



**Wilson
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CHINA ENVIRONMENT FORUM

Catalyzing Cleaner Air in Cities

Scoping Report on City Certification, Indexes, and Plans for Clean Air Asia

Produced by the Woodrow Wilson Center's China Environment Forum

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EXECUTIVE SUMMARY

Cities matter. More than half of the globe's population resides in cities. Cities account for two-thirds of the world's energy consumption and emit about 70 percent of global greenhouse gas emissions. Energy production in the world's booming cities, particularly in Asia, is also driving massive air pollution that threatens the health and economic livelihoods of these urban citizens. According to a report recently released by World Health Organization (WHO), air pollution caused more than 223,000 deaths globally in 2010.¹

Clean Air Asia (CAA) has created the Cities Clean Air Partnership to establish a comprehensive platform for cities to cooperate and jointly address air quality problems. One component of this initiative is to create a clean air certification program that can help cities identify and become motivated to mitigate air pollution problems. The number of environmental and sustainability certifications focused on cities have been increased greatly over the past few years, particularly in the United States, but none focus solely on the issue of clean air. In an effort to help inform CAA in the design of their unique certification system the Wilson Center's China Environment Forum—with support from the Environmental Protection Agency Taiwan and the U.S. Environmental Protection Agency—worked with a team of three Taiwanese researchers—Dr. Tu Wenling, Ms. Jenneille Hsu, and Ms. Chen Chiu-Hsing—to produce this scoping report on a growing number of city sustainability certification programs, ranking systems, indices, and plans, particularly in the United States.

After several months of desktop research, in July and August 2015, we conducted interviews in ten cities—New York City, Boston, Cambridge, Baltimore, Washington DC, Raleigh, Dallas, Denver, Los Angeles, and San Diego—about certification programs and other systems the cities were using to promote cleaner and greener cities. (See Appendix 1 for a list of organizations and programs that focus on city sustainability certifications and rankings). We cast our net broadly and spoke with individuals in city, regional, and national government agencies, as well as nongovernmental organizations (NGOs) and companies that run sustainability certification or similar programs. Besides investigating the mechanics of different rating or planning programs, we also focused on what motivated or hindered U.S. city governments to participate in certification programs, indexes, or city-to-city partnerships that aimed to promote sustainability. We examined various urban government air quality plans, building energy efficiency programs, and clean transportation initiatives for useful insights. (See Appendix 2 for the list of organizations and individuals interviewed).

¹ See the original report entitled “Air Pollution and Cancer,” done by the International Agency for Research on Cancer—A research group under the WHO. <http://www.iarc.fr/en/publications/books/sp161/AirPollutionandCancer161.pdf>

Our selection of cities aimed at getting a cross section of programs that are being used. We found many cities engaged in multiple programs to promote sustainability. For example, Cambridge participates in **CityLinks**, a peer-to-peer city partnership program funded by USAID, and has been working on its application for a **STAR Community Rating System** certification.

Some cities focus their efforts on a single-rating system, such as STAR (Baltimore has already been certified with the top rating of 5 stars, and Raleigh 4 stars). We selected Dallas and Denver, because they are the only two cities in the United States to have all municipal departments and operations certified by **ISO 14001, Environmental Management Systems**.

We spoke with **Southern California Air Quality Management District** to gain insights into how they have successfully used regional planning and regulations to push cities within the region to lower pollution emissions.

City officials in NYC and Boston share their comprehensive urban planning frameworks and initiatives that prioritize lower greenhouse gas emissions—**PlaNYC** and **Greenovate Boston**, respectively.

Flow of the Scoping Report

This scoping report is divided into four sections. **Section I** provides an overview of programs that are aimed at promoting sustainable cities in the United States that contain information drawing heavily on our U.S. interviews. While they differed in scope and focus, there were some common threads across the programs that offer valuable insights into creating the clean air certification system. We grouped them in four categories:

- **Certification programs** (STAR Communities, Sustainable Jersey, ISO 14001 and LEED City);
- **Single-issue ranking systems** (ACEEE Scorecard and Energy STAR city ranking);
- **Partnership and transparency strategies** (city-to-city peer learning, data disclosure, programs in Europe and Asia, and single-issue frameworks for a city or community), and;
- **Local/regional air quality programs and measures** (PlaNYC and Greenovate Boston, North Central Texas Council of Governments, and U.S. EPA Menu of Control Measures).

Section II explores the incentives, as well as challenges, for cities to participate in various certification/ranking programs. By highlighting key state and non-state drivers, this section provides the political, economic, social, and business context of cities seeking their sustainability objectives.

Drawing from our research and interviews, **Section III** presents some of the recommendations for designing a Clean Air Certification System by underscoring thematic and technical areas, including energy efficiency, transparency, and collaboration, while offering guidance for different governance levels.

