. Evidence gathered in cities suggests that effective city governments are given the necessary power to make decisions at local level. The presence of a strong local government leader is also an asset in this context. Integrated, multi-stakeholder decision-making is also supported by coordinated practices and procedures, such as emergency management structures and response plans.

Inclusive governments recognise the importance of grassroots knowledge to help them understand local challenges, and they value the research and innovation that universities and businesses can contribute to solve city problems. By forging cross-sector relationships, resilient cities are better able to coordinate people and access private resources and support during times of need. Integration and reflectiveness are essential to emergency coordination and capacity-building, enabling appropriate and timely government responses.

Specific indicators that underpin this goal include: Government decision-making; Co-ordination with other government bodies; multi-stakeholder collaboration; hazard monitoring and risk assessment; Government emergency management.

11. Empowered stakeholders

This is underpinned by education for all, and relies on access to up-to-date information and knowledge to enable people and organisations to take appropriate action.

Individuals and communities that know what to do during unexpected events are invaluable assets to a city. The provision of early warnings and access to education, information and knowledge empowers citizens and gives them the tools to take appropriate decisions in the face of shocks and stresses. As a consequence, urban stakeholders are better positioned to act, learn, and adapt.

The generation of information and knowledge depends on a city's investment in research, data collection and risk monitoring. By leveraging relevant information for evidence-based decision-making, resilient cities can take better decisions and act appropriately in changing circumstances. Multiple and well-used channels of communication help to make this process effective. In addition, resilient cities ensure that information shared with their citizens can be understood. Other forms of knowledge exchange between communities and cities – such as city networks or 'twin city' schemes – are also beneficial when it comes to disseminating best practice.

Inclusive provision of education and information enables citizens to protect themselves in emergency situations. For example, in many cities that are vulnerable to seismic activity, television and radio stations automatically switch to deliver official earthquake information following an event, which alerts the public to risks and precautionary measures. Sharing knowledge, experience and best practices between cities enables reflectiveness through broader exchange of information, feedback loops, learning and adaptation.

Specific indicators that underpin this goal include: Education for all; Community awareness and preparedness; Mechanisms for communities to engage with government.

12. Integrated development planning

This is indicated by the presence of a vision, an integrated development strategy, and plans that are regularly reviewed and updated by cross-departmental groups.

Development plans and land use regulations are instruments that cities use to coordinate and control urban development and guide future investments. The creation and implementation of plans and regulations ensures that individual projects and programmes are aligned and sufficiently address uncertainty. Integrated plans create a formalised framework to deal with multidisciplinary issues, such as climate change, disaster risk reduction or emergency response.

A critical aspect of delivering a comprehensive development and planning framework is the presence of a city vision. The development of a shared and integrated city vision requires understanding of and alignment between the motivations of different stakeholders involved in designing and implementing projects in the city. This, in turn, requires ongoing processes of communication and coordination at all stages of planning. A vision should be underpinned by appropriate evidence and acceptance of uncertainty, and delivered via policy and regulations. Land use plans should be permanently enforced and regularly updated. Preparation of plans relies on collecting up-to-date and relevant data, as well as the ongoing monitoring of urban trends.

The implementation of integrated strategies and plans ensures that different projects and programmes across a city are aligned, mutually-supportive, reflective of past experience and resourceful in the face of future uncertainty. These processes should be truly inclusive, incorporating consultations with residents and others who will experience their effects.

Specific indicators that underpin this goal include: City monitoring and data management; Planning process; Land use and zoning; Planning approval process.

"Surat started off as a place with household workplaces specialising in high skill products –hand woven textiles, diamond cutting/ polishing and embroidery. Due to scarcity of labour, competition in the country and demand for craftsmanship, employers had to be nice to their immigrant employees – they needed to retain their employees. They tried to understand their issues and treated them like family…This sentiment has continued."

Elected standing commitee member

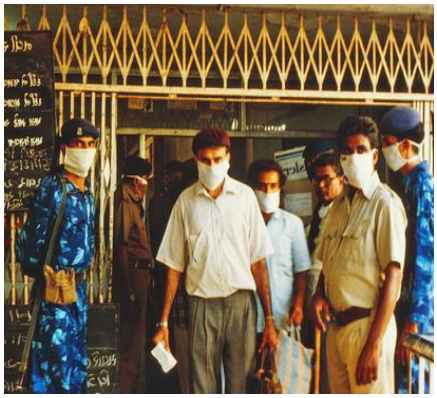
Building cross-sectoral leadership for disasters, **Surat**

As the fastest growing city in India, and despite its economic prosperity, Surat struggles to keep up with demands on its infrastructure and services. It has experienced several shocks in recent decades, including floods, social unrest and an outbreak of the pneumonic plague. This has strongly influenced the city's successful efforts to enhance resilience.

Surat is well-known for its flooding challenges. However, 20 years ago, a chain reaction following a flood permanently changed Surat's approach to flood management. After the flood in 1994, poor sanitation in vulnerable communities is reasoned to have caused an outbreak of pneumonic plague. While the number of suspected cases was limited, the unexpected nature and fear of a relatively unknown disease caused panic which started locally but quickly spread nationally and internationally.

Door to door solid waste collection
© JNNURM

Following this catastrophe, a municipal commissioner was put in place to lead the city back to normality and rebuild trust internally and externally. There was a recognised need for improved infrastructure, such as sewerage and stormwater drainage, as well as better flood management to reduce the chances of a recurrence. This event also raised awareness of public health generally and the wellbeing of the workforce to contribute to economic prosperity. The local government put in place measures to prevent rapid disease spread, such as monitoring at household level, and provided local health centres in the most vulnerable areas to anticipate and respond to a disaster.



Civil hospital quaratined by Indian military officials © Laurie Garett

It took longer to restore trust in the security of Surat after the disaster than it did to clean up the streets and control the disease. This lack of trust delayed residents from returning to the city and impacted heavily on business continuity. In light of this, the business community, led by the Chamber of Commerce, now contributes strong leadership in planning for disasters and being on the ground during emergencies, helping to disseminate information and resources. This complements government recognition of the importance of providing fast, reliable information to the public about emergencies and their management.

Addressing seismic risk beyond building codes, **Concepción**

"In Concepción we had two earthquakes: the 8.8 one and the social earthquake – looting, arson… I think the last one affected our soul most violently."

Mayor of Concepción

Events following the massive 8.8 earthquake that hit Concepción's metropolitan area on 27 February 2010 highlight the physical and social aspects of resilience. Due to the presence and enforcement of building codes in Chile, buildings sustained moderate damage and there was limited loss of life considering the magnitude of the earthquake. Critical services – electricity, water and sewerage networks – were disrupted and transport came to a standstill.

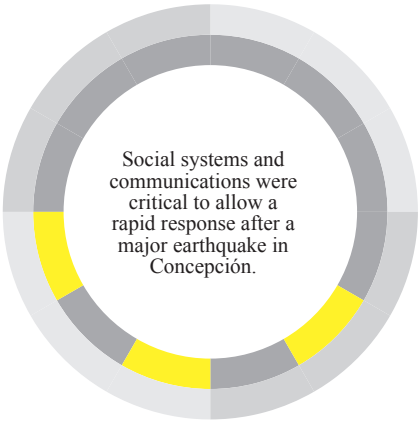
What was unexpected was the almost total breakdown of communication networks: internet, telephone and radio. Officials were unable to communicate with each other, obtain help from disaster management agencies in Santiago, or inform the public as to what was happening. Reports of food shortages, looting and arson led to rumours about gangs stealing from homes. An overriding sense of insecurity led to panic, which escalated into widespread looting and anxiety. Neighbours demonstrated community cohesiveness by joining forces to protect each other and setting up shifts to keep watch after dark and guard their home.

The only communication network that continued to function was Radio Bio Bio, thanks to its continuity planning and back-up systems. By providing the public with a source of information about what was happening and enabling residents to communicate with one another, the radio station became a centre point for keeping some level of social stability.

Emergency drill at Concepción municipality

Arrival of military to Coronel, Gran Concepción © Radio Bio Bio/Leesly Leal

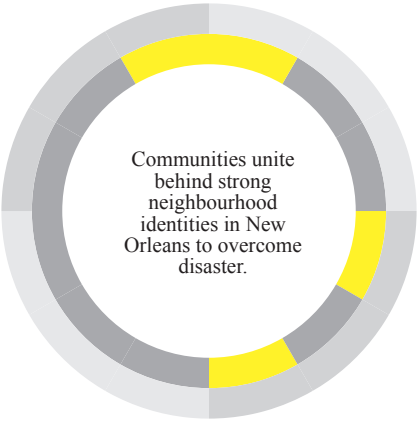
Order was gradually restored after the arrival of the military and the imposition of a curfew that was welcomed by the population. The level of social instability after the disaster, as well as its link to inadequate emergency communications, were key learning points for the city. The situation in Concepción after the earthquake demonstrates that it can take a city longer to recover from the social and human impacts of disasters than to restore the physical elements.



Enhancing resilience through community-led actions, **New Orleans**

"A lot of residents feel a strong sense of belonging here. They had a chance to evacuate and start a life somewhere else, but most of them chose to come back here because it reminded them of a little Vietnam. This really feels like a community – you can't keep a secret here, people are so close."

Deputy Director of Mary Queen of Vietnam Community Development Corporation



The city of New Orleans has endured two significant disasters recently: Hurricane Katrina in 2005 and the BP oil spill in 2010. Located close to both the Gulf of Mexico and Lake Pontchartrain, many local residents rely on these water resources for their livelihoods in the fishing and food processing industries. One such community is the city's Vietnamese community in the neighbourhood of Versailles. Their proximity to open water has made the community particularly vulnerable to the recent disasters. Their response illustrates the importance of social aspects of resilience, particularly the fundamental role of strong, unified communities.

Retail activities in Versailles

Katrina displaced almost the entire population of Versailles; destroyed and damaged homes and businesses, including fishing boats; forced the permanent closure of the nearest hospital and schools; and left the community temporarily without power or water. Galvanised by the leadership of the local Catholic priest, himself supported by a network of community leaders, evacuated residents began to return to Versailles a few weeks after Katrina. Learning that the government was unable to provide the necessary resources for the recovery as quickly as they were needed, the community rebuilt both its physical and social structures on its own.

Resumption of Catholic masses at the Mary Queen of Vietnam church – led by the priest who had displayed such leadership – helped to promote a sense of normality, and reminded residents of their shared religion, their common language (Vietnamese) and their collective identity and cultural heritage. Residents were encouraged to rebuild their homes by bartering their skills with one another. For example: local electricians helped to restore power to the homes of roofers; in exchange, the roofers helped to replace damaged tiles and roofs on the electricians' homes.

In 2006, the Mary Queen of Vietnam Community Development Corporation (MQVN CDC) was founded to help local residents rebuild not only their homes but also their lives after Katrina. This organisation still exists, promoting redundancy by providing social services and care in the continued absence of health facilities in the neighbourhood, and also training residents in alternative livelihoods.

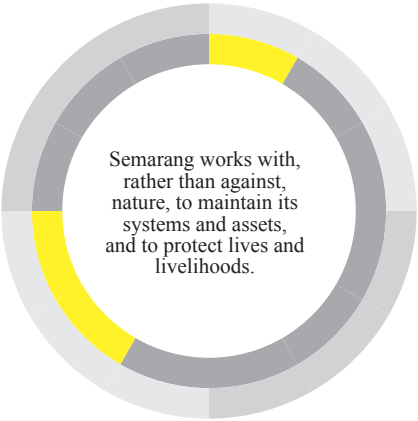
The Deepwater Horizon BP oil spill in 2010 polluted many of the fishing waters that local fisherfolk relied on for their livelihoods. The MQVN CDC now re-trains fisherfolk in market gardening and aquaponics, providing them with alternative livelihood options.

Original homes of the first Vietnamese migrants in New Orleans (damaged by Hurricane Katrina)

Balancing natural resources under challenging conditions, **Semarang**

"There are three water vendors in this area, including me… There is limited water and the well is getting dry."

Water vendor



Semarang suffers from regular flooding and landslides. These issues are made worse by inadequate basic services provided to some of the residents, which cause them to extract water locally. This is an example of the inter-relationships between stresses, which lead to further problems.

Drinking water in Semarang is not easily accessible for some communities. Despite their proximity to water, residents in Semarang's coastal communities are often most affected by water shortages. They commonly purchase water of unknown quality from formal or informal vendors. Wells are another alternative water source for communities or individuals who cannot be supplied by water mains. However, in some coastal areas wells are becoming salinised, while wells in other parts of the city are running dry during periods of peak demand.

Flooding in Semarang streets

Forced to extract groundwater to meet its residents' basic needs, Semarang is facing another significant urban challenge. Land subsidence is a side-effect of groundwater extraction, taking place at a rate of up to 10cm a year according to some estimates. This environmental process has increased the city's vulnerability to flooding by lowering the city's ground level. Tidal flooding, which occurs on a daily basis in some communities, has significant impacts on communities living along the coast. Homes, shops and roads are regularly flooded, and fishpond farmers have had their fish stocks washed out to sea, affecting their livelihoods.

Semarang waterfront © Rockfeller Foundation

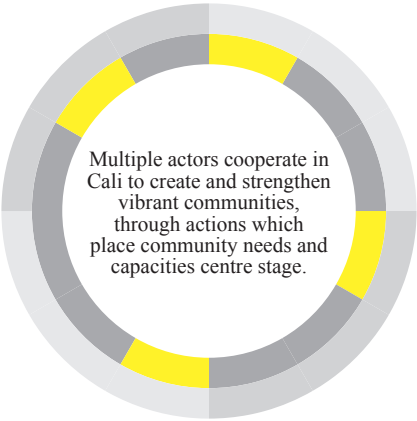
To prevent further damage to their homes, some coastal communities have installed floating floorboards in their houses, and put aside money every year to raise the height of their houses. Fishpond farmers now use nets in their ponds to reduce loses during floods. With the support of local universities, some fishpond farmers have also experimented with cultivating mussels as an alternative crop, as they grow tethered to rocks rather than floating free in the water.

Close by, in Semarang Port, private- and state-owned businesses appear to be far less affected by coastal flooding. With larger financial resources at their disposal, they have been able to invest in hard infrastructure – such as automatic pumping systems – to reduce operational disruption caused by flooding. Businesses have also improved their transport access to the Semarang Port area by laying a new road 50cm higher than the previous road level. This local adaptation enables access to the port to continue during coastal flooding events, allowing one of Semarang's key economic assets to function. This ensures continuity in the availability of goods, services and jobs, which benefits the local communities, and the wider city.

Minimising vulnerabilities through multiple approaches, **Cali**

"How do we help? We try to get where the state is unable to reach. We listen, we support, and work with the social fabric of our community."

Fundación Paz y Bien volunteer



Cali is the third largest city in Colombia, located in the broad, fertile Cauca River valley. The city's rapid growth since the 1970s has forced large numbers of people, often the poorest, to live in flood-prone areas, among them the Aguablanca district. To improve these vulnerable areas, the local government and grassroots groups have developed parallel and complementary approaches that serve as an example of creating resilience.

The first levees to protect Aguablanca from river flooding were built around 30 years ago, but the structural integrity of the defences has been compromised over time. Local residents have placed pipes for domestic water supply through the levees and extracted materials for construction aggregates. To protect the levees, the city government, supported by national and international partners, is implementing a number of interventions. In this process, the municipality has recognised that ensuring the robustness of the infrastructure in the long term requires the engagement of the local communities.

Providing information about the risks associated with degrading infrastructure has ensured that communities can better appreciate the value of the flood defence and understand how it works. This integrated approach to community participation has also resulted in the passive surveillance of public spaces and better control of illegal dumping next to the levees.

Mayor of Cali visiting Aguablanca district
© Alcaldía de Santiago de Cali.

Grassroots organisations, such as Fundación Paz y Bien, have developed community-led approaches to address community vulnerabilities that have been challenging for the city government and threaten social breakdown. With the aim of empowering communities and diversifying livelihoods, Fundación Paz y Bien provides training, microfinance and emotional support.

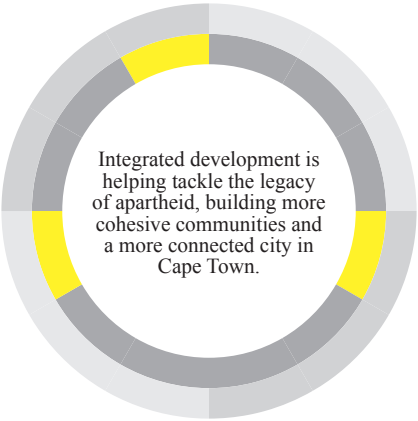
One of this organisation's major achievements is the implementation of a popular microcredit programme in Aguablanca. Their deep understanding of the community's problems has enabled the organisation's members to develop a reflective and inclusive approach that specifically targets needs identified by the community itself. With this approach, Fundación Paz y Bien has helped to build a more cohesive community and has become a key point of support and guidance for families suffering the impacts of violence, extreme poverty, and economic instability in Aquablanca.

Community workshop at Fundación Paz y Bien

Valuing spatial planning and leadership, **Cape Town**

"The city wasn't designed by economic forces; instead it was designed by social engineering. Maybe we need social engineering to change it again?"

Representative of the Cape Town Partnership



Many of the stresses currently faced by Cape Town are the legacy of the segregation and discriminatory practices of South Africa's apartheid system. Apartheid planning processes promoted spatial segregation and resulted in disconnected neighbourhoods and a limited transport system in the city. These challenges are starting to be addressed through improved leadership and a new approach to spatial planning.

A typical informal house in Sweet Homes, Khayelitsha

Capetonians live in residential areas which are still often categorised by the race or economic status of their inhabitants. New housing developments typically only occur on the periphery of the city, while redevelopment of brownfield sites in the city is uncommon. Integrated mixed-use developments are extremely rare. Therefore, to travel between home and work, residents rely heavily on a limited transport network, with few choices of route or safe and affordable modes. Some areas of the city still lack any public transport.

Particular areas of the city lack basic services, specifically the informal settlements in which 14% of Capetonians live. Many of these settlements exist in the flood-prone Cape Flats area. The City of Cape Town would like to relocate residents in these settlements to safer locations where they could provide them with basic services such as water and electricity. However, the city budget is not sufficient to do so. The city government also struggles to maintain security in these areas. The conditions of isolation and lack of basic needs and security contribute to the residents' lack of empowerment and a feeling of being inadequately engaged in decision-making processes.

As part of an effort to address these challenges, the City of Cape Town has drafted a Spatial Development Framework (2012) which promotes a new integrated approach to planning and development of neighbourhoods and services. A new integrated transport system – headlined by the MyCiTi bus system – is also in development by the government body, Transport for Cape Town.