We close in **Section IV** with a short Roadmap for CAA and its partners that offer guidelines for implementing the Clean Air Certification System.

Section I.

PROGRAMS AIMED AT PROMOTING SUSTAINABLE CITIES

While the goal of this scoping study is to inform the creation of a clean air certification system, we did not find a certification system in the United States, Europe or Asia that focused solely on clean air. However, clean air was directly part of more comprehensive city sustainability programs and an implied goal in some energy efficiency related single-issue ranking/indexing systems. (See Appendix 1).

In the United States, city governments prioritize local economic development and job creation. Thus, city certification systems that are designed to capture issues more broadly than environmental protection or a single environmental issue hold great appeal to city mayors and government departments. For example, both the STAR Community Rating System and Sustainable Jersey are sustainability certifications that contain three main pillars—economy, environment, and equity—which capture a city’s performance and actions beyond environmental protection. Achieving the three “E” goals in a city or community requires an integrated approach to deal with multifaceted problems in various sectors. However, in developing countries and Asia, green city initiatives or programs tend to focus on a single-issue indicator system. For example, China has a national low-carbon city indicator system; Taiwan has Low-Carbon Community Evaluation Criteria System; and the World Bank has the Low-Carbon Livable Cities Initiative that supports developing country cities around the world in their efforts to plan low-carbon development and target appropriate financing.

Below we outline how various organizations have designed and executed certification programs in the United States, starting with comprehensive certification programs and then introducing some single-issue ranking initiatives for cities and some programs that promote transparency and partnerships to help improve environmental quality in cities. Most of this information draws on interviews conducted in the summer of 2015 across 9 cities in the United States. (See Appendix 2 for interview list). This section concludes with some local air quality programs and measures that cities have implemented. This collection of diverse programs offers valuable information on how to set indicators for evaluating a city’s action and performance, as well as provide insights into how various programs helped build the capacity of cities to participate and motivate them to take actions.

A. Certification Programs

1. STAR Communities

Beginning in 2008, many U.S. cities began setting up sustainability offices and were able to tap some federal subsidy programs to promote pollution prevention and other green investments. As these urban environmental programs started to grow, the founders at STAR Community Rating System (hereafter, STAR) saw the need of establishing universal metrics to comprehensively evaluate cities in terms of sustainability. When initiating the program, STAR created a diverse steering committee that included city membership organizations like ICLEI, U.S. Green Building Council, and ICMA, which helped STAR build a rigorous, yet flexible rating system that helps local leaders identify, validate and support implementation of best practices to improve the resilience of their city or community. Released in 2012, STAR was built to help local leaders assess their city’s sustainability,

set targets for moving forward, and measure progress. STAR certification program has spread across the United States with nearly with 100 city members. In 2015 cities receiving certifications more than doubled over 2014, rising from 20 to 43.

Process of getting certified Under STAR

The STAR certification is divided into 7 thematic sustainability goal areas (built environment; climate and energy; economy and jobs; education, art and community; equity and empowerment; health and safety; and natural systems) and within these seven goals there are between 5 and 7 objectives. Cities can use the total of 44 objectives to evaluate their performance in obtaining the seven goals.²

Each of the objectives contains two types of evaluation measures in the STAR Community Rating System: **Community Level Outcomes** (e.g., meeting specific EPA air quality standards) and two types of **Local Actions**—preparatory and implementation actions. Preparatory actions score fewer points than implementation actions score. While actions do always not produce immediate positive environmental outcomes, the STAR program intends to award cities for their efforts toward the right path. The dilemma of rewarding cities action-versus-outcome will be discussed more in detail in the recommendation section.

A city needs a minimum of 200 points to get certified. The lowest certification level is 3 stars (see Table 1). STAR’s founding steering committee thought an award of 1 or 2 stars would be embarrassingly low, so instead cities that score under 200 points are categorized simply as “reporting cities.” After self-assessing, getting scores, and setting up action plans, cities continue to ask STAR’s help to implement their proposed city actions. One of the biggest benefits of the STAR program is the process of certification and not necessarily the certification itself.

Table 1. Weighting of STAR’s Seven Goal Areas

| Goal Area | Points Available |
|-----------------------------|------------------|
| Built Environment | 100 |
| Climate & Energy | 100 |
| Economy & Jobs | 100 |
| Education, Arts & Community | 70 |
| Equity & Empowerment | 100 |
| Health & Safety | 100 |
| Natural Systems | 100 |
| Innovation and Process | 50 |
| Total | 720 |

² See the STAR webpage for details on the goals and actions that communities can take. http://www.starcommunities.org/wp-content/uploads/2015/03/STAR_Rating_System_Version1.2.pdf

Recently STAR started to do benchmarking to show how cities are doing compared to national standards. Planning departments can use these metrics and scores to show other departments and the mayor offices in what areas they need to do better and in what areas they are doing well compared to other cities. Looking forward, STAR does not have any plans to change the levels but may change how cities get points. For example, some actions in the metrics could be aligned with state regulations.