Within informal settlements, the City and NGO partners are undertaking inclusive re-blocking exercises to better engage residents and increase community cohesion. This involves rebuilding areas within the settlements to allow greater space for socialising and also to allow access for service provision, particularly for emergency services to respond to incidents such as domestic fires.

MyCiTi bus and feeder station, Gardens

What next?

A year ago, we set out to create a City Resilience Index. Our objective was not to rank and compare cities. Rather, we set out to better understand what it is that makes a city resilient. The purpose of the City Resilience Index is to provide cities with a robust, holistic and accessible basis for assessment so that they are better placed to make investment decisions and engage in urban planning practices that ensure people living in cities – particularly the poor and vulnerable – survive and thrive no matter what shocks and stresses they encounter.

The City Resilience Framework is the first step. It provides the foundation for the Index, defining its structure; the categories, the goals and indicators. We have also developed a preliminary list of variables and metrics. As far as possible, these are based on data that is already available, and aligned with variables used today by cities to measure other aspects of urban performance. They will be reviewed and refined over the coming months based on consultation with experts in specific areas and the cities we have engaged with to date; also the 100 Resilient Cities and the Asian Cities Climate Change Resilience Network.

By the end of 2015, we hope to have a final version of the City Resilience Index that will have been piloted in several cities. We are also exploring opportunities to develop tools, based on the data we have collected, that provide a more specific lens for organisations interested in understanding resilience to particular types of hazard, in different sectors or at specific scales. Our hope is that the City Resilience Framework and City Resilience Index will also facilitate collaboration and alignment of global efforts to create safer and more resilient cities that will ensure the wellbeing of the majority of the world's population as the 21st century unfolds.

For more information

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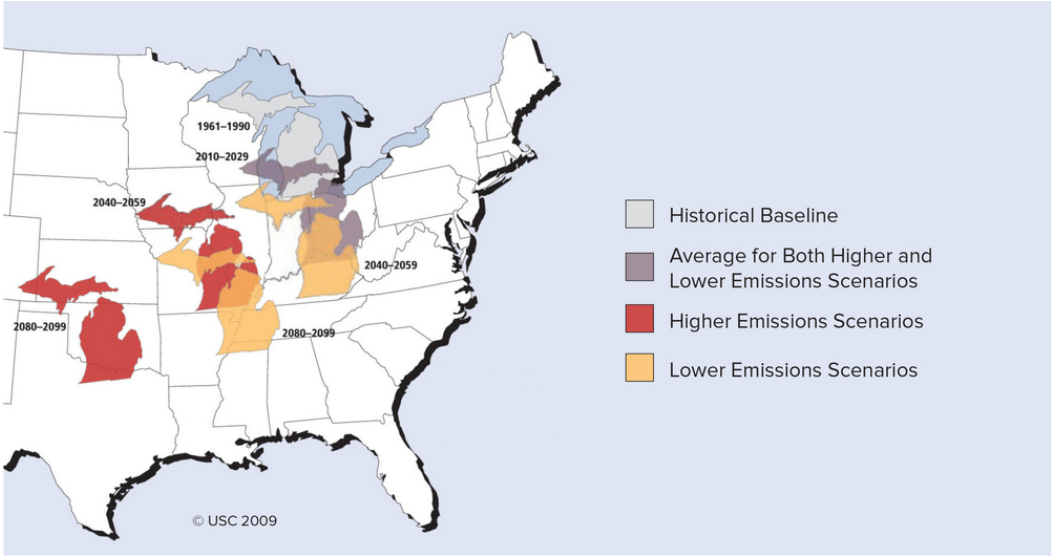
Climate Variability

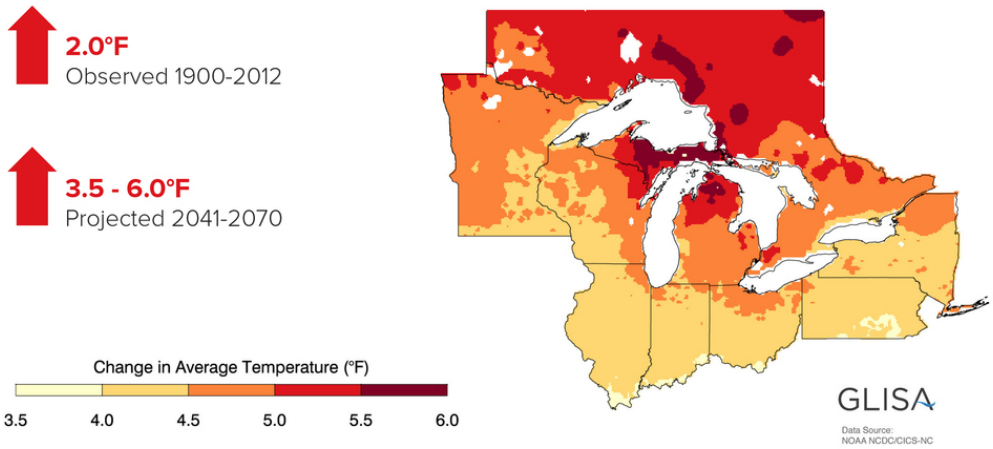
Our climate is responsible for many types of extreme events, and communities throughout the Great Lakes are working to become more resilient to the impacts of a variable climate. Communities should be aware of climate trends and feel empowered to plan for greater resiliency to climate impacts.

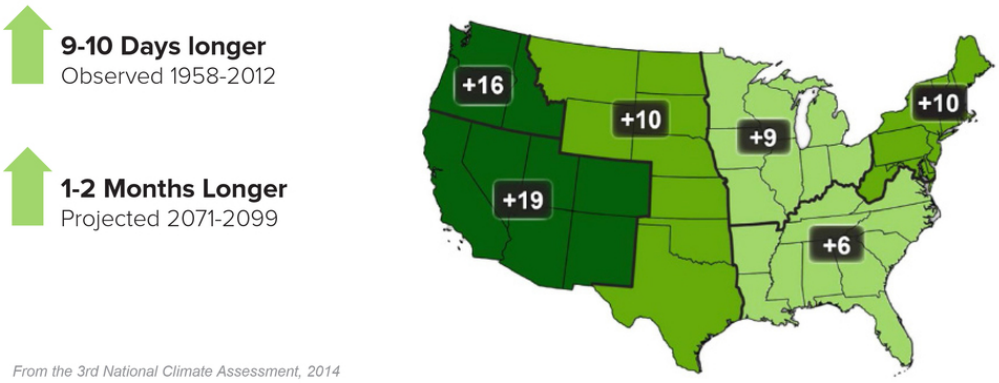
TRENDS/IMPACTS

- Global trends are more certain than regional trends
- Natural variability plays a larger role at the regional scale.



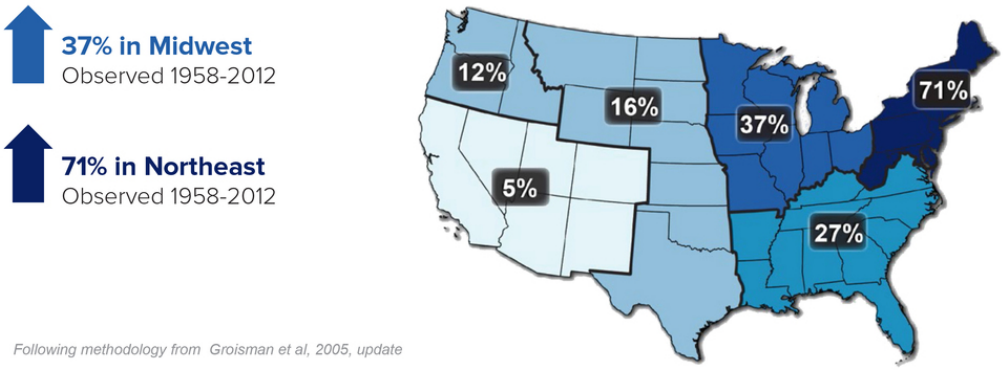
RISING AVERAGE TEMPERATURES





OBSERVED EXTREME PRECIPITATION

The amount falling in the heaviest 1% of precipitation events increased by 37% in the Midwest and by 71% in the Northeast from 1958 to 2012.

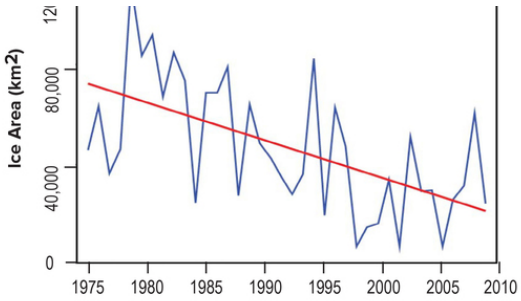


GREAT LAKES ICE COVERAGE

Lakes Ice Coverage
Observed 1973-2010

- Lake Superior is warming twice as fast as nearby air.
- Lake Superior could have little open-lake ice cover during a typical winter by mid-century.

Austin and Colman, 2007



IMPLICATIONS FOR COMMUNITIES

Damages to Infrastructure

- 2014 Metro Detroit flood

Health Impacts

- Extreme heat events
- Flooding
- Infectious disease
- Air quality issues

Food and Agriculture

- Negative impacts on tree species
- Fire hazards and wildfire

Environmental Impacts

RESOURCES

Michigan Resources
Michigan Climate Coalition
Michigan Hazard Mitigation Plan
Forestry
Michigan Health Adaptation Plan
Agriculture
Energy

Midwest Resources
GLISA – Headquarters for all climate data in the Midwest region

International Resources:
International Panel on Climate Change
Union of Concerned Scientists

National Resources
NOAA
National Climate Assessment
American Association of the Advancement of Science
Climate Adaptation Knowledge Exchange (CAKE) - *features a wide variety of case studies*

POLITICS / EDUCATION

The politicization of climate variability has had the effect of making it difficult for communities to have productive conversation on these issues. However, communities can talk about resiliency outside the framework of climate variability and its politics by focusing on other benefits of resiliency planning. A community undergoing a resiliency planning process can improve its ability to withstand, react, and adapt to any kind of future change. Positive environmental outcomes from this process may include;

- a greater ability for public infrastructure systems to handle an emergency
- improved water quality
- better recreational opportunities.

When discussing climate variability, it is most important to discuss what is happening and could happen to a local community. Global trends with vast natural and social causes are controversial and abstract. Instead, communities should focus on areas of agreement (i.e. "flooding is bad and we should mitigate against flood damage in our community") and "actions of no regret."

Actions of no regret are projects and investments where the benefits are clear, regardless of the impact of climate variability. For instance, investing in green stormwater infrastructure, such as raingardens and green roofs, reduces water pollution and beautifies the built environment. By focusing on projects that the majority of the residents ca support, communities can bypass heated climate change debates and instead enact practical improvements.

VULNERABILITY ASSESSMENTS

Vulnerability assessments have been used across Michigan by the Land Information Access Association (LIAA). The purpose of a vulnerability assessment is to identify vulnerabilities within a community and to develop tools communities can use to foster resiliency in their policy decisions. A vulnerability assessment looks at exposure to risk and sensitivity to risk. Evaluating exposure to risk asks: where is the environmental risk the greatest? Evaluating

"

"A vulnerability assessment is a first

Vulnerability Analysis Steps

1. Identify Sensitive Populations
2. Identify Environmental Risk
3. Composite Vulnerability

risk assessment is an early step in risk management."

— Michigan DNR

Vulnerability assessments are made up of two parts – exposure and sensitivity. Exposure demonstrates the land, property, and neighborhoods that are most likely to be impacted by flooding, heat, or other severe weather. Low lying land, land near bodies of water, areas with large swaths of pavement, neighborhoods with few trees, and sections with older homes all suffer from high levels of exposure.

Sensitivity demonstrates the members of the population that are most likely to be impacted by severe weather. The most sensitive populations are the elderly, young children, people with medical conditions, those living in poverty (especially the homeless), people who work outdoors, and athletes. People who live alone, regardless of their economic status, are also at higher risk.

The Vulnerability Assessment combines the concepts of exposure and sensitivity into a single metric using mapping, as demonstrated in the following maps from the greater Ludington area:

Vulnerability = Exposure + Sensitivity

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Image of Ypsilanti City Logo

The City of Ypsilanti Sustainability Plan contained herein was adopted by Resolution _____ of the Ypsilanti City Council on Month, Day, Year

Ypsilanti City Council

Mayor Edmonds

Council Member Bashert
Council Member Robb
Mayor Pro-Tem Brown
Council Member Vogt
Council Member Murdock
Council Member Richardson

Frances McMullan, City Clerk

The City of Ypsilanti Sustainability Plan contained herein was adopted by resolution_____of the Ypsilanti Sustainability Commission on Month, Day, Year

Ypsilanti Sustainability Commission

Commissioner Emily Drennen
Commissioner Nancy Heine
Commissioner Natalie Sampson
Commissioner Thomas McKee
Commissioner Brett Zeuner
Commissioner Julia Bayha
Commissioner Keith Michalowski
Commissioner Thomas Kovacs
Commissioner Bryan Foley Present

, Commission Secretary

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Ypsilanti Sustainability Commission

The Commission was founded through the city ordinance No. 1280, adopted February 23, 2017. As set forth in that ordinance the Sustainability Commission Mission shall seek to:

a) Create a model of sustainability through efforts to advocate, educate and promote the social, economic and environmental health of the community now and into the future.

b) Broaden the lens and scope of energy and environmental needs in the future such as wind, solar, clean air, water and improving infrastructure.

c) Recognize natural resources as chief assets of the City of Ypsilanti and encouraging responsible stewardship of these assets.

d) Collaborate with citizens, employees, employers, service providers and other governmental agencies and educational agencies to share ideas.

e) Create a Sustainability Plan.

f) Review the City of Ypsilanti's Climate Action Plan, Alternate Fuel Policy, the Michigan Green Communities Challenge, and other plans and policies and to continue the work of said plans and policies.

g) Prioritize sustainability policies.

What is Sustainability?

"Achieving a balance of ecological, social, and economic considerations to provide for an equitable path for the growth and improvement of our community in the uses of our resources, remaining conscious of the historical context, while ensuring the availability and vitality of those resources for future generations."

- Adopted by the Ypsilanti City Council on October, 17th 2017

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Expected Use of this Sustainability Plan

The Commission expects this framework to be used as a tool to aid in civic decision making, including but not limited to Master Plan updates and other strategic initiatives and documents implemented by the city. It is intentionally broad and idealistic in its scope for the expressed purpose of providing guidance on a broad array of issues that decision-makers may confront.

This guiding document serves to satisfy the directive to create a Sustainability Plan, stated in the founding ordinance of the Sustainability Commission. By identifying key goal areas, as well as leading indicators to assess progress in these areas, the plan will help to organize progress on sustainability issue within Ypsilanti.

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Seven Main Goal Areas

The Ypsilanti Sustainability Commission chose to use the seven main goal areas of the STAR Community Rating System® (STAR) to guide the creation of our city's Sustainability Framework.

STAR provides a comprehensive set of national goals and objectives for improving the sustainability of U.S. cities, towns, and counties. Ypsilanti is one of hundreds of communities across the country using this system to help implement and track sustainability throughout the city and its programs.

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Built Environment

Achieve livability, choice, and access for all people who live, work, and play in Ypsilanti

Safe Wastewater Management

Housing and Transportation Costs

Drinking Water Quality

Transportation Safety

Transportation Mode Split

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Climate & Energy

Reduce climate impacts through adaptation and mitigation efforts, increase resource efficiency and build resiliency in Ypsilanti

Climate Adaptation

Greenhouse Gas Emissions

Renewable Electrical Energy Supply

Total Solid Waste

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Economy & Jobs

Create equitably shared prosperity and access to quality jobs in Ypsilanti

Employment Opportunities

Median Household Income

Businesses in Community

Living Wages

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Education, Arts & Community

Empower a vibrant, educated, connected, and diverse Ypsilanti

Third Grade Reading Proficiency

Equity in Graduation Rates

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Equity & Empowerment

Ensure equity, inclusion, and access to opportunity for all community members in Ypsilanti

Environmental Justice, Risk and Exposure

Equitable Access & Proximity to Foundational Community Assets

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Health & Safety

Strengthen Ypsilanti to be a healthy, resilient, and safe place for residents and businesses

Food Security and Assistance

Violent Crime Rate

Access to Healthful Food

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Natural Systems

Protect and restore the natural resource base upon which all life in Ypsilanti depends

Designated Green Infrastructure

DRAFT

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Built Environment	Climate & Energy	Economy & Jobs	Education, Arts & Community	Equity & Empowerment	Health & Safety	Natural Systems
Ambient Noise & Light	Climate Adaptation	Business Retention & Development	Arts & Culture	Civic Engagement	Active Living	Green Infrastructure
Community Water Systems	Greenhouse Gas Mitigation	Green Market Development	Community Cohesion	Civil & Human Rights	Community Health & Health System	Invasive Species
Compact & Complete Communities	Greening the Energy Supply	Local Economy	Educational Opportunity & Attainment	Environmental Justice	Emergency Prevention & Response	Natural Resource Protection
Housing Affordability	Industrial Sector Resource Efficiency	Quality Jobs & Living Wages	Historic Preservation	Equitable Services & Access	Food Access & Nutrition	Outdoor Air Quality
Infill & Redevelopment	Resource Efficient Buildings	Targeted Industry Development	Social & Cultural Diversity	Human Services	Indoor Air Quality	Water in the Environment
Public Spaces	Resource Efficient Public Infrastructure	Workforce Readiness		Poverty Prevention & Alleviation	Natural & Human Hazards	Working Lands
Transportation Choices	Waste Minimization				Safe Communities	

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LEADING STAR
COMMUNITY INDICATORS

2018 Methodology Guide

STAR COMMUNITIES

SUSTAINABILITY TOOLS FOR ASSESSING & RATING COMMUNITIES

STAR Communities is a Washington, DC based nonprofit organization that works to evaluate, improve, and certify sustainable communities. We administer the STAR Community Rating System (STAR), the nation's leading framework and certification program for local sustainability. Cities and counties use STAR to measure their progress across social, economic, and environmental performance areas.

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David Abell, Program Coordinator

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Introduction

The STAR Community Rating System® (STAR) provides a comprehensive set of national goals and objectives for improving the sustainability of U.S. cities, towns, and counties. STAR contains 45 objectives with over 500 evaluation measures. The measures are divided into two types of data: outcomes and actions. Outcome measures are quantitative, such as the number of businesses in a community or median household income. Action measures are qualitative, referring to plans, policies, programs, or other activities that are intended to improve outcomes. The rating system is available for download for free on the STAR Communities website, www.starcommunities.org/rating-system/download.