Key points about STAR

- Getting certified is not the primary goal to participate in STAR. Cities are attracted to STAR because it is a management tool that provides consulting service to cities and helps them start local policies and programs.
- STAR provides metrics, templates, and spreadsheets to cities, while offices of sustainability or planning are able to use STAR as a communication tool to bring different departments to participate. Metrics and quantitative standards are easy to communicate across different departments.
- Many of the staff at STAR and its steering committee are former city employees who are very knowledgeable on the challenges and operations of U.S. cities.
- To city members, STAR certification helps catalyze a cross-departmental process to help cities become more resilient and sustainable. STAR also created an affiliates program to train NGOs, universities and experts to build their capacity to help their local city/community.
- Comprehensiveness is both STAR's advantage and disadvantage. It is impossible for a community to adopt all STAR measures.
- STAR is a national program. The Program uses existing national standards such as EPA air attainment standards, LEED, and other industrial standards in the rating system. Cities thus do not need to pursue two standards in achieving sustainability. Federal standards usually serve as the baselines, but cities can account for local components in their urban planning.
- Some cities told us the certifying fee is expensive, preventing them from participating. Another challenge is collecting all the necessary data from different departments. The cities that have been successful generally have someone who has considerable experience in the city government and is very familiar with the STAR program.
- We found that the STAR program's success is attributed to its focus on "sustainability" rather than "green." By integrating economic and equity elements to their core goals and providing comprehensive metrics, STAR attracts diverse city government stakeholders..
- Many cities integrate the metrics into their city sustainability plans or climate action plans. For example, the Los Angeles Sustainability Plan ("pLAn") included getting certified by STAR as one of the targets. STAR has seen many reporting cities support their goals. Even for cities that are not certified, they use the metrics or self-assessment tools to create new interagency dialogues.

Box 1. Case of Baltimore & STAR: Challenge of Balancing Actions and Positive Outcomes

Two weeks after Baltimore received its 5-star rating from STAR for implementing all 44 actions, the city erupted in riots following the hospitalization and death Freddie Gray, a black Baltimore man who was beaten by white police officers. The riots erupted due to decades-long conflict and tension between the black community and the police. The STAR staff was saddened how a city that had received a high rating fell quickly into chaos, yet it shows how a certification system can not necessarily capture the full reality of a community. Notably, the Baltimore Sustainability Office and city government was highly committed to report everything the city has done across all the action criteria and the exercise created a new intergovernmental communication that could serve the city well as it moves to address poverty and equity issues. In contrast, the city planning department staff in Washington DC is also committed to the STAR certification process, but the city government is too big and fragmented and they were not always sure where to get information from other departments.

Box 2. Case of Cambridge: A Good Fit for STAR

The last time the city of Cambridge, Massachusetts did a sustainability planning process was 15 years ago. In early 2013 the city's sustainability office started examining numerous certification systems and after about a year honed on STAR. The sustainability office then proposed the idea of pursuing STAR certification to the mayor. The mayor's approval enabled the sustainability office to use STAR as the umbrella to discuss with the other city staff how they could approach the certification issue in terms of workload and timeline. This latter internal discussion process took more than 6 months. March 2015 the sustainability office managers decided to go to meet the STAR team in Washington, DC. Robert O'Keefe thought the 6-month of internal-discussion process was crucial because it laid foundation for gradually convincing various stakeholders within the government why certification was important and how the city would benefit. The sustainability staff talked to their colleagues about how the STAR rating certification is a "reflective" and "prescriptive tool."

Since March 2015 the city has worked with STAR to do more baseline planning to develop a full plan to begin in the fall of 2015. They were hoping to complete the work and get a 5-Star rating by November 2015, but they are aiming now for early 2016. Cambridge officials believe that STAR offers a mechanism that helps them benchmark their present baseline and identify gaps they need to emphasize in long-term planning. While the staff expressed concern that STAR may have a bit too many actions to track in their matrix, they agreed that the matrix helps them be systematic in sharing plans and actions with citizens. The matrix provides evidence to community members who are critical of perceived inaction by the city. They also liked how the STAR action matrix enabled them to compare their efforts and performance with other cities.