A subset of the outcome measures, called the Leading STAR Community Indicators (Leading Indicators), was developed to communicate high-priority sustainability issues that U.S. communities are tackling. The Leading Indicators:

- provide communities with a simple way to get started with sustainability indicators;
- offer guidance on metrics that are commonly important and readily accessible;
- enable benchmarking and annual reporting in communities throughout the U.S.; and
- leverage local government consensus to improve access to data.

At this time, participation in reporting for STAR is limited to local governments representing communities in the United States. Local governments must have a STAR Communities account to participate.

Purpose

The Leading Indicators are intended to be used by local governments at the city or county level to collect and report on a common set of metrics. Participation in the data entry phase is limited to designees from within the local government. However, once published, the communities' data and associated graphics for aggregating and comparing other communities is available to the public. Data may consist of elements from the local government itself, universities, nonprofits, the private sector, regional, state or federal agencies, philanthropic institutions, and other community leaders.

This Leading STAR Community Indicators Methodology Guide is a supporting document. Communities engaged in data collection and reporting follow the directions contained herein to locate the appropriate data sources and understand submittal requirements.

In addition, the Methodology Guide is a tool for verifying the data reported. Whereas STAR Communities staff verifies applications for STAR certification, the Leading Indicators are self-reported without review or authentication by STAR Communities staff. Participating communities are held accountable by reporting their values in accordance with the guidance in this Methodology Guide. If a discrepancy is found, viewers should notify the community's contact, listed on the Indicators dashboard, and refer it to STAR Communities at info@starcommunities.org.

While many of the outcome measures within STAR are designed to track progress over time, the Leading Indicators are designed to provide an annual snapshot. However, the methodologies for each indicator and its respective STAR outcome are based on the same data sources and limitations. Therefore, the data collected for the Leading Indicators can also help communities understand and transition to STAR certification.

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Development

The concept for the Leading STAR Community Indicators emerged from an informal group of approximately 15 U.S. communities, affiliated with both the Urban Sustainability Directors Network (USDN) and STAR Communities. The communities expressed interest in identifying a subset of STAR's outcome measures that could be used for annual reporting and peer city benchmarking, in between re-certification efforts. The ability to attract new communities to STAR by providing a smaller set of measures to report on was also of interest.

With the support of the STAR Communities Board of Directors, the working group received philanthropic support to pursue the project in early 2015. The group then surveyed USDN and STAR Communities members about indicators and performance measurement; reviewed analyses of the first 30 STAR certifications; assessed potential alignment with long-standing city indicators projects; convened regular work group and sub-committee meetings; and traveled to Washington, DC to hold an in-person convening.

By summer 2015, the working group had selected a set of 25 outcome measures from the rating system for further study and analysis. That draft set was reviewed by the STAR Technical Advisory Group in June 2015 and Steering Committee in July 2015 and by late summer the final set of 21 measures was decided on.

A small set of working group members agreed to pilot test the indicators in advance of the Annual Meeting of the USDN. STAR Communities staff provided technical guidance and support to those communities. A workshop was held in Minneapolis, MN in late October for USDN members ready to commit to the project. Working group members challenged other USDN members to participate in the pilot and support the Leading STAR Community Indicators project. Almost 40 communities participated in the pilot phase of the Leading STAR Community Indicators project from January until November 2016.

The following groups were directly involved in the development of the Leading Indicators:

Urban Sustainability Directors Network: The Urban Sustainability Directors Network (USDN) is a peer-to-peer network of local government professionals from cities across the United States and Canada dedicated to creating a healthier environment, economic prosperity, and increased social equity. Our dynamic network enables sustainability directors and staff to share best practices and accelerate the application of good ideas across North America.

STAR Communities: STAR Communities is a nonprofit organization that works to evaluate, improve, and certify sustainable communities. We administer the STAR Community Rating System, the nation's leading framework and certification program for measuring social, economic, and environmental sustainability at the communitywide scale.

Working Group: The following communities were a part of the working group: Tucson, AZ; Evanston, IL; Dubuque, IA; Dearborn, MI; San Antonio, TX; Santa Fe, NM; Las Cruces, NM; Santa Monica, CA; Ann Arbor, MI; Washington, DC; Fairfax, VA; Charlotte, NC; Minneapolis, MN; Fort Lauderdale, FL; St. Peters, MO; and Surrey, BC.

Pilots: Abington Township, PA; Albany, NY; Ann Arbor, MI; Austin, TX; Avondale, AZ; Beaverton,

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OR; Blacksburg, VA; Bloomington, IN; Brookings, SD; Cary, NC; Cedar Rapids, IA; Cleveland, OH; Columbia, MO; Columbus, OH; Denver, CO; Evanston, IL; Fairfax, VA; Fayetteville, AR; Holland, MI; Hollywood, FL; Houston, TX; Indianapolis, IN; Iowa City, IA; Johnson County, IA; Kansas City, MO; King County, WA; Lakewood, CO; Las Vegas, NV; Louisville, KY; Montgomery County, MD; Northampton, MA; Oklahoma City, OK; Palm Bay, FL; Plano, TX; Sarasota, FL; Springfield, MO; St. Peters, MO; Tacoma, WA; Tucson, AZ; and Washington, DC.

Reporting Indicators

The Leading STAR Community Indicators are completed through demonstration of two types of measures: Required Indicators and Flexible Indicators. Required Indicators typically draw data from nationally available and easy-to-use sources and must be fully completed by each participant. Flexible Indicators require a more in-depth process involving local data collection. For Flexible Indicators, participants first note whether or not a relevant analysis or assessment has been completed and if data is available for the community. If data is not available, participants only need to mark "No". If data is available, documentation is required. The Leading Indicators includes 13 Required Indicators and 8 Flexible Indicators.

A list of the Leading Indicators is provided in the Table of Contents on Page 6.

Supporting Materials

This Methodology Guide includes specific directions on how to collect data for each indicator. In addition, STAR has developed several project management tools and resources available for download from either the Online Reporting Tool's Resources section or Indicator area of STAR's website.

The Online Reporting Tool is a resource available to STAR subscribing communities and is the main tool for posting a community profile, submitting indicators, and providing a narrative to accompany individual indicators. It can be accessed by the community's primary contact person by logging into their online account. The community profile is created and maintained by the community's contact person. It may include a brief community description, up to 5 slideshow pictures, a city logo, contact information, website link, description of governance structure, and the latest population count.

Indicators are submitted via an online reporting form that includes specific fields that must be completed and a narrative section that allows a community to provide context for the values reported. The narrative section may include explanations for the reported values or highlight actions being taken within the community.

In addition to the Online Reporting Tool, participating communities are provided a data collection sheet. The data collection sheet is an Excel document that includes all the fields that must be entered into the Online Reporting Tool. The data collection sheet was created to provide a portable tool that project managers can use to compile their community's data.

Finally, there are five formula-based Excel spreadsheets to help ensure communities use consistent calculations for some of the more complicated indicators. Once completed, these spreadsheets are uploaded as supporting documentation in the Online Reporting Tool.

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Online Dashboard

The Leading Indicators Dashboard can be accessed at www.starcommunities.org/indicators.

The landing page for the Leading Indicators includes a section on Getting Started as well as a map identifying participating communities throughout the United States. Navigation buttons allow website users to do one of three things: **View Indicators**, **Compare Communities**, or **Community Dashboards**.

The **View Indicators** button allows website users to view an aggregate graph of each indicator across all participating communities for the most recent reporting year. The national value for the indicator, if available, is provided under the graph.

The **Compare Communiti**es button allows website users to select up to 10 communities to compare specific indicators for the most recent reporting year.

The **Community Dashboards** button provides access to the community's profile and a link to the individual indicators reported by the community in the present year and any previous years reported.

Self-Reporting

The Leading Indicators are intended to be a self-reporting tool for participating communities to display annual data and apply a benchmark to other communities. The data reported is not subjected to the same rigorous verification process required for STAR certification.

Viewers of the online dashboard must be aware that there may be errors in reporting. This Methodology Guide is made freely available for any user to review and confirm values stated by any community. If an error is discovered, please notify the community's contact person (contact information found on the Community Dashboard) and STAR Communities at info@starcommunities.org.

How Data Will Be Used

The intent of the Leading Indicators is to provide an online platform for a community to share specific metrics related to sustainability and be able to compare these metrics with other communities. Where relevant, national values will be added for context.

However, the Leading Indicators will not be used to establish ranking of "most sustainable community". These Leading Indicators were identified to be meaningful for annual reporting and important for understanding underlying issues. But they are not exhaustive and collectively do not represent achievement of some qualifying status. Often there are nuances that may impact a specific indicator within a community. The point is to share where communities are at and how they are working to improve.

The narrative used to describe comparisons shall not and should not be consolidated into "best of" lists.

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LEADING STAR
COMMUNITY INDICATORS

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21	Designated Green Infrastructure	Flexible	33

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Important Notes For Starting

- A community's report is submitted by the local government of either a U.S. city or county.
- Only one person is designated as a point of contact per community. If you are unsure of who this person is, open up the Community Dashboard to view the community's profile.
- A community must be an active subscriber of STAR Communities to access the reporting tools. If you are interested in signing up or having your community participate, go to www.STARcommunities.org for more information.
- **When starting this year's report, the "For Calendar Year" field must be 2018 and the "Population" field must be based on the 2016 ACS 5-year estimate: Total population row from Table DP05 of the U.S. Census.**

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Indicator 1: Drinking Water Quality

Required

Corresponds to STAR BE-2, Outcome 1

Demonstrate that the community is not in violation of EPA's drinking water rules for chemical and microbial contaminants in water pipes and turbidity

EPA's standards are primarily designed to protect public health by limiting the levels of contaminants in drinking water. This indicator focuses on standards for total coliform, turbidity, and water pathogens. It should be noted that EPA does not have the authority to regulate private drinking water wells where approximately 15% of Americans get their water. STAR encourages participants to address water quality in private wells in addition to the public system.

Data for this indicator is available from the community's water supplier, which could be either a regional organization or the community's water agency or department.

Participants must show that within the past year the community has not been in violation of EPA's drinking water rules for chemical contaminants, such as total coliform and E. coli. Specifically, participants must demonstrate compliance with the EPA's Total Coliform Rule, which stipulates that small systems may have no more than one positive sample per month and large systems may have no more than 5% positive samples per month. Communities with multiple water treatment plants must meet the standards for all facilities.

In addition, participants must demonstrate that the drinking water supplied to residents in the past year is not in violation of EPA's Maximum Containment Level (MCL) standards for turbidity and any regulated water pathogens.

Note that communities that are solely supplied via groundwater may not need to report on turbidity or water pathogens. If this is the case, simply note these elements do not apply because supply is only groundwater.

Most water suppliers publish Consumer Confidence Reports (CCR) or Water Quality Reports (WQR) on their websites and/or on the EPA's CCR webpage. Reports are generally issued in the spring of year following when data was collected. It should be noted that some drinking water providers title their reports based on the data year (i.e. 2017 CCR) while others title their reports based on the year released (i.e. 2018 CCR). Either is acceptable if the reported data is from the 2017 calendar year.

To complete this indicator, participants must report any violations during the 2017 calendar year and provide the CCR or Water Quality Report published in 2018. Communities with multiple water treatment plants must meet the standards for all facilities.

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Indicator 2: Safe Wastewater Management

Required

Corresponds to STAR BE-2, Outcome 3

Demonstrate that all NPDES permit holders, including publicly owned treatment works (POTWs), are in compliance with Clean Water Act effluent and reporting guidelines

Untreated or poorly treated wastewater degrades surface waters and makes them unsafe for human uses such as drinking, fishing, and swimming. The National Pollutant Discharge Elimination System (NPDES) permit program of the Clean Water Act (CWA) helps to control wastewater pollution by regulating point sources that discharge pollutants into U.S. waters.

To access data, go to the EPA's Enforcement and Compliance History Online (ECHO) system, then follow these steps:

1. Do not perform the "Quick Search". Select "More Search Options".
2. In Search Type form: select "Water";
3. In Geographic Location form:
    a. City: if participant is a city or township, type name of city. If participant is a county, leave this field blank;
    b. State: select the appropriate state; and
    c. County: if participant is a county, select the name of the county;
4. In Enforcement and Compliance form, click "View More" in the upper left corner, then:
    a. Quarters in Significant Non-Compliance (past 3 years): select "1 or More Quarters"; and
5. Select "Search".

If no facilities are listed, then this confirms that there are no quarters in significant noncompliance. Report the value as 0.

If facilities are listed in the ECHO table, then select Download Data, format "Excel". This file will be used to record the facilities in Significant Non-Compliance for the 2017 calendar year and uploaded as supporting documentation. If an error occurs in downloading, create a new Excel file and enter the data manually, including at least the Facility Name and NPDES ID.

Next, in the online ECHO table, click the Facility Name from the list to open the Detailed Facility Report. Scroll down the Detailed Facility Report to the Enforcement and Compliance section. Restrict data to "CWA only". Consider the Facility-Level Status code for any quarter within the 2017 calendar year. If the code indicates a SNC/Cat 1 with a SNC/RNC History code starting with S, E, X, T, or D, then record this as a facility in violation in the spreadsheet by noting the code and a brief description of the violation. Also, record whether the facility is a POTW, such as a wastewater treatment facility or industrial discharger/other. Include each facility in the online list of facilities. If the violation did not occur in the 2017 calendar year, then note that in the Comments column of the spreadsheet. Then, sum the number of POTWs and other regulated facilities in Significant Non-Compliance for the 2017 calendar year.

Participants must supply both the number of POTWs and the number of other regulated dischargers in Significant Non-Compliance in the 2017 calendar year. Upload the ECHO-derived Excel spreadsheet or a screenshot of the search results if none are listed.

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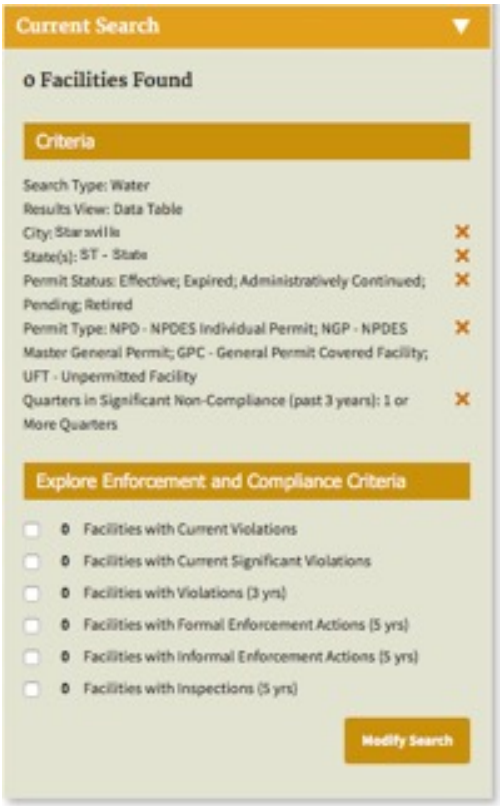
Examples of submittals for Indicator 2:

If the search results in facilities listed in SNC:

Facility Name	NPDES ID	Facility Type	SNC in 2016?	Quarters in SNC for 2016	Notes
Starsville Potable Water Facility	US0000001	Raw Water Treatment	Yes	3	The first 3 quarters of 2016 show code S(CSchVio); in 1st quarter there is a note about Limit Viol related to pH. The SNC is likely related to lack of reporting.
Starsville Wastewater Treatment Facility	US0000002	POTW	No	0	Violations occurred in 2015 calendar year
Astro Pipeline Company LP	US0100000	Industrial	Yes	1	E(EffViol) in 1st quarter of 2016 for exceeding Iron limits
		# of POTWs in SNC:	0		
		# of other in SNC:	2		

If the search results in no facilities listed in SNC:

--OR--



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Indicator 3: Housing and Transportation Costs

Required

Corresponds to STAR BE-4, Outcome 1

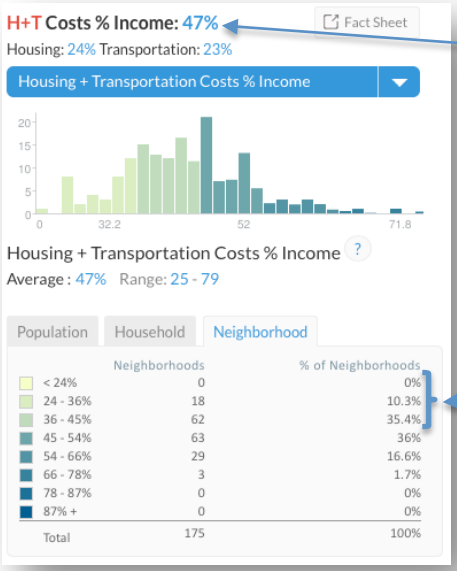
Provide the Average Housing + Transportation Cost as a percent of income for the jurisdiction
--AND--
Provide the percentage of Census block groups where a household earning the Area Median Income (AMI) would spend less than 45% on housing and transportation combined
--AND--
Provide the percentage of Census block groups where a household earning 80% AMI would spend less than 45% on housing and transportation combined

STAR has adopted the Center for Neighborhood Technology's (CNT) Housing + Transportation Affordability Index (H+T Index) to measure household affordability because it factors in both housing and transportation costs at a neighborhood level. CNT's methodology defines affordability as combined housing and transportation costs that consume no more than 45% of household income. CNT's methodology relies on a traditionally accepted standard of 30% of household income for housing costs plus 15% for transportation costs. The H+T data is based on the Core Based Statistical Areas and uses data from the 2016 American Community Survey 5-year Estimate, National Transit Database, Consumer Expenditure Survey, and other national sources. Therefore, the reporting year for this indicator should be 2016.

The H+T Index displays data based on population, household, and neighborhood scales. The neighborhood scale is roughly equivalent to a Census block group.

Open the H+T Index interactive map, then enter the city or county name into the search field. First, record the Average Housing + Transportation Costs % Income. Then, select the Neighborhood tab and sum all percentages in the "% of Neighborhoods" column for rows labeled "<24%", "24 – 36%", and "36 – 45%". The sum is the percentage of Census blocks where 45% or less of Regional Typical household income is spent on housing and transportation. Record this value.

Repeat for Regional Moderate households by selecting the radio button for "Regional Moderate" in the filter above the map.



Average Housing + Transportation Costs % Income

Sum percentages of all rows less than or equal to 45%

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Indicator 4: Transportation Mode Split

Required

Corresponds to STAR BE-7, Outcome 1

Provide the percentage of residents for the following journey-to-work trips:

- Drive alone
- Carpool
- Public transit
- Walk
- Bike
- Work from home

While it would be ideal to know the transportation habits of all residents in various activities throughout the year, commuting data provides a good proxy for understanding the community's overall mode choices. Participants must document the percentage of residents for the following 6 mode categories: Drive alone, Carpool, Public transit, Walk, Bike, and Work from home.

To access data, go to American FactFinder2 and click "Advanced Search". Then, follow these steps:

1. Enter the following dataset in the Topic or Table Name field: "S0801 – Community Characteristics by Sex";
2. Enter the city or county name in the State, County, or Place field;
3. Click "Go";
4. Select the 2016 ACS 5-year estimates; and
5. Record and report the percentages for each mode listed.

The graphic below demonstrates what the data source table should look like.

Subject	United States					
	Total		Male		Female	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Workers 16 years and over	140,770,488	+/-86,009	74,452,993	+/-55,396	66,317,495	+/-54,036
MEANS OF TRANSPORTATION TO WORK						
Car, truck, or van	86.0%	+/-0.1	85.8%	+/-0.1	86.1%	+/-0.1
Drove alone	76.4%	+/-0.1	75.9%	+/-0.1	76.8%	+/-0.1
Carpooled	9.6%	+/-0.1	9.9%	+/-0.1	9.3%	+/-0.1
In 2-person carpool	7.4%	+/-0.1	7.5%	+/-0.1	7.3%	+/-0.1
In 3-person carpool	1.3%	+/-0.1	1.4%	+/-0.1	1.2%	+/-0.1
In 4-or-more person carpool	0.9%	+/-0.1	1.1%	+/-0.1	0.7%	+/-0.1
Workers per car, truck, or van	1.07	+/-0.01	1.07	+/-0.01	1.06	+/-0.01
Public transportation (excluding taxicab)	5.1%	+/-0.1	4.8%	+/-0.1	5.4%	+/-0.1
Walked	2.8%	+/-0.1	2.9%	+/-0.1	2.7%	+/-0.1
Bicycle	0.6%	+/-0.1	0.8%	+/-0.1	0.3%	+/-0.1
Taxicab, motorcycle, or other means	1.2%	+/-0.1	1.5%	+/-0.1	0.9%	+/-0.1
Worked at home	4.3%	+/-0.1	4.2%	+/-0.1	4.5%	+/-0.1

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Indicator 5: Transportation Safety

Required

Corresponds to STAR BE-7, Outcome 3

Provide the number of pedestrian and bicyclist fatalities in the jurisdiction

While there are many indicators of transportation safety, STAR uses pedestrian and bicyclist fatalities because of the interconnectedness with transportation choices. People will only shift their mode of travel to walking or bicycling if they have safe supporting infrastructure, thereby gaining the affordability benefits and reducing vehicle miles traveled (VMT).

Data for this indicator is available both at the city and county level from NHTSA's Fatality Analysis Reporting System (FARS) via the Query FARS Data tool. After opening the website, follow these steps:

1. Select "2016" in the dropdown menu on the upper right of the page and click submit;
2. Select "Option 2" and click submit;
3. Select "City" or "County" from the Crashes fields, and "Injury Severity" and "Person Type" from the Non Occupant fields and click submit;
4. In a separate web page, go to the US General Services Administration's GLCs for the USA & DC website. Download the "FRPP GLC United States" Excel document. Filter table to locate the appropriate 4-digit city or 3-digit county code;
5. Go back to the FARS Query. Select the applicable state from the State list and enter the city or county code into box beneath the list. Select "Fatal Injury (K)" from the Injury Severity list, and select both "Pedestrian" and "Bicyclist" from the Person Type list. To select multiple values, hold down the "Control" key on a PC or the "Command" key on a Macintosh while clicking the variables of interest. Then, click "Univariate Tabulation"; and
6. Select "Person Type" from the variable list, "Number of Persons" from the Data to Count list and click submit.

Participants may also use local data, if it is deemed to be more accurate. Local data may be available from local law enforcement or the state's Department of Transportation. If using local data, note that this is the case in the Indicator Story section of the reporting tool.

At this time, participants shall report a combined number with both pedestrian and bicyclist fatalities. If participants want to clarify or differentiate these numbers, do so in the Indicator Story section of the reporting tool. Future iterations of the tool may require these values to be reported separately.

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Indicator 6: Climate Adaptation, Vulnerability Assessment

Flexible

Corresponds to STAR CE-1, Outcome 1

Document the current vulnerability rating in up to 4 of the core areas identified locally

Climate change impacts vary by location. Given this, participants are encouraged to focus on issues of greatest concern in their local context.

The National Oceanic and Atmospheric Administration (NOAA) has developed a U.S. Climate Resilience Toolkit that details a 5-step process for planning and implementing resilience-building projects, including the identification of climate threats and assessment of vulnerability and risks. Examples of vulnerability assessments include: King County, WA's Strategic Climate Action Plan, Broward County, FL's vulnerability assessment for coastal cities, and Baltimore, MD's Disaster Preparedness and Planning Project (DP3) all provide examples of assessing climate vulnerability.

If a Climate Vulnerability Assessment has been completed for the jurisdiction based on evaluation of conditions for one or more years between 2013 and 2017, then participant should respond "Yes" and follow the instructions below. Participants with assessments conducted prior to 2013 may respond "Yes" if the assessment has been updated within the past 5 years. If a Climate Vulnerability Assessment has not been completed or the assessment is based on conditions from more than 5 years ago with no update, respond "No" and go to the next indicator.

For those reporting "Yes", identify up to 4 core areas of local climate change adaptation concerns. The core areas must fit into at least 3 of 4 general groupings: Built Environment, Economic Environment, Natural Environment, and Social Environment.

Below are examples of core areas within the general groupings:

Built Environment
- homes threatened by fire or flooding
- roadways and evacuation routes
- stormwater infrastructure
- transportation infrastructure

Natural Environment
- biodiversity
- coastal zone threats
- forestry
- water resources

Economic Environment
- agriculture
- community development
- energy supply and/or demand
- tourism (e.g. coastal areas or winter recreation)

Social Environment
- emergency management
- recreational facilities
- public health
- sensitive and vulnerable populations

Once the core areas are recorded, move on to the next steps of quantifying the vulnerability.

While vulnerability assessments vary in terms of breadth and depth, they should be conducted every 2-5 years after the initial assessment and consider the following aspects:

- *Sensitivity* is the degree to which climate change would impair a system if projected impacts occur. Systems that are greatly impaired by small changes in climate have a high sensitivity, while systems that are minimally impaired by the same small change in climate have a low sensitivity. To determine the system's sensitivity, the local government should consider non-climate factors already affecting the

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system that weaken its ability to deal with additional stressors related to climate change.

- *Adaptive capacity* is the ability of a system to make adjustments or changes in order to maintain its primary functions even with the impacts of climate change. To determine the system's adaptive capacity, STAR recommends that participants consider current resources and the resources needed to adapt to anticipated long-term changes. An adaptive capacity assessment should consider a minimum of 5 categories of resources: economic, environmental, governance, social, and technology or infrastructure.

The tables below provide a way to measure climate change vulnerability for systems with identified risk exposure. STAR has developed a spreadsheet based on these tables that may be used by participants to identify the Sensitive Ranking and Adaptive Capacity Ranking in each of the core areas identified.

Vulnerability, Sensitivity and Adaptive Capacity Rankings					
Sensitivity Ranking		**Adaptive Capacity Ranking**		**Vulnerability Index**	
S-0	System will not be affected by the impact	AC-0	System is not able to accommodate or adjust to impact	PO	Potential Opportunity
S-1	System will be minimally affected by the impact	AC-1	System is minimally able to accommodate or adjust to impact	V-1	Low Vulnerability
S-2	System will be somewhat affected by the impact	AC-2	System is somewhat able to accommodate or adjust to impact	V-2	Medium-Low Vulnerability
S-3	System will be largely affected by the impact	AC-3	System is mostly able to accommodate or adjust to impact	V-3	Medium Vulnerability
S-4	System will be greatly affected by the impact	AC-4	System is able to accommodate or adjust to impact in a beneficial way	V-4	Medium-High Vulnerability
				V-5	High Vulnerability

Vulnerability Index		**Sensitivity Ranking: Low to High**				
		S-0	**S-1**	**S-2**	**S-3**	**S-4**
Adaptive Capacity Ranking: Low to High	**AC-0**	V-2	V-3	V-4	V-5	V-5
	AC-1	V-1	V-2	V-3	V-4	V-5
	AC-2	V-1	V-1	V-2	V-3	V-4
	AC-3	PO	V-1	V-1	V-2	V-3
	AC-4	PO	PO	PO	V-1	V-2

If reporting on this indicator, participants must report the Vulnerability Index for each core area identified and upload either the most recent Climate Vulnerability Assessment or the completed STAR-provided Excel spreadsheet, including sources.

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Indicator 7: Greenhouse Gas Emissions

Flexible

Corresponds to STAR CE-2, Outcome 1

Demonstrate communitywide greenhouse gas (GHG) emissions from within the past 5 years

The Kyoto Protocol development process established the long-term target of reducing by 80% the GHG emissions of all industrialized countries by 2050. Although the U.S. was not a participant in the Kyoto Protocol, over 1,000 mayors across the U.S. were signatories to the U.S. Conference of Mayors' Climate Protection Agreement, committing to meet or exceed the Kyoto targets.

While a potentially more aggressive target, its long-term nature did not lead to the immediate actions necessary to reduce GHG emissions. So, leaders and delegates from 195 world nations formulated a global agreement on the reduction of climate change at the 2015 Paris Climate Conference. The final agreement outlines various measures that need to be implemented to limit the rise in average global temperature to well below 2°C, ideally at below 1.5°C. In March 2015, the U.S. set a goal to reduce its greenhouse gas emission by up to 28% below 2005 levels by 2025.

For this indicator, the participant is required to submit a GHG inventory of emissions throughout the jurisdiction, not just local government operations. In addition, the reported data must be from the most recent year released between 2013 and 2017.

There are several methods to assess communitywide GHG emissions; STAR recommends either the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) or the more U.S. tailored version called the U.S. Community Protocol for Accounting and Reporting or Greenhouse Gas Emissions (USCP).

The minimum standards from each protocol are nearly identical. The primary differences are that the USCP does not require cross-boundary sources, such as transportation, to be separated by jurisdictional boundary. However, it does require an assessment of energy used in the delivery of potable water.

If such a communitywide GHG inventory has been completed, then participant should respond "Yes". If not, then respond "No" and go to the next indicator.

For participants reporting "Yes", report the total communitywide GHG emissions from within the past 5 years (in metric tons carbon dioxide equivalent, MTCO2e) and provide a link to or upload of the inventory. *Note that this indicator will be converted to "GHG emissions per capita" in the public-facing dashboard display.*

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Indicator 8: Renewable Electrical Energy Supply

Flexible

Corresponds to STAR CE-3, Outcome 2

Demonstrate the portion of the community's overall electric utility generating capacity includes a portion from renewable energy sources

Per EPA estimates, approximately 67% of electricity comes from burning fossil fuels, such as coal, oil, and natural gas. This combustion is responsible for over 30% of total GHG emissions in the United States. Since 1990, GHG emissions from electricity have increased by about 12% as demand for energy has grown and fossil fuels remain the primary source for generation. In addition, fossil fuel combustion contributes to increased air pollution and higher rates of water consumption in comparison to renewable energy sources.

According to the U.S. Energy Information Administration, renewable energy sources represented roughly 9% of non-vehicular U.S. energy consumption in 2011. To successfully address climate change and achieve energy independence, the U.S. must drastically increase its use of renewable energy-based electricity.

For the purposes of STAR, renewable energy facilities are defined as those that use biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts or less, hydroelectric that is third-party certified by the Low Impact Hydropower Institute, digester gas, solid waste conversion, landfill gas, ocean waves, ocean thermal, or tidal currents to produce electricity. Renewable energy credits (RECs) may be included if they are Green-e certified.

The first step is to identify whether the electric utility discloses the portion of their generating capacity that comes from renewable energy sources. This information may be available in an annual report, on the "About Us" section of a company's website, or in compliance reports for a renewable portfolio standard (RPS). The data must be from the most recent year released, between 2013 and 2017. If not disclosed or data is older than 2013, then mark "No" in the reporting tool and move to the next indicator.

If disclosed, there are two options for reporting. In Option A, participants report on the portion of the generating capacity coming from renewable sources. In Option B, participants may report the value of a state or local RPS and confirm compliance. For either option, use the STAR-provided Excel spreadsheet.

For Option A, establish the total generating capacity of the electricity provider. The provider's service area may or may not align with the jurisdictional boundaries. If more than one provider to the jurisdiction, estimate the percentage of the market held by each electricity provider. Then, determine the generating capacity of any renewable energy sources, as defined by STAR in the paragraph above. Divide the generating capacity of any renewable energy sources by the total capacity. If more than one utility, sum the contributions based of each provider's proportional contribution to the community. Participants may either report this value or detail each specific renewable energy source and its associated percentage. If detailing, the generating capacity of renewable energy sources that are off-grid, such as landfill gas, may be added.

For Option B, if the utility must comply with an RPS, the RPS rate may be submitted. If utility is not in compliance, the rate of record must also be submitted. If more than one utility serves the jurisdiction, then establish the percentage of the market held by each electricity provider. Participants may either report this value or detail each specific renewable energy source and its associated percentage. With Option B, off-grid renewable energy sources cannot be included.

In addition to recording the value, upload the STAR-provided Excel spreadsheet and include a link to data source.

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Indicator 9: Total Solid Waste

Flexible

Corresponds to STAR CE-7, Outcome 1

Provide the total solid waste generated within the jurisdiction that is disposed of via landfill, waste-to-energy facility, or incinerator

STAR encourages an ambitious long-term target of reducing by 100% the total solid waste generated within the jurisdiction that is disposed of via landfill or incinerator. Commonly called zero waste, this target encourages communities to reach a high level of sustainability.

Total solid waste includes municipal solid waste, construction and demolition waste, organic waste, and household hazardous waste. Participants should include all of these waste streams in total solid waste calculations.

Participants must identify whether they measure total solid waste generated within the jurisdiction that is disposed of via landfill, waste-to-energy facility, or incinerator. Data must represent waste disposed within the past 5 years, between 2013 and 2017. Ideally, solid waste counts will represent only the community's generated waste. However, some local governments share disposal facilities. Therefore, data may be reported at a larger geographic level and the portion attributable to the jurisdiction can be calculated based on a ratio to the population.

If reporting on this indicator, participants must submit the most recent annual total solid waste and upload a description of the methodology used to calculate total solid waste.

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Indicator 10: Third Grade Reading Proficiency

Required

Corresponds to STAR EAC-3, Outcomes 1

Demonstrate the percentage of third grade public school students that meet or exceed reading proficiency

According to the 2015 National Report Card published by the National Assessment of Educational Progress (NAEP), average reading scores for fourth graders across the country remain below proficient with no change in the scores between 2013 and 2015. Reading proficiency standards are a key indicator of whether students have acquired the knowledge necessary to succeed in more advanced classwork in higher-grade levels.

A study by the University of Chicago found third grade reading level to be a significant predictor of eighth grade reading level and ninth grade course performance, as well as graduation and college attendance, even after controlling for demographic characteristics and school influences on individual performance.

Data for this indicator is available from either the local school district or the state department of education. If the public school district boundaries extend beyond the jurisdiction, then only count the individual elementary schools within the jurisdiction. If multiple public school districts operate within the community, submit data based on the individual elementary schools and/or each independent school district that is completely within the jurisdiction.

Use the STAR-provided Excel spreadsheet to help with data collection and weighted population calculations.

Participants must provide the percentage of third grade public school students meeting or exceeding reading proficiency standards in the 2016-2017 school year and upload the STAR-provided Excel workbook with a link to the data source.

Note that some school districts test students at the beginning of the fourth grade, rather than the end of the third grade. Fourth grade reading proficiency scores may be submitted if third grade scores are not available for the jurisdiction.

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Indicator 11: High School Graduation Rate & Graduate Rate Equity

Required

Corresponds to STAR EAC-3, Outcomes 3 & 4

Provide the average 4-year adjusted cohort high school graduation rate for all public schools in the jurisdiction
--AND--
Provide the average 4-year adjusted cohort high school graduation rate for all students in all public schools in the jurisdiction from groups based on race/ethnicity, special education, English language learners, and low-income

In his 2009 State of the Union address, President Obama set a goal to achieve a 90% high school graduation rate nationwide by 2020. Since then, the nation as a whole has seen significant progress with rates up to 81% in 2015.

The link between educational attainment and earnings potential is well documented. Research by the Institute for Social Research at the University of Michigan shows that, on average, households headed by a high school graduate accumulate 10 times more wealth than households headed by an individual who dropped out of high school.

In order to improve accountability at the high school level, the U.S. Department of Education (DoED) requires all state and local educational agencies receiving Title 1 funds to calculate and report a uniform high school graduation rate, which is called the 4-year adjusted cohort high school graduation rate.

Data for this indicator is available from either the local school district or the state department of education. If the public school district boundaries extend beyond the jurisdiction, then only count the individual high schools within the jurisdiction. If multiple public school districts operate within the community, submit data based on the individual high schools and/or each independent school district that is completely within the jurisdiction.

Because the number of graduating students in a high school may vary widely, the total graduation rate for the jurisdiction is based on a weighted average based on the number of students and individual high school graduation rate. Use the STAR-provided Excel spreadsheet to help with data collection and calculations.

Participants must provide a weighted average of the 4-year adjusted cohort high school graduation rate for all public schools located within the jurisdiction for the 2016-2017 school year. Participants must also report a weighted average 4-year adjusted cohort high school graduation rate for student subgroups attending public schools located within the jurisdiction. DoED student subgroups include:

- Race/ethnicity: American Indian/Alaska Native, Asian, Latino, Native Hawaiian/Pacific-Islander, African-American, White;
- Special education;
- English Language Learner (ELL); and
- Low-income: eligible for USDA Free and Reduced-Price Lunch Program.

Upload the STAR-provided Excel spreadsheet with a link to the data source used.

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Indicator 12: Environmental Justice, Risk and Exposure

Flexible

Corresponds to STAR EE-3, Outcome 1

Quantify risk and exposure to environmental justice conditions for overburdened neighborhoods

STAR recognizes that communities may not have the resources to work on all environmental justice conditions, such as health disparity and toxic exposure, all at once. A first step is to identify areas with high concentrations of populations that have been historically overburdened with environmental impacts. Some communities may have this data from local sources. If so, upload maps and data based on local sources.

If the community does not have existing local data, then they may use the EPA's Environmental Justice Screening and Mapping Tool (EJSCREEN). Begin by entering the name of the jurisdiction in the search field. Click "Map Data" in the top navigation bar and select "EJ Indexes". Click through each option and record the Blockgroup ID for any Block Group that is in the 80 percentile or higher for the jurisdiction. Take a screenshot of each map where the EJ Index is in the 80 percentile or higher and paste into a new document. Whether reporting on this indicator or not, upload the mapping document. *Note that while EJScreen provides a starting point for identifying environmental justice sites in the community, these mapping efforts should be paired with robust community engagement to determine on-the-ground conditions and priorities.*

Regardless of whether reporting on this flexible indicator, all participants must upload a map showing areas with that are historically overburdened by environmental impacts.

If the community has quantified risk or exposure, then select 4 areas or sites to report. Name the geographic area and describe the indicators being measured for the area. The selected sites should be those known or suspected of having higher pollution exposure levels or risks.

Participants reporting on this indicator must identify at least one indicator to assess per site; however, multiple indicators may be identified and tracked. Indicators can vary considerably depending on the environmental conditions at each site. Examples of environmental justice indicators include:

- concentration of air pollutant emissions from a specific point source, such as an industrial or incineration facility;
- concentration of chemical pollutants in waters near a specific point source or discharge site;
- number of permit exceedances by regulated facilities;
- concentration of polluted stormwater runoff into rivers and streams;
- contaminated soil from industrial processes; and/or
- noise or vibration levels.

If reporting this indicator, participants must provide the locally selected indicators and the most recently reported values for each geographic area from within the past 5 years (2013 – 2017).

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Flexible

Indicator 13: Equitable Access & Proximity to Foundational Community Assets

Corresponds to STAR EE-4, Outcome 1

Demonstrate access and proximity by residents of diverse income levels and race/ethnicity to the following community facilities, services, and infrastructure:

- Public transit facilities and service levels
- Public libraries
- Public schools
- Public spaces
- Healthful food
- Health and human services
- Digital access or high speed internet
- Urban tree canopy
- Emergency response time

While there are a variety of conditions that impact the opportunity for residents to thrive, this indicator focuses on 9 categories of foundational community assets where:

- local governments typically exert influence or control;
- a deficit in access or proximity could have a significant negative bearing on residents' quality of life;
- access and proximity to them can be highly varied across neighborhoods and populations; and
- related spatial data availability affords ease of diagnosis, actionable insights, and accountability for progress.

This indicator relies on spatial analysis of demographic characteristics, specifically household income levels and racial/ethnic composition of neighborhoods.

Note that the analysis described below is only required if the participant is reporting data for this indicator.

Identifying Quintiles for Analysis

Each of the selected categories of foundational community assets must be assessed against a backdrop of the community's demographic characteristics. The following methodology describes the steps necessary to determine income and race/ ethnicity parameters to be used in the spatial analysis. The participant will use Census data on income and racial demographics to divide the community's Census tracts into quintiles. These quintiles will be overlaid with spatial data on key foundational community assets in order to assess which quintiles are receiving lower levels of access or service. The participant should conflate the income and racial layers using a weighted point structure to create one final base map for submission.

To do this, complete the following steps:

1. Determine the appropriate geographic boundary for the selected category. It may be the same as the jurisdictional boundary, or may vary based on service territories.
2. Select the most recent year for the data related to the foundational community assets being reported.
3. Identify the demographic characteristics for the established boundary using American FactFinder2.

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For race/ethnicity, use the following dataset for 2010 Census block groups for the applicable city or county: QT-P6 – Race Alone or in Combination and Hispanic or Latino: 2010. For household income, use the following dataset for the 2016 5-year average household income by Census tracts: B19013 – Median Household Income in the past 12 months.

4. Distribute race/ethnicity characteristics into 5 relatively even groups based on population within the Census block groups. For example, if the total population is 100,000 residents, then the groups should reflect the race/ethnicity concentrations for the lowest 20%, the second lowest 20%, the middle 20%, the second highest 20%, and the highest 20% of the population.
5. Distribute household income characteristics into 5 relatively even groups based on population. For example, if the total population is 100,000 residents, then the groups should reflect the income range for the lowest 20%, the second lowest 20%, the middle 20%, the second highest 20%, and the highest 20% of the population.
6. Assign a score to each Census area and then add the scores to create a merged set of quintiles. For race/ethnicity, assign a score from 1 for the Census block groups with the lowest percentages of people of color to 5 for the Census block groups with the highest percentages of people of color. Then, evaluate the block groups within the respective Census tract and average the scores to create a Census tract score for race/ethnicity.
7. For income demographics, assign a score of 1 for the highest income Census tracts to 5 for the lowest income Census tracts.
8. Sum the 2 scores for each Census tract and then divide the result in a weighted set of quintiles that can be used to assess the distribution of the community's assets. A relatively equal number of Census tracts should be in each quintile.
9. Overlay the appropriate information for the categories described in Sections A – I below.
10. Calculate the lowest performing quintile at the selected year and then average the performance for all 5 quintiles to establish the community norm. This will be auto-calculated in the STAR-provided Excel workbook.

Category Standards for Submissions

Communities should use GIS spatial data layers to demonstrate access to community assets as described in Sections A – I below. Data will be needed from the local or regional GIS manager, relevant service providers in the jurisdiction, and/or the authorities specified below for each category. Reported data must be from the most recent data year, between 2013 and 2017.

A. Public transit facilities OR service levels: For this category, participants can show either proximity to transit facilities OR access to transit service levels.

- The spatial data layer for the public transit facilities option should depict transit access points (stops, stations, and terminals) in the jurisdiction based on locally collected data originated by all relevant transit service providers. Proximity is defined as a 1/4-mile walk distance from bus or streetcar stops, or a 1/2-mile walk distance of bus rapid transit stops, light or heavy rail stations, and/or passenger ferry terminals.

OR

- The spatial data layer for the transit service levels option should depict public transit service levels based on total service hours of commuter rail, light rail, heavy rail, streetcar, bus, and/or passenger ferry service available to the public in hours per week. Service should be delivered to residents in or adjacent to the Census tracts and block groups of the demographic quintiles.

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B. Public libraries: The spatial data layer should depict all public libraries in the jurisdiction based on data collected locally by the library network. Proximity to libraries is measured as households within a 1/2-mile walk distance of a library.

C. Public schools: For this category, participants can show either proximity to public schools OR access to high quality schools.

- The spatial data layer should depict all public elementary schools in the jurisdiction based on data collected locally by the school district. Proximity is measured as households within a 1/2-mile walk distance of a school.

OR

- The spatial data layer should depict information for all public elementary schools in the jurisdiction based on data collected locally by the school district and should depict performance in third grading reading level.

D. Public spaces: The spatial data layer should depict public spaces based on locally collected information from the jurisdiction's natural resources or parks department. Proximity to these spaces is defined as a 1/2-mile walk distance to a public space.

E. Healthful food: The spatial data layer should depict healthful food retail outlets based on local data provided by commercial databases (ESRI's Business Analyst, InfoUSA, or Dun and Bradstreet) and/or other local sources. Proximity to healthful food retailers is measured as households within a 1/4-mile walk distance of the identified retailers.

F. Health and human services: The spatial data layer should depict publicly accessible hospitals and clinics in the jurisdiction based on data collected locally by the public health agency. Proximity to these facilities is measured as households within a 1/2-mile walk distance of appropriate facilities.

G. Digital access or high speed Internet: For this category, participants can show either proximity to public Internet facilities OR access to high-speed Internet service.

- The spatial data layer for the first option should depict public Internet access points based on locally collected data from libraries, community-based organizations, and other community anchor institutions that offer the service. Proximity is measured as households within a 1/2-mile walk distance of all Internet access points.

OR

- The spatial data layer for access to high-speed internet should depict the coverage of broadband service provided in the jurisdiction to residents in the Census tracts and block groups of the demographic quintiles based on information provided by all relevant companies or local/state communications authorities.

H. Urban tree canopy: The spatial data layer for urban tree canopy should show the prevalence of vegetation in Census blocks and tracts, where prevalence is determined by spatial portrayals of trees and vegetation using land cover maps from one of the following types of sources: satellite data (converted to a normalized difference vegetation index - NDVI), i-Tree Canopy, or i-Tree ECO.

I. Emergency response times: The spatial data layer should include the number of households in Census blocks and tracts where response times meet NFPA 1710 or 1720 standards based on information provided by the local fire department.

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Indicator 14: Businesses

Required

Corresponds to STAR EJ-1, Outcome 1

Provide the number of business establishments in the jurisdiction

Business establishments provide employment opportunities and resources to residents and communities. This indicator helps characterize the health of the region's overall business development patterns.

Data for this indicator is published by the Census' Business Patterns in late Spring 2018. County participants must use the "County" geographic area. Cities or towns may elect to use a different geographical scale, such as county, Metro/Micropolitan Statistical Area or ZIP Code, if it is a better representation of economic activity.

To access data, go to American FactFinder2 and click "Advanced Search". Then, follow these steps:

1. Select "Topics" from the blue box fields in the left margin. Then, click "Program" and select "Business Patterns". Close Topics menu;
2. Select "Geographies" from the blue box fields in the left margin. Click "Name" from the tabs along the top;
3. Type the name of the jurisdiction in the search box and click "Go". *Note that data is only available for county, MSA, or ZIP Code, not individual cities*;
4. Select the box next to the most appropriate geography and then select "Add". If using ZIP Codes, select the geography with "All 5-Digit ZIP Codes fully within/partially within …"
5. Close Geographies menu; and
6. From the list of options, select the most recent Geography Area Series: County Business Patterns table for 2016.

Participants must provide the number of establishments from the "Total for All Sectors" row. If using ZIP Codes, the participant may need to sum the totals for each ZIP Code. If this is the case, do not include any values from ZIP 99999 in the total.

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Indicator 15: Employment

Required

Corresponds to STAR EJ-1, Outcome 2

Provide the percentage of the population 16 years and over employed
--AND--
Provide the unemployment rate of the population 16 years and over

Employment and unemployment rates are basic indicators of economic health. A decreasing unemployment rate signals that the economy is strong enough to provide jobs for those who are able to work. An increasing employment rate also indicates that the local workforce has the skills needed for the jobs that are available.

To access data, go to American FactFinder2 and click "Advanced Search". Then, follow these steps:

1. Enter the following dataset in the Topic or Table Name field: "S2301 – Employment Status";
2. Enter the city or county name in the State, County, or Place field. In some cases, the Metropolitan or Micropolitan Statistical Area may be a better representation of the community than the jurisdiction. That is acceptable, but the same scale must be used for both parts.
3. Click "Go"; and
4. Select the 2016 ACS 5-year estimate.

Participants must provide the values for "Employment/Population Ratio - Estimate and Unemployment rate - Estimate from the Population 16 years and over" row.

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Indicator 16: Median Household Income

Required

Corresponds to STAR EJ-4, Outcome 1

Provide the real median household income for the jurisdiction

Real median household income is commonly used to measure economic performance and is considered by many statisticians to be a better indicator than the average household income, as it is not dramatically affected by unusually high or low values.

To access data, go to American FactFinder2 and click "Advanced Search". Then, follow these steps:

1. Enter the following dataset in the Topic or Table Name field: "DP03 – Selected Economic Characteristics";
2. Enter the city or county name in the State, County, or Place field.
3. Click "Go"; and
4. Select the 2016 ACS 5-year estimate.

Participants must provide the value for the median household income.

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Indicator 17: Living Wages

Required

Corresponds to STAR EJ-4, Outcome 2

Provide the percentage of household incomes in the jurisdiction that meet or exceed the living wage standard

In many American communities, workers in low-wage jobs do not earn sufficient income to provide basic needs, such as shelter, clothing, and nutritious food, given the local cost of living. This indicator measures whether the median household income in a jurisdiction is sufficient to allow employees to live where they work.

A living wage is the minimum income necessary for a worker to meet basic needs, such as housing payments, food, clothing, utilities, and access to health care without governmental support. It is calculated based on a 40-hour workweek and HUD guidelines that an individual or household should not spend more than 30% of income on housing.

To determine the percentage of households that meet or exceed the living wage standard, participants should follow the steps below:

1. Determine the total households and types of households by using the Census' American FactFinder2, Advanced Search, Dataset "DP02 – Selected Social Characteristics in the United States", and enter the name of the jurisdiction;
2. Record the 2016 ACS 5-year estimate data into the STAR-provided Excel spreadsheet;
3. To determine the number of households in each income and benefits range group, clear the DP02 dataset and use the following dataset for the applicable city or county: "DP03 – Selected Economic Characteristics";
4. Record the 2016 ACS 5-year estimate data into the STAR-provided Excel spreadsheet;
5. To calculate the living wage standard, open the Living Wage Calculator. Select the applicable jurisdiction and record the living wage standard for each of the categories listed on the STAR-provided Excel spreadsheet; and
6. Based on the data entered, the STAR-provided Excel spreadsheet will calculate the percentage of households living above the living wage in the jurisdiction.

Participants must provide the calculated living wage standards for the jurisdiction, the percent of household incomes in the jurisdiction that meet or exceed the living wage standard, and the STAR-provided Excel spreadsheet.

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Indicator 18: Food Security and Assistance

Required

Corresponds to STAR HS-4, Outcome 1

Provide the percentage of the overall population and of children that are food insecure

The financial means to purchase healthful food is an ongoing challenge for millions of low-income families in the United States. Food insecurity prompts families to turn to federal assistance, food banks, or other charitable and nonprofit community resources.

To access data, go to Feeding America's Map the Meal Gap tool. [Data release for 2016 should be available in Spring 2018.] Then, follow these steps:

1. For Map Type, select "County". Participating cities should use the most relevant county. If the city's jurisdictional area crosses into more than 1 county, record the percentages for each county and calculate a weighted percentage based on the resident population;
2. For Year, select "2016";
3. For Demographic, select "Child";
4. For Location, select the relevant state;
5. The map will reposition to show the selected state. Then, click on the County; and
6. Scroll down to the graphic below the map and note the "Food Insecurity Rate for Overall and Child".

Participants must provide the Food Insecurity Rate values for the overall population and child population.

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Indicator 19: Access to Healthful Food

Flexible

Corresponds to STAR HS-4, Outcome 2

Demonstrate the percentage of residents living in a food desert

In recent years, the importance of convenient access to fresh food has emerged as both a public health issue and a new priority for urban planning. While obesity levels for adults and children continue to climb across the U.S., the situation is particularly dire in minority and low-income areas where disparities in access to full-service grocery stores have been repeatedly documented. While access to a nearby grocery store does not guarantee improved nutrition and health, it is an essential component, especially in very low-income areas where convenience stores and fast food restaurants are prevalent alternatives.

Participants must identify whether the community has mapped and assessed food deserts within the jurisdiction. **If not, participants must still upload a map of food deserts in their jurisdiction from the USDA Economic Research Service (ERS) Food Access Research Atlas.** To create map, click the link and perform the following:

1. Type jurisdiction name in "Find a place" field;
2. Select the following layers: "LI and LA at 1 and 10 miles" and "LI and LA at ½ and 10 miles"; and
3. Use the map tool to Print to PDF.

If food deserts have been mapped and assessed, participants must provide the overall percentage of residents living in a food desert and upload or provide a link to a map of community food deserts and the calculation used for measurement. This may be done using data from the ERS's "Download the Data" website or using local data.

To perform an assessment, there are two options – one using ArcGIS Network Analyst and one using just ArcGIS.

If using ArcGIS Network Analyst, performing the following:

1. Gather and map data regarding the location of healthful food retail outlets either locally or through a national vendor, such as ESRI's Business Analyst or Dun & Bradstreet. Note that narrowly focused or specialty shops, such as seafood shops, and convenience stores should not be included; healthful food retail outlets are full-service locations where customers can purchase a variety of foods necessary for complete and balanced meals (NAICS code 445110);
2. Using business licensing permits, certificates of occupancy, or similar data, map existing healthful food retail outlets;
3. Using ArcGIS Network Analyst, create a ¼-mile walk distance buffer around each retail location;
4. Determine the percentage of residents living within a walkable ¼-mile of a healthful food outlet. Assume equal population density within the Census tract;
5. Subtract the percentage of residents living within a walkable ¼-mile of a healthful food outlet from 100% to find the percentage of residents living within a food desert.

If using just ArcGIS, open the ERS's "Download the Data" website and perform the following:

1. Download the Current Version Food Access Research Atlas Data Download (Excel file);
2. Using ArcGIS, join the spreadsheet with a Census tract boundary file for the jurisdiction;
3. Use business licensing permits, certificates of occupancy, or similar data to identify and map existing

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healthful food retail outlets. Note that narrowly focused or specialty shops, such as seafood shops, and convenience stores should not be included; healthful food retail outlets are full-service locations where customers can purchase a variety of foods necessary for complete and balanced meals (NAICS code 445110);

4. Add a 0.5 mile (urban) or 10-mile (rural) buffer around each healthful food retail outlet;
5. Estimate the percentage of residents within the Census tracts served by healthful food outlets. Assume equal population density within the Census tract. Areas that appear as food deserts, but have no residents, such as airports or rail yards, may be excluded;
6. Subtract the percentage of residents within the buffer of a healthful food outlet from 100% to find the percentage of residents living within a food desert.

If reporting on this indicator, participants must provide the value for the percentage of residents living within defined food deserts for a reporting year within the past 5 years and upload or link to a map of community food deserts, including the calculation used for measurement.

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Indicator 20: Violent Crime Rate

Required

Corresponds to STAR HS-7 Outcome 1

Provide the violent crime rate for:

- Homicides per 100,000 residents
- Incidents of rape or attempted rape per 100,000 residents
- Aggravated assaults per 100,000 residents

At the local level, violent crime rates are provided through the FBI's Uniform Crime Reports (UCR) system. The FBI strongly cautions against using UCR data to rank communities or evaluate law enforcement effectiveness because crime rates can vary widely due to economic stability, job availability, population density and degree of urbanization, and the concentration of youth, among other factors.

To access data, go to UCR Data Reports, select the "Crime in the United States" for 2017. [Data release should be available in the Summer or Fall of 2018.] Then, follow these steps:

1. Select "Violent Crime" from the list of Offenses Known to Law Enforcement;
2. If a city or town:
    a. Select "Table 6" from the list of data tables;
    b. Select the appropriate state from the list;
    c. In the table produced, scroll down to city name and record values for population, murder and nonnegligent manslaughter, rape (revised definition), and aggravated assault;
    d. If the city includes universities or colleges that operate outside of the local government jurisdiction, repeat steps a – c using Table 7; and
    e. Convert crime values to a rate per 100,000 residents.
3. If a county:
    a. Select "Table 9" from the list of data tables;
    b. Select the appropriate state from the list;
    c. In the table produced, scroll down to city name and record values for population, murder and nonnegligent manslaughter, rape (revised definition), and aggravated assault. These values only represent unincorporated areas of the county;
    d. If the county includes municipalities with population 10,000 or greater, repeat steps a – c using Table 6;
    e. If county includes universities or colleges that operate outside of the local government jurisdiction, repeat steps a – c using Table 7; and
    f. Convert summed crime values to a rate per 100,000 residents.

UCR data is only available for communities with population 10,000 or greater. For smaller communities, use local data that is normalized per 100,000 people. If the population is 10,000 or greater and it is not listed in the *Crime in the US 2017* report, it may be because the deadline for data submittals to the FBI was missed. In this case, collect the data locally from the appropriate sources.

Participants must provide the violent crime rates for homicide, rape or attempted rape, and aggravated assault per 100,000 for the 2017 calendar year.

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Indicator 21: Designated Green Infrastructure

Flexible

Corresponds to STAR NS-1, Outcome 1 [Green Stormwater Infrastructure]

Provide the percentage of the jurisdiction's land area that has designated green stormwater infrastructure providing bioretention and infiltration services

According to a U.K. study on green infrastructure and climate adaptation, a community begins to see climate adaptation benefits when 35% of the community's land area is designated as green infrastructure. Designated green infrastructure implies an interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas. Green infrastructure may be designated as preserved in a natural state or engineered for retention or infiltration of stormwater, such as green roofs, porous pavement, or bioswales.

Land areas used must be legally protected from development through conservation easements, forest preserves, land trusts, right-of-way, and similar conservation mechanisms. Land zoned for, and being used as, parkland and open space may also be included if it is maintained in a natural state and connected to the broader system. However, golf courses may only be included if the participant can document it was designed as part of the community's green infrastructure system.

Participants must identify whether or not the community has mapped and assessed green infrastructure within the jurisdiction. Data must be based on a year within the past 5 years (2013 – 2017). Participants supplying data must provide the total percentage of the jurisdiction's land area that has protected vegetated or pervious surfaces.

Participants will need to rely on a combination of local and national datasets for this outcome. National datasets include the National Wetland Inventory for wetlands, EPA's National Stormwater Calculator and Enhanced River Reach GIS File, and i-Tree, which is a tool that provides tree canopy and pervious surface data. Use ArcGIS to determine the percent of the jurisdiction's land area that is encompassed by these various forms of green infrastructure.

To calculate the percent of green infrastructure features, sum the acres of all green infrastructure features and divide by the total land area in the jurisdiction. In the total land area calculation, do not include acres of permanently saturated areas, such as lakes, streams, or ponds. Do include land areas classified as wetlands.

If reporting this indicator, participants must provide the percentage of the jurisdiction's land area classified as green infrastructure and upload or link to a map of community green infrastructure, including the calculation used for measurement.

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CITY OF YPSILANTI SUSTAINABILITY COMMISSION RESOLUTION
FOR THE ADOPTION OF
ENERGY STAR PORTFOLIO MANAGER

AT A MEETING OF THE SUSTAINABILITY COMMISSION OF THE CITY OF YPSILANTI, MICHIGAN, HELD AT CITY HALL, ON JUNE 11, 2018,

RESOLUTION 2018-06-002 - ADOPTION OF ENERGY STAR PORTFOLIO MANAGER

WHEREAS, EPA's ENERGY STAR Portfolio Manager is a no-cost, interactive energy management tool that allows users to securely track and assess energy, water consumption, and greenhouse gas production across a building portfolio; and
WHEREAS, 40 percent of U.S. commercial building space is already benchmarked in Portfolio Manager — making it the industry-leading benchmarking tool; and

WHEREAS, using EPA's ENERGY STAR Portfolio Manager would allow the City of Ypsilanti to identify under-performing buildings, verify efficiency improvements, and apply for ENERGY STAR certification for superior energy performance; and

WHEREAS, our participation in the Michigan Green Communities' Challenge requires the City to begin tracking building energy use;

THEREFORE, BE IT RESOLVED that the Sustainability Commission urges City Council to direct staff to begin using EPA's ENERGY STAR Portfolio Manager to benchmark building water use, energy use, and greenhouse gas production.

Zero Waste event

Christine Chessler-Stull to me Jul 10

As mentioned I wont be available that weekend at all, so if Washtenaw County (Noelle Bowman) decide to explore the Parkridge Summer Festival opportunity for this year I will leave that up to them.

Ill get back with you in August regarding a time later this Fall that I can present to the group. I appreciate the opportunity.

-Christine

From: Keith Michalowski [mailto:kmichalowski@gmail.com]
Sent: Tuesday, July 10, 2018 11:24 AM
To: Christine Chessler-Stull
Cc: Noelle Bowman; Bryan Foley; Emily Drennen; Nancy Heine; Julia Bayha
…

Subject: Re: Zero Waste event

Hi Christine,
So glad to hear that the program is active! I agree it's likely too late to apply this to this years Heritage Festival given the sheer magnitude of vendors. Maybe we still have time to try to run a pilot at the Parkridge Summer Festival? Worth a shot :)

I'm really glad you are interested in presenting to us. Our meetings are the second Monday of the month at 7pm at Ypsilanti City Hall. We would be thrilled to host you whenever works best for you!

Thanks so much for organizing and helping us get involved with this fantastic project! This is exactly the kind of outreach I was hoping we could do.

I have copied a couple of our commissioners on this email for their reference. Bryan Foley will likely be taking the lead on the implementation of Zero Waste events, but you are always welcome to contact me.

Best wishes,
Keith

On Tue, Jul 10, 2018 at 11:12 AM Christine Chessler-Stull <christine@recycleannarbor.org> wrote:

> Hi Keith,
>
> The program is very much alive and well! ☺ http://recycleannarbor.org/divisions/curbside-recycling/service-areas/zero-waste-services
>
> I would be happy to discuss Zero Waste for the Heritage Festival for 2019. Recycle Ann Arbor does truly require the period of planning recommended (3-6 months) to make sure the event is successful and attendees are educated in waste reduction, etc.. Since were now in mid-July, and most of the infrastructure for your event is already set, we know with our past experience that this would not be enough time to introduce Zero Waste and changes of this magnitude to the Heritage Festival.
>
> Additionally, and mainly the most important consideration, I am out of town the weekend of the Heritage Festival. Currently RAA's Zero Waste program is just led by me and another staff member, so with me not being available this complicates the ability to host anything this year also.
>
> Noelle is CC'ed on this email in the event she may be available and/or interested in working out something for the 2018 Heritage Festival. However, we both normally agree that professionally a planning period of (minimum) 3 months is required to host Zero Waste successful- for you, your organization, your attendees, etc.
>
> I would be happy to present to your Commission group in early fall if you want to let me know some dates, times, etc of these meetings.
>
> **Christine Chessler-Stull** |Outreach & Zero Waste Coordinator
> Recycle Ann Arbor |2420 S. Industrial Highway, Ann Arbor, MI 48104| (734) 662-6288 ext. 119
> **Stay In Touch:** Facebook|Twitter |Website|Newsletter|YouTube

From: Keith Michalowski [mailto:kmichalowski@gmail.com]
Sent: Tuesday, July 10, 2018 9:42 AM
To: Christine Chessler-Stull
Subject: Re: Zero Waste event

Hi Christine,
Thank you for the quick reply! We were hoping to cover the Heritage Festival (Aug 24-26) and the Parkridge Summer Festival (Aug 25). It sounds like we might be too late? I hope not. I can provide the rest of the details once I coordinate with the event hosts. I was hesitant to contact them until we were able to establish a plan. One of our commissioners expressed difficulty finding the right person to speak to about this; he suggested the program may no longer exist. I'm glad this is not the case. Regardless of whether we can cover these events, I would love to move forward with you so we can sponsor events in the future. I honestly would like to apply Zero Waste to as many events as my Commission and your fabulous program can support! Would you be available and interested in providing our Commission with a short presentation on Zero Waste?

Thank you for your time,
Keith Michalowski
734-217-4554

P.S. I am generally unavailable during business hours to take calls. I am free around lunch time and in the evenings

On Tue, Jul 10, 2018 at 8:05 AM Christine Chessler-Stull <christine@recycleannarbor.org> wrote:

> Hi Keith,
>
> Thanks for your interest in hosting Zero Waste events in Ypsilanti!
>
> With our partnership program, Zero Waste Washtenaw, with Washtenaw County staff (which you had on the email already), we would need to discuss which organization is the better "fit" for these events.
>
> - First things first though—have you had a chance to review out Zero Waste Event guide?
> - Also, our Zero Waste vendor and exhibitor guidelines (we require events follow these guidelines) if they contract with our services.
>
> - Also, what events are you interested in hosting or exploring as Zero Waste?
> - Names, Dates, Time Frames, Attendance, etc.
>
> Usually we do a full pre-event consultation 3-6 months prior to the event of interest so we can make sure your event will achieve the most success (landfill diversion)—which also means switching your food vendors to compostable and/or recyclable products, etc.
>
> Get back with the above and then the next step should be a follow-up phone call or in-person meeting to further explore your options.
>
> Talk soon,
>
> **Christine Chessler-Stull** |Outreach & Zero Waste Coordinator
> Recycle Ann Arbor |2420 S. Industrial Highway, Ann Arbor, MI 48104| (734) 662-6288 ext. 119
> **Stay In Touch:** Facebook|Twitter |Website|Newsletter|YouTube
>
> ---
>
> **From:** Keith Michalowski [mailto:kmichalowski@gmail.com]
> **Sent:** Tuesday, July 10, 2018 12:07 AM
> **To:** christine@recycleannarbor.org; ndbowman9@gmail.com; publicworks@washtenaw.org
> **Subject:** Zero Waste event
>
> Hi folks,
> I'm the chair of the Sustainability Commission of the City of Ypsilanti. We are interested in facilitating Zero Waste events in Ypsilanti. Can you please advise on how to proceed with setting one of these up?
>
> Thank you for your time,
> Keith Michalowski

Why consider a Zero Waste Event?

Washtenaw County serves as host to hundreds of community events per year, some with as few as 50 guests, others drawing in tens of thousands. "Waste" is a common side effect at events. In fact, about 2.5 pounds of waste is created per event-goer each day; that adds up to lots of waste! More often than not, only trash disposal options are available to guests, which means ALL that waste is sent to the landfill. On average, Zero Waste Washtenaw event partners divert 92% of all waste from the landfill!

What is a Zero Waste Event?

An event where the leadership is committed to minimizing or completely eliminating all waste sent to landfill. This is achieved by working directly with event partners & vendors to reduce event waste in the first place, and by providing guests access to recycling and compost disposal options. When an event diverts 100% of its waste from entering the landfill to instead be used as resources, it has achieved the zero waste goal.

How does participation in a Zero Waste Event benefit my community?

- Helps events, collaborating organizations and communities to achieve their sustainability goals & strengthen community environmental leadership
- Engages event-goers of all ages through hands-on education and outreach
- Provides a cleaner, more sanitary and inviting event atmosphere for guests
- Provides for more efficient use of natural resources and saves landfill space
- Can reduce the presence of toxic & hazardous materials
- Helps to achieve state-wide goals to improve overall recycling & food waste diversion rates

ZERO WASTE WASHTENAW

ZeroWasteWashtenaw.com

Zero Waste Events INSIDE City of Ann Arbor

(734) 662-6288

Recycle Ann Arbor
2420 S. Industrial Hwy
Ann Arbor, MI 48104
recycleannarbor.org

Zero Waste Events OUTSIDE City of Ann Arbor

(734) 222-6821

Washtenaw County
Office of the Water Resources Commissioner
705 Zeeb Rd.
P.O. Box 8645
Ann Arbor, MI 48107-8645
recycle.ewashtenaw.org

Zero Waste Washtenaw is supported in part by the MIchigan Dept. of Environmental Quality (DEQ) Community Pollution Prevention Grant Program

ZERO WASTE WASHTENAW

ZeroWasteWashtenaw.com

A How-to-Guide to Achieve Zero Waste at Your Event

A Zero Waste Event

- Educates
- Demonstrates
- Involves
- Inspires

Please *Reuse* this brochure, or *Recycle*!

What it takes to be a Zero Waste Success!

COLLABORATING ORGANIZATIONS: Zero waste is a new concept to many, so it's important to make sure everyone involved understands the expectations in achieving this goal. We recommend closely planning with event sponsors, waste haulers, food vendors, table exhibitors, & venue planners.

IDENTIFYING WASTE: You will be coached on how to reduce waste and what waste items to expect at the event. It's important that all event coordinators follow the vendor guidelines for which materials are acceptable to use at a zero waste event - this can make or break your success.

VENDOR GUIDELINES: A list of acceptable and unacceptable items will be available for distribution to all food vendors and table exhibitors. We encourage event planners to work with all of these parties 2-3 months in advance of your event so everyone has time to understand the guidelines.

VOLUNTEER ROLES: Volunteers are the back-bone of zero waste events. Volunteers stand near zero waste stations and educate event-goers about proper waste disposal. To minimize contamination of recycling and compost, volunteers may sort through contents as needed. Volunteers can also assist with set-up and closing of large events.

STAFF ROLES: Event committees & zero waste staff are responsible for setting up, tearing down, and monitoring the zero waste stations & volunteers throughout the event. Staff should always be on the move, checking in & replacing bags as they fill. Once a bag fills, staff sorts, weighs, records data, and places at location of final disposal.

EVENT MAP: Acquire an up-to-date site map to locate entrances, exits, exhibitor tents, and food vendors. Plan to have zero waste stations set-up near high traffic points. It is beneficial to do a site walk through with a map to identify the best station placement locations. Also, it is important to identify locations for zero waste event coordinator parking, waste collection/recording and final disposal.

SPECIAL SIGNAGE & EQUIPMENT NEEDS: Work with zero waste event staff to determine the best quantity of collection stations for your event. Stations are fully equipped with signage denoting what materials event-goers may send to compost, recycle, or landfill.

PUBLICIZE YOUR EVENT: To optimize participation, prepare your event partners & guests ahead of time by communicating the goal of zero waste on printed and online media. Include the Zero Waste Washtenaw program logo, so interested individuals may visit the website to learn more about the goals and what to expect when participating in a zero waste event.

WASTE TRACKING & DIVERSION PLAN: Zero waste staff will work with the event organizers to monitor and record waste at the event in order to calculate an overall waste diversion rate. Waste tracking is of the utmost importance because it provides organizers a basis by which on-going improvement & success may be achieved.

POST-EVENT PUBLICITY: We encourage organizers to communicate with local government, visitor's bureaus, radio stations, organizational social media channels & similar avenues to gain exposure for the great work your event has accomplished!

It's easy to make a Zero Waste Event!

More information and resources: www.ZeroWasteWashtenaw.com

Zero Waste Special Event
Exhibitor & Food Vendor Guidelines

Thank you for participating in a **Zero Waste Special Event**! We have worked closely with the event committee to ensure that this event will allow it to have the smallest environmental footprint possible- **and that starts with you!**

The goal of a Zero Waste event is to plan ahead and only **distribute materials that are locally recyclable, compostable, or reusable** (minimal materials that have to be landfilled). These guidelines include which types of containers and packaging are acceptable. ***Please note that you will be coached on alternatives for any non-compliant materials and/or asked to remove them in certain situations.***

Throughout the event, it is important that you sort your waste at the event's Zero Waste Stations into the appropriate bins for compostables, recyclables, or trash. Recycle Ann Arbor staff and Zero Waste volunteers will be available to help sort and answer any questions you have.

All food containers and utensils must be certified compostable by Biodegradable Products Institute (BPI). You can purchase these products at Bgreen, located at 2111 Packard Rd., 734-214-3000. Please contact Christine Chessler-Stull at Recycle Ann Arbor at 734-662-6288 x 119 or christine@recycleannarbor.org for help in distinguishing and obtaining Zero Waste materials.

Guidelines for Materials to Use (& Avoid) to Achieve a Successful Zero Waste Event:

Aim For	Avoid
All paper containers including plates, napkins, paper towels, cups, and bags.	**Plastic coated paper products are not acceptable.** *Many paper products (including frozen food paper packages) are coated with plastic liners.*
Waxed paper products are great. *If you cannot easily scratch the coating off with your fingernail, it is a plastic lining and is not acceptable.*	**Styrofoam is not recyclable locally if it has food waste on it.** Since contamination is very likely, we ask you not use Styrofoam.
Compostable potato, corn starch, or sugarcane tubs, cups, containers, lids, clamshells, utensils (spoons, forks, knives). *BPI certified.*	**Plastic lids, utensils, or plastic straws. Prepackaged foods in non-recyclable material, such as chip bags & condiment packs.**
Wooden stir-sticks, chopsticks, toothpicks, and skewers. Must be plain wood without plastic decorated tops.	**Plastic stir sticks, chopsticks, toothpicks, or skewers.**
Aluminum foil and cans, paper milk cartons and drink boxes, plastic and glass bottles.	**Foil drink pouches.**
Paper bags and reusable bags.	**Plastic bags or plastic wrap.**
Unpackaged promotional materials that are reusable (pens, key chains, etc.).	**One-time use decorations, such as plastic tablecloths, stickers, balloons, confetti, etc.**
Office paper, including flyers, brochures, etc. *Post-consumer or recycled content preferred.*	**Metallic, laminated, or non-paper materials.**

The Bigbelly *Smart* Waste & Recycling System For The City of Ypsilanti

Shawn Hopkins

Wednesday, September 13, 2017

ABOUT

The World Leader in Smart Waste & Recycling Systems

Deployed in All 50 States, 50+ Countries with 14 Years of Experience

SOLUTION

Bigbelly Provides a Public Right-of-Way Platform to Deliver Smart City Solutions & Host Communications Infrastructure

MARKETS

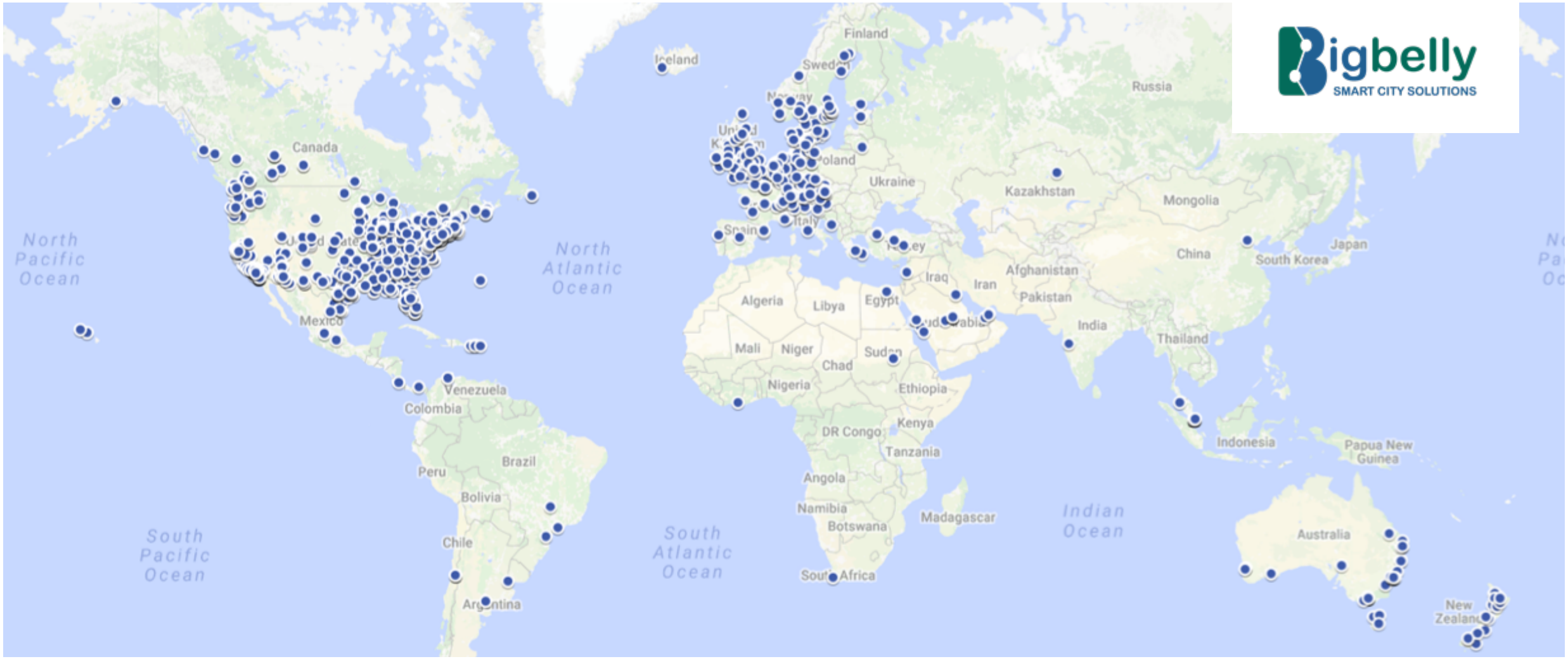
Cities, Parks, Transit Systems, Colleges & Universities, Corporate Campuses, Retail, Sports Venues, Airports

EXAMPLE CUSTOMERS

Amsterdam, Atlanta, Chicago, Dublin, Los Angeles, London, Melbourne, New York City, Philadelphia, Stockholm

Harvard, MIT, Trinity College, Brown, UC System, Northern Arizona, LSU, Texas A&M, Virginia Tech, U. Georgia

Charlotte Airport, Navy Pier Chicago, Prague Zoo, Wegmans, Caterpillar, Microsoft, Google, Gillette Stadium



Today's Global Footprint

In The Last 12 Months...

112,119,235 Gallons of Waste Captured

45,659,865 Compaction Cycles Logged

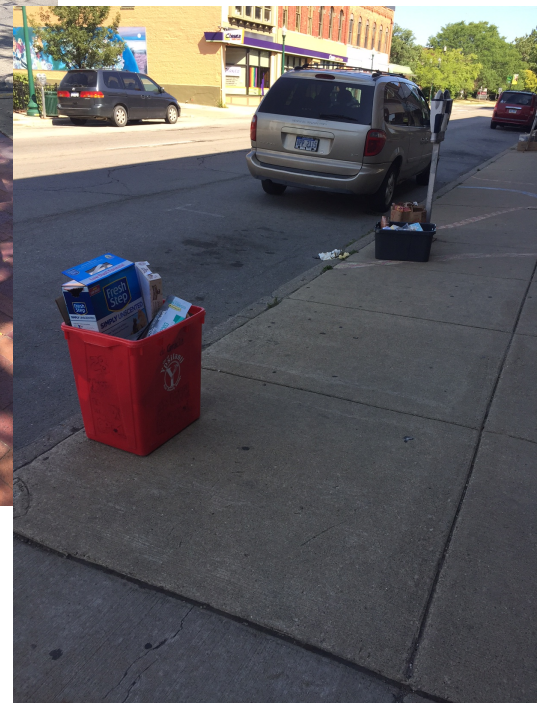
47,843,765 Station Messages Sent & Received

5,985,727 Collections Made Globally

City of Ypsilanti - Challenges with Existing bins

- Open top bins
  - Weather dependent
  - Overfilling problems
  - Pests
- Illegal dumping
- Recycling totes
  - Small containers
  - Open to public

- Not a connected system with data



Existing Configuration

- 42 Locations
  - Downtown area
  - Depot Town
  - East Campus/Cross St

Transforming Public Space Waste Operations

Cleaner Public Spaces

Total Waste Containment

No Windblown Litter or Access for Critters

No Visible Waste and Overflows

Increased Productivity

Increased Capacity (5x Traditional Bin)

Automated Real-Time Collection Notifications

Real-time Insights, Analytics & Reporting

Measurable Sustainability

Uniform Public Space Recycling Programs

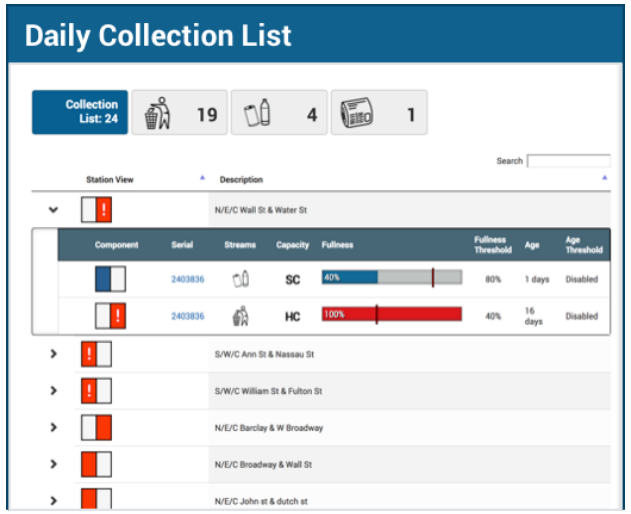
Measurable Recycling Diversion Rates

Reduced Pollution and Carbon Footprint

World Leading Smart Waste & Recycling System

- Smart, connected waste and recycling stations
  - Communicate real-time fullness status to collection crews
- Cloud-based management console and mobile app
  - System set up, management, monitoring, and optimization

Cloud-Connected Platform for Smart Waste Management



CLEAN Management Console is the cornerstone of the Bigbelly Smart Waste & Recycling System

- **Web-based software** enables system setup, management, monitoring, and optimization
- **Centralized dashboard** with real-time collection requirements and metrics
- **Auto-generated notifications** trigger collections exactly when needed
- **Suite of reports** enable users to prioritize collections & optimize ongoing operations

Suite of Smart, Connected Waste & Recycling Stations

SELF-POWERED

SMART

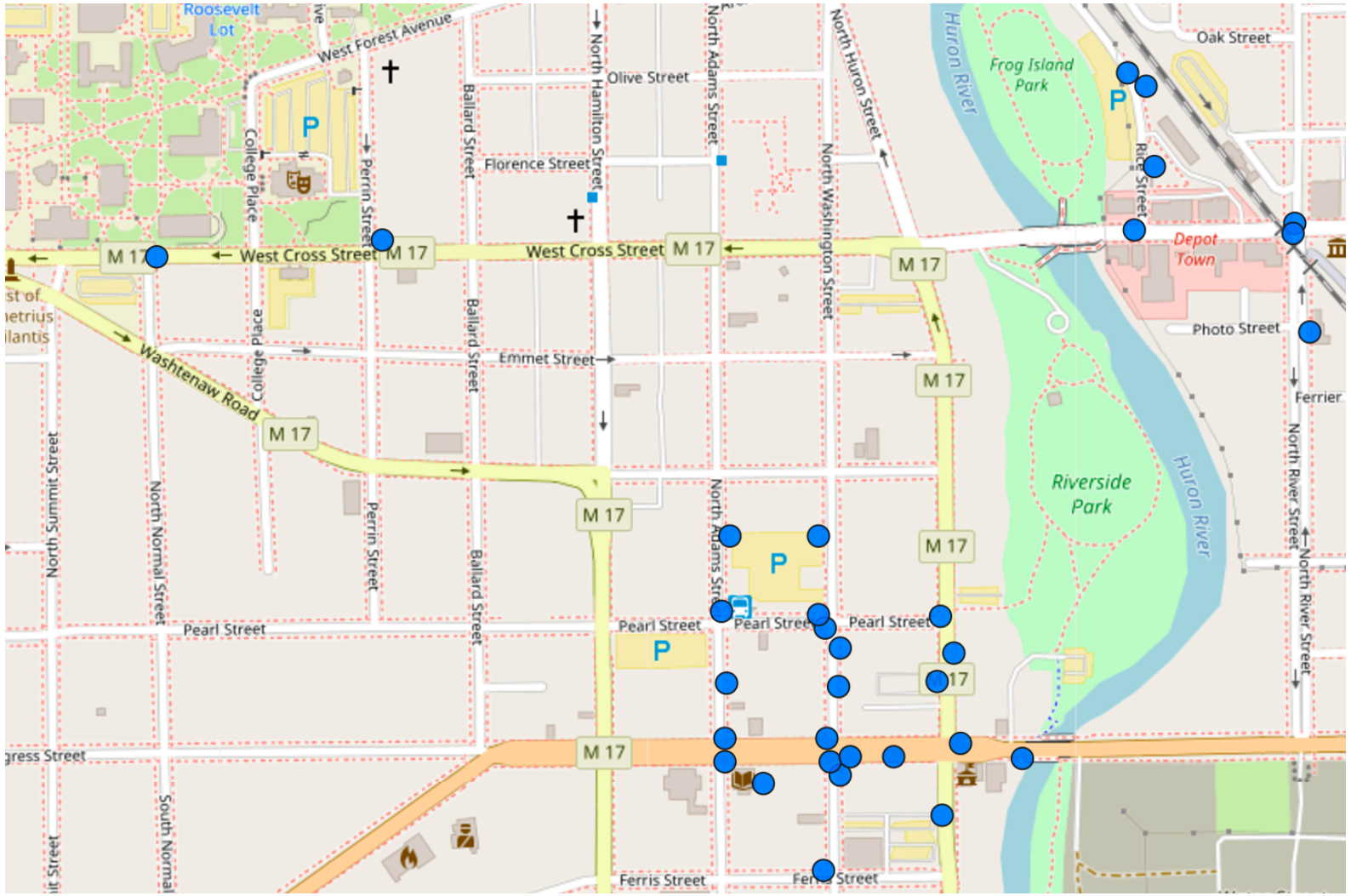
SENSING

GPS ENABLED

CONNECTED

Fleets are configured based on capacity, waste streams, and options/accessories.

Recommended Bigbelly Configuration



- Bigbelly Recommendation
- 32 Double Stations Recommended at Blue Circles
  - High Capacity for Trash
  - Standard Capacity for Recycling
- Message Panels
- Foot Pedals for HC stations

Bigbelly provides a public right-of-way platform to deliver Smart City solutions and host communications infrastructure.

Modernize A Core City Service With Smart Waste & Recycling

Deployed In The Public Right-of-way “Where the People Are”

Hide Smart City Applications In Plain Sight

Connect™ by Bigbelly

A platform deployed in the public right-of-way that delivers more than smart waste & recycling. In addition to modernizing a core city service, it is optimal for hosting additional technologies.

Smart **Waste & Recycling** System

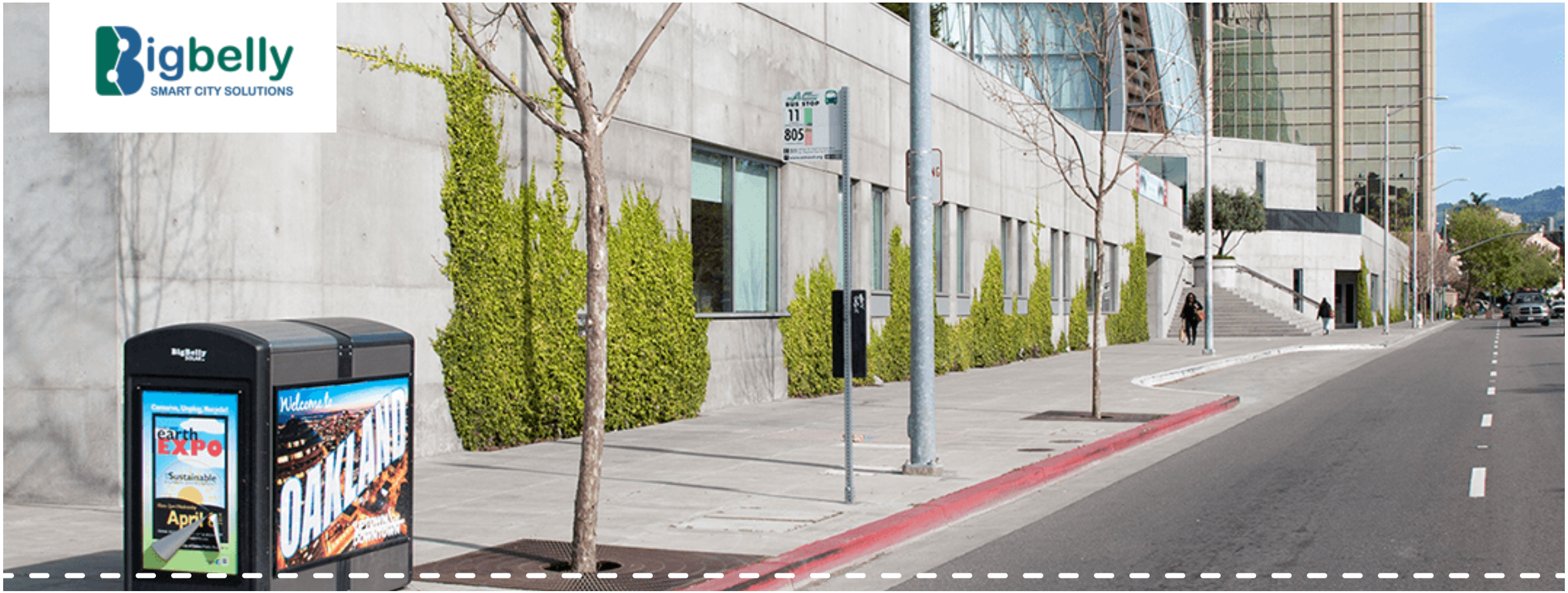
Beacons for Location-Based Data

Infrastructure To **Host Small Cell** & Other Wireless Technologies

Wi-Fi Hotspots For Public Space Wi-Fi, No Power, No Plugs

Sensors For Measuring Foot Fall Traffic, Pollution, Temperature, Etc.

Host For First Responder Networks And Emergency Response Systems



Thank You!

Discover More at
www.bigbelly.com

CITY OF YPSILANTI

Program Overview

Connect is Bigbelly's turnkey smart city solution which delivers a connected smart waste and recycling platform and provides Customers with a partner to help deploy, manage, and optimize their customized solution over a 60-month term. This subscription-based service was designed to deliver a flexible, scalable, smart platform that transforms waste operations today, and enables Customers to benefit from the technology innovations of the future.

Connect 60 Month Term	
System Software ▪ CLEAN Management Console Licenses for Full Term ▪ CLEAN Mobile Software Licenses for Full Term	**Automated System Monitoring** ▪ Automated System Diagnostics and Alerts
Equipment/Hardware ▪ Custom Configuration as Detailed Below	**Cleaning and Inspection** ▪ Annual Comprehensive Station Cleaning ▪ Annual Station Inspection
Station Installation ▪ On-Site Installation for Stations	**Warranty** ▪ Hardware Parts Warranty for Full Term
Setup and Training ▪ CLEAN Software Account Setup ▪ System Training & Onboarding	**Customer Support** ▪ Customer Support Hotline and Trained Field Service Professionals
Equipment/Hardware Configuration 32 HC5/SC5.5 Double Stations with Side Message Panels and Foot Pedals	
Total Monthly System Cost	$5,068.80

One Time Fees	
3 Boxes of HC Bags (Box of 50)	$100.50
3 Boxes of SC Bags (Box of 100)	$147.00
Shipping	$4,001.00

[1]*Pricing is valid for 60 days from September 12, 2017.*
[2]*Sales Tax is NOT included in above pricing.*
[3]*Pricing is subject to Connect Program Terms and Conditions.*
[4]*Initial order of bags included in "One Time Fees". Please visit www.wastezero.com/bigbelly for future orders.*

Announcement: Updated Station Naming Conventions

All Station Naming Conventions will be updated beginning on June 26, 2017 with the CLEAN 5.0 release. '*Bigbelly*' and '*Smartbelly*' product names are being retired to support a more transparent nomenclature. *Bigbelly™* will continue to be our Company Name, and *Connect™* will continue as our subscription platform.

Bigbelly, our **compacting model**, will now be referred to as a **"HC" or High Capacity station.**
Smartbelly, our **non-compacting model**, will now be referred to as a **"SC" or Standard Capacity station.**

Retired Naming		*New Naming*
Bigbelly Stations = BB5	→	High Capacity Stations = HC5
Smartbelly Stations = SB5	→	Standard Capacity Stations = SC5

Updated Naming Conventions for Current Suite of Stations

Retired Naming		*New Naming*
BB5 Single Station	=	HC5 Single Station
SB5 Single Station	=	SC5 Single Station
SBC5 Companion	=	SCC5 Companion
BB5 + SB5 Double Station	=	HC5/SC5 Double Station
BB5 + SB5 Double Station (Wi-Fi 600)	=	HC5/SC5 Double Station (Wi-Fi 600)
SB5 + SB5 Double Station	=	SC5/SC5 Double Station
BB5 + BB5 Duo Station	=	HC5/HC5 Double Station
BB5 + SB5 + SB5 Triple Station	=	HC5/SC5/SC5 Triple Station
SB5 + SB5 + SB5 Triple Station	=	SC5/SC5/SC5 Triple Station

*Note: The term **'Duo Station' is being retired from use** (formerly indicating a station with two compactors).*

CITY OF YPSILANTI

Program Overview

Connect is Bigbelly's turnkey smart city solution which delivers a connected smart waste and recycling platform and provides Customers with a partner to help deploy, manage, and optimize their customized solution over a 60-month term. This subscription-based service was designed to deliver a flexible, scalable, smart platform that transforms waste operations today, and enables Customers to benefit from the technology innovations of the future.

Connect 60 Month Term

System Software
- CLEAN Management Console Licenses for Full Term
- CLEAN Mobile Software Licenses for Full Term

Automated System Monitoring
- Automated System Diagnostics and Alerts

Equipment/Hardware
- Custom Configuration as Detailed Below

Cleaning and Inspection
- Annual Comprehensive Station Cleaning
- Annual Station Inspection

Station Installation
- On-Site Installation for Stations

Warranty
- Hardware Parts Warranty for Full Term

Setup and Training
- CLEAN Software Account Setup
- System Training & Onboarding

Customer Support
- Customer Support Hotline and Trained Field Service Professionals

Equipment/Hardware Configuration
- 3 HC5/SC5.5 Double Stations with Side Messaging Panels & Foot Pedals

Total Monthly System Cost	$539.22

One Time Fees	
2 Boxes of HC Bags (Box of 50)	$67.00
2 Boxes of SC Bags (Box of 100)	$98.00
Shipping	$295.00

[1]*Pricing is valid for 60 days from April 10, 2018.*
[2]*Sales Tax is NOT included in above pricing.*
[3]*Pricing is subject to Connect Program Terms and Conditions.*
[4]*Initial order of bags included in "One Time Fees". Please visit www.wastezero.com/bigbelly for future orders.*

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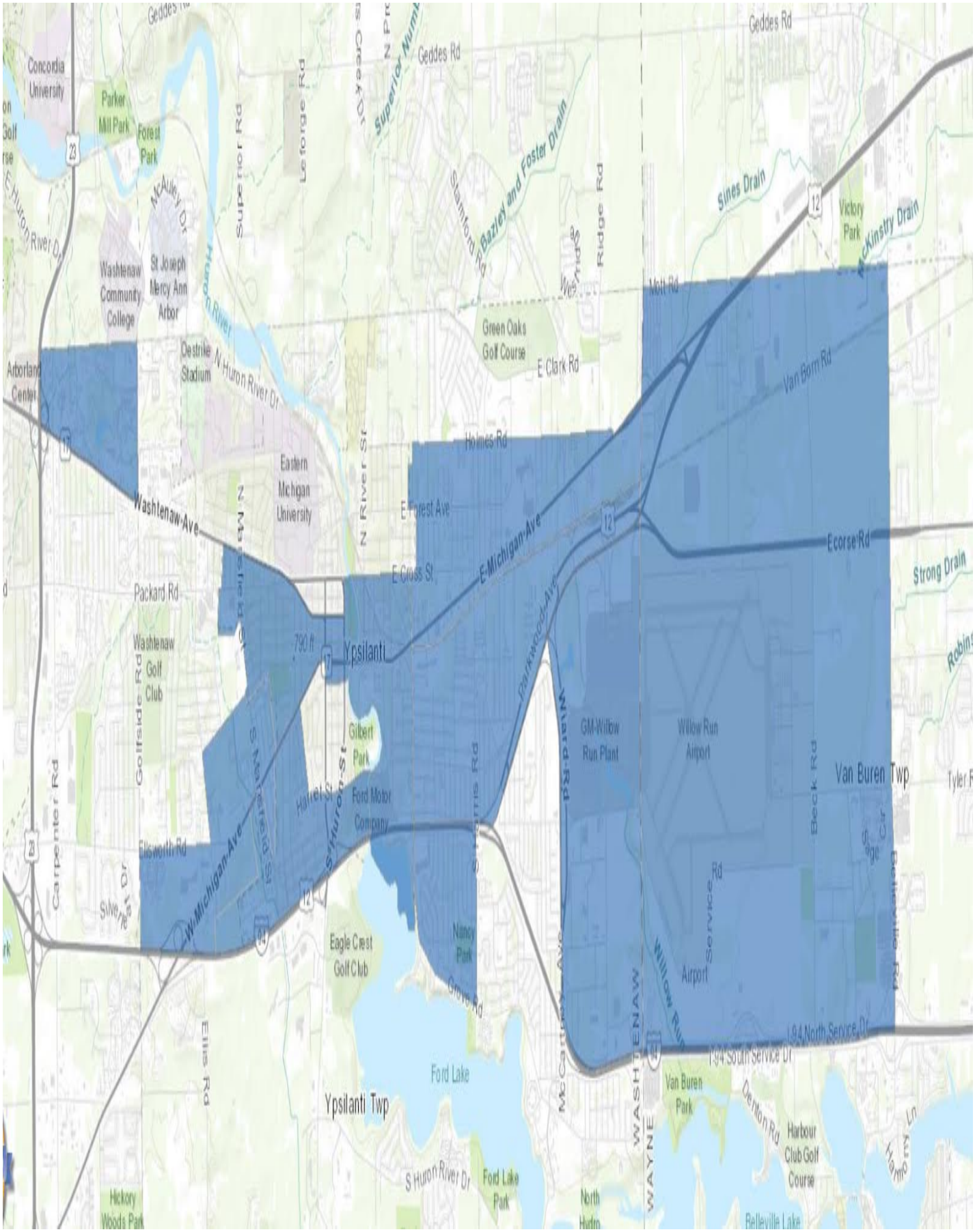
Concordia University
Parker Mill Park
Forest Park
Geddes Rd
Superior Rd
Leforge Rd
Superior Number 2 Drain
Bazley and Foster Drain
Stamford Rd
Ridge Rd
Sines Drain
McKinstry Drain
Victory Park
Molt Rd
Washtenaw Community College
St Joseph Mercy Ann Arbor
McAuley Dr
E Huron River Dr
N Huron River Dr
Huron River
Green Oaks Golf Course
E Clark Rd
Van Born Rd
Arborland Center
Destrie Stadium
Holmes Rd
Eastern Michigan University
N River St
E Forest Ave
Washtenaw Ave
E Michigan Ave
Ecorse Rd
Strong Drain
E Cross St
Packard Rd
Ypsilanti
Washtenaw Golf Club
Golfside Rd
Parkwood Ave
Wiard Rd
GM-Willow Run Plant
Willow Run Airport
Van Buren Twp
Gilbert Park
Ford Motor Company
Harvey St
Carpenter Rd
Ellsworth Rd
W Michigan Ave
Beck Rd
Airport Service Rd
Eagle Crest Golf Club
Nancy Park
Grove Rd
Ellis Rd
I-94 North Service Dr
I-94 South Service Dr
Ford Lake
Ypsilanti Twp
Van Buren Park
Denton Rd
Harbour Club Golf Course
S Huron River Dr
Ford Lake Park
Hickory Woods Park
Belleville Lake

IRS

Opportunity Zones Frequently Asked Questions

Q. What is an Opportunity Zone?

A. An Opportunity Zone is an economically-distressed community where new investments, under certain conditions, may be eligible for preferential tax treatment. Localities qualify as Opportunity Zones if they have been nominated for that designation by the state and that nomination has been certified by the Secretary of the U.S. Treasury via his delegation authority to the Internal Revenue Service.

Q. Who created Opportunity Zones?

A. Opportunity Zones were added to the tax code by the Tax Cuts and Jobs Act on December 22, 2017.

Q. Have Opportunity Zones been around a long time?

A. No, they are new. The first set of Opportunity Zones, covering parts of 18 states, were designated on April 9, 2018.

Q. What is the purpose of Opportunity Zones?

A. Opportunity Zones are an economic development tool—that is, they are designed to spur economic development and job creation in distressed communities.

Q. How do Opportunity Zones spur economic development?

A. Opportunity Zones are designed to spur economic development by providing tax benefits to investors. First, investors can defer tax on any prior gains until the earlier of the date on which an investment is sold or exchanged, or December 31, 2026, so long as the gain is reinvested in a Qualified Opportunity Fund. Second, if the investor holds the investment in the Opportunity Fund for at least ten years, the investor would be eligible for an increase in basis equal to the fair market value of the investment on the date that the investment is sold or exchanged.

Q. What is a Qualified Opportunity Fund

A. Qualified Opportunity Fund is an investment vehicle that is set up as either a partnership or corporation for investing in eligible property that is located in an Opportunity Zone and that utilizes the investor's gains from a prior investment for funding the Opportunity Fund.

Q. Do I need to live in an Opportunity Zone to take advantage of the tax benefits?

A. No. You can get the tax benefits, even if you don't live, work or have a business in an Opportunity Zone. All you need to do is invest in a Qualified Opportunity Fund.

Q. I am interested in investing in an Opportunity Zone. Is there a list of Opportunity Zones available?

A. Yes. The current list of approved Opportunity Zones can be found at Opportunity Zones Resources. This list will continue to be updated as more Opportunity Zones are approved. A complete list of approved Opportunity Zones will be published later this spring after all Opportunity Zones have been nominated, certified and designated.

Q. How does a taxpayer become certified as a Qualified Opportunity Fund?

A. To become a Qualified Opportunity Fund, an eligible taxpayer self certifies. (Thus, no approval or action by the IRS is required.) To self-certify, a taxpayer merely completes a form (which will be released in the summer of 2018) and attaches that form to the taxpayer's federal income tax return for the taxable year. (The return must be filed timely, taking extensions into account.)

Q. I sold some stock for a gain in 2018, and, during the 180-day period beginning on the date of the sale, I invested the amount of the gain in a Qualified Opportunity Fund. Can I defer paying tax on that gain?

A. Yes, under § 1400Z-2(a)(1) of the Internal Revenue Code, you may elect to defer the tax on some or all of that gain. If, during the 180-day period, you had invested in one or more Qualified Opportunity Funds only an amount that was less than your entire gain, you may still elect to defer paying tax on part of the gain, up to the amount that you invested in that way.

Q. How do I elect to defer my gain on the sale of the stock?

A. You may make an election to defer the gain, in whole or in part, when filing your 2018 Federal Income Tax return in 2019 (that is, you may make the election on the return on which the tax on that gain would be due if you do not defer it).

Q. I sold some stock on December 15, 2017, and, during the required 180-day period, I invested the amount of the gain in a Qualified Opportunity Fund. Can I elect to defer tax on that gain?

A. Yes, as long as it was invested in the 180-day period, under § 1400Z-2(a)(1) of the Internal Revenue Code, you may elect to defer the tax on that gain. A deferral election may be made on your 2017 Federal Income Tax return. Information about the sale of your stock is required to be included in that return using IRS Form 8949. Precise instructions on how to use that form to elect deferral of the gain for your 2017 return will be forthcoming shortly.

Q. Can I still elect to defer tax on that gain if I have already filed my 2017 tax return?

A. Yes. You may elect to defer the gain, but you will need to file an amended 2017 return. As part of that amended return, you will follow the election procedure described in the answer to the preceding question.

Q. I have comments that I would like to make on § 1400Z-2. How can I share those comments with the IRS?

A. Please send all comments to CC.ITA.Section.1400@irscounsel.treas.gov.

Q. How can I get more information about Opportunity Zones?

A. Over the next few months, the Treasury Department and the Internal Revenue Service will be providing further details, including additional legal guidance, on this new incentive. More information will be available at Treasury.gov and IRS.gov.

Disclaimer

These FAQs are not included in the Internal Revenue Bulletin, and therefore may not be relied upon as legal authority. This means that the information cannot be used to support a legal argument in a court case.

Page Last Reviewed or Updated: 07-Jun-2018

Michigan Opportunity Zones

MSHDA™
MICHIGAN STATE HOUSING DEVELOPMENT AUTHORITY

The following list shows cities, townships and villages within each county that are covered, in whole or part, by a U.S. Department of the Treasury-designated Opportunity Zone.

For maps of the zones by Regional Prosperity Initiative (RPI), please go to Michigan.gov/MSHDA and select Developers > Opportunity Zones.

Alcona County (RPI 3)
Greenbush township
Gustin township
Harrisville township
Hawes township
Lincoln village
Mikado township
Millen township

Alger County (RPI 1)
Burt township
Grand Island township
Munising city
Munising township

Allegan County (RPI 4)
Fillmore township
Holland city

Alpena County (RPI 3)
Alpena city

Antrim County (RPI 2)
Chestonia township
Mancelona township
Mancelona village
Star township

Arenac County (RPI 5)
Arenac township
Deep River township
Lincoln township
Standish city
Standish township

Baraga County (RPI 1)
Arvon township
Covington township
LAnse township
LAnse village
Spurr township

Barry County (RPI 4)
Hastings charter township
Hastings city

Bay County (RPI 5)
Bay City city

Berrien County (RPI 8)
Benton charter township
Benton Harbor city
Niles city
Niles township
Sodus township
Watervliet city
Watervliet township

Branch County (RPI 8)

Emmet County (RPI 2)
Bliss township
Carp Lake township
Cross Village township
Mackinaw City village
McKinley township
Wawatam township

Genesee County (RPI 6)
Burton city
Flint charter township
Flint city
Genesee charter township
Grand Blanc charter township
Grand Blanc city
Mount Morris township

Gladwin County (RPI 5)
Beaverton city
Beaverton township
Buckeye township
Gladwin city
Gladwin township
Grout township
Sage township
Tobacco township

Gogebic County (RPI 1)
Ironwood city

Grand Traverse County (RPI 2)
Garfield charter township
Traverse City city

Gratiot County (RPI 5)
Alma city
Pine River township

Hillsdale County (RPI 9)
Hillsdale city
Hillsdale township

Houghton County (RPI 1)
Houghton city
Portage charter township

Huron County (RPI 6)
Bad Axe city
Colfax township
Verona township

Ingham County (RPI 7)
Delhi charter township
East Lansing city
Lansing city
Meridian charter township

Ionia County (RPI 4)
Easton township

Luce County (RPI 1)
Columbus township
Lakefield township
McMillan township
Newberry village
Pentland township

Mackinac County (RPI 1)
Bois Blanc township
Moran township
St. Ignace city
St. Ignace township

Macomb County (RPI 10)
Clinton charter township
Eastpointe city
Mount Clemens city
Roseville city
Sterling Heights city
Warren city

Manistee County (RPI 2)
Manistee city
Manistee township

Marquette County (RPI 1)
Marquette charter township
Marquette city

Mason County (RPI 4)
Ludington city
Pere Marquette charter township

Mecosta County (4)
Big Rapids charter township
Big Rapids city
Colfax township
Green charter township

Menominee County (RPI 1)
Cedarville township
Carney village
Daggett township
Daggett village
Gourley township
Harris township
Nadeau township
Powers village
Spalding township
Stephenson city
Stephenson township

Midland County (RPI 5)
Midland city

Missaukee County (RPI 2)
Caldwell township
Lake City city

Ontonagon County (RPI 1)
Greenland township
Ontonagon township
Ontonagon village
Rockland township

Osceola County (RPI 4)
Cedar township
Evart city
Evart township
Hartwick township
Hersey township
Highland township
Osceola township
Sylvan township

Oscoda County (RPI 3)
Comins township
Mentor township

Otsego County (RPI 3)
Bagley township
Gaylord city
Livingston township

Ottawa County (RPI 4)
Holland city

Presque Isle County (RPI 3)
Belknap township
Pulawski township
Rogers City city
Rogers township

Roscommon County (RPI 3)
Au Sable township
Backus township
Denton township
Gerrish township
Higgins township
Roscommon township
Roscommon village

Saginaw County (RPI 5)
Buena Vista charter township
Kochville township
Saginaw city

Sanilac County (RPI 6)
Bridgehampton township
Applegate village
Carsonville village
Custer township
Deckerville village
Marion township
Washington township

Schoolcraft County (RPI 1)

Coldwater city
Coldwater township

Calhoun County (RPI 8)
Albion city
Albion township
Battle Creek city
Eckford township
Fredonia township
Marengo township
Marshall city
Marshall township

Cass County (RPI 8)
Dowagiac city
Cassopolis village
Jefferson township
LaGrange township

Charlevoix County (RPI 2)
East Jordan city
South Arm township

Cheboygan County (RPI 3)
Beaugrand township
Cheboygan city

Chippewa County (RPI 1)
Sault Ste. Marie city

Clare County (RPI 5)
Clare city
Grant township
Hamilton township
Harrison city
Hatton township
Hayes township

Clinton County (RPI 7)
Bingham township
St. Johns city

Crawford County (RPI 3)
Frederic township
Grayling charter township
Grayling city

Delta County (RPI 1)
Escanaba city
Wells township

Dickinson County (RPI 1)
Breitung charter township
Iron Mountain city

Eaton County (RPI 7)
Carmel township
Charlotte city
Eaton township
Ionia city
Ionia township

Iosco County (RPI 3)
Au Sable charter township
Baldwin township
East Tawas city
Oscoda charter township
Tawas City city

Iron County (RPI 1)
Bates township
Iron River city
Iron River township

Isabella County (RPI 5)
Mount Pleasant city
Union charter township

Jackson County (RPI 9)
Blackman charter township
Jackson city

Kalamazoo County (RPI 8)
Kalamazoo city
Portage city

Kalkaska County (RPI 2)
Bear Lake township
Boardman township
Garfield township
Oliver township
Orange township
Springfield township

Kent County (RPI 4)
Grand Rapids city
Wyoming city

Keweenaw County (RPI 1)
Allouez township
Eagle Harbor township
Grant township
Houghton township
Sherman township

Lake County (RPI 4)
Chase township
Baldwin village
Cherry Valley township
Pinora township
Pleasant Plains township
Webber township
Yates township

Lapeer County (RPI 6)
Lapeer city

Lenawee County (RPI 9)
Adrian city
Madison charter township

Livingston County (RPI 9)
Fowlerville village
Handy township
Lake township
Reeder township

Monroe County (RPI 9)
Frenchtown township
Monroe charter township
Monroe city

Montcalm County (RPI 4)
Day township
Douglass township
Eureka township
Evergreen township
Greenville city
Montcalm township
Sheridan village
Sidney township
Stanton city

Montmorency County (RPI 3)
Avery township
Briley township
Montmorency township
Vienna township

Muskegon County (RPI 4)
Muskegon city
Muskegon Heights city

Newaygo County (RPI 4)
Ashland township
Bridgeton township
Garfield township
Grant city
Newaygo city

Oakland County (RPI 10)
Ferndale city
Hazel Park city
Madison Heights city
Oak Park city
Pontiac city
Rochester Hills city
Southfield city
Troy city
Waterford charter township
Wixom city

Oceana County (RPI 4)
Hart city
Hart township

Ogemaw County (RPI 3)
Cumming township
Goodar township
Ogemaw township
Rose City city
Rose township
West Branch city
West Branch township
Hiawatha township
Manistique city
Manistique township
Thompson township

Shiawassee County (RPI 6)
Owosso city

St. Clair County (RPI 6)
Port Huron city

St. Joseph County (RPI 8)
Constantine township
Fabius township
Florence township
Lockport township
Sherman township
Sturgis city
Sturgis township
Three Rivers city

Tuscola County (RPI 6)
Almer township
Caro village
Indianfields township

Van Buren County (RPI 8)
Hartford township
Lawrence township
Lawrence village
Paw Paw township
Paw Paw village

Washtenaw County (RPI 9)
Ann Arbor city
Chelsea city
Pittsfield charter township
Ypsilanti charter township
Ypsilanti city

Wayne County (RPI 10)
Dearborn city
Dearborn Heights city
Detroit city
Hamtramck city
Highland Park city
Inkster city
Lincoln Park city
Redford charter township
River Rouge city
Romulus city
Taylor city
Van Buren charter township
Wayne city
Westland city

Wexford County (RPI 2)
Cadillac city