Cambridge is one of the cities that did considerable preparation before pitching STAR certification through the mayor's office, which is ideal, for working directly with the city manager helps guarantee there will be broader political will to participate. Some departments in Cambridge are interested in doing STAR certification because they already meet or exceed all the standards. By demonstrating it is not too difficult to meet the standards the program can attract greater participation across agencies. At the time of our interview with Cambridge the city was still in the process of doing inventory of current practices in the city and had discovered some important policy gaps, such as the lack for formal sustainability policies and engagement with small businesses in the city.

Cambridge is in the early stage of lifecycle of STAR, but the city already has the capacity and many policies that could make it a high-ranking city. The staff related how they enjoyed working towards STAR because they see they are doing things very well compared to the national baseline. They commented how other cities might be overwhelmed with the application steps to get buy in and build the cross-departmental information network.

The city has been committed 2 fulltime staff and one part-time intern to be the coordinators of doing the cross-departmental data gathering and network building around STAR sustainability indicators. The coordinators of the certification process are familiar with the STAR system and well-versed in the city government operations. Each department has different people keeping the data and requires good personal relations and institutional history to help tap into the data.

2. Sustainable Jersey

Sustainable Jersey is a nonprofit organization that develops best practices for local communities to improve their sustainability performance in New Jersey. Established in 2009, Sustainable Jersey aims to empower cities and communities to create a sustainable environment, improve energy efficiency, and preserve natural resources. Sustainable Jersey focuses predominantly on prescriptive and practical environmental and energy-efficient policies that could be implemented at the local level.

There are currently two levels of certification—bronze and silver. 429 out of 565 communities in the state are now registered in the Sustainable Jersey program—28 have reached silver certification and 149 bronze. Within the next year there are plans to develop new standards for a gold level to become the top certification. Sustainable Jersey offers technical assistance to communities that have not been certified.

Sustainable Jersey requires communities to institutionalize their sustainability efforts by creating a green team within the local government to participate in the program. The program involves sustainable actions in three categories that are similar to those under the STAR program: prosperity, people and planet. Under each category, there are different topics and standards that are used to benchmark performance. To provide high quality evaluations on the performance of the communities across the various topics, Sustainable Jersey has formed 20 taskforces, consisting of government officials, scholars and experts from NGOs. A community is required to submit documents to support the application for certification. If the documents meet the standards after being reviewed by the professionals from the appropriate taskforce, the community will be certified

and documents will be published online for public access. If the community fails the first round, they have two more chances to apply.

Key points about Sustainable Jersey compared to STAR

- Because Sustainable Jersey focuses on communities in a single state, the program is much more detailed and prescribed in providing actions to help communities create a sustainability plan. Conversely, national programs like STAR that cover different states must sometimes provide guidance and actions that are more broad and general. Even the climate variances between states make setting some environmental performance benchmarks different.
- Corporate donations have enabled Sustainable Jersey to sometimes provide small grants to communities to help them apply for the certification. By contrast, STAR does not offer a funding mechanism.

3. ISO 14001

ISO is an independent, nongovernmental international organization that has 162 national standard bodies as members. ISO brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges. The 20,500 standards have set a baseline for all kinds of industries and technologies on issues like sustainability, climate change, food safety, agriculture, and healthcare.

ISO 14001:2015 is an environmental management system standard for organizations of any size, type, location, and level of maturity to certify their operations to: (1) enhance environmental performance; (2) fulfil compliance obligation, and (3) minimize negative impacts to the environment. ISO's general principles are Plan-Do-Check-Act, which requires constant improvement and review. ISO 14001:2015 is intended to help organizations manage their environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability. The ISO 14001 certification requires annual inspections to monitor an organization's compliance to standards and continuous improvement. Organizations can pursue recertification every 3 years.

Box 3. ISO 14001 Case Study #1: Denver

Denver chose ISO 14001 because the Department of Environmental Health (DEH) wanted to start sustainability practice within government operations. The DEH supervisor had a bigger vision on community sustainability. However, he hoped the government would not just talk the talk rather would make significant changes in the city's operation and adhere to some clear sustainability standards. They hired a consultant to launch the process. As the consultant was most familiar with ISO 14001, which likely led DEH to more deeply explore that option. Denver was an ideal candidate because the DEH already had very robust environmental compliance/ program. The DEH led the process in reaching out to different departments and agencies to help them attain ISO14001 EMS standard. DEH started with big agencies like the fire department and certified them first so they could become co-leaders in supporting EMS implementation throughout the government. They were able to engage various departments through this process and help them find the environmental management solutions they had never thought of before. By the 3rd year (2013?), all of the departments were certified.

One of the big motivators DEH pursued ISO14001 was that Denver International Airport has already had ISO 14001 certification for many years. The airport was one of the top 5 in the US and a leader in the airport management. DEH was able learn from the airport's success in helping other departments adopt the standard. The DEH noted that the internal audits help in terms of sharing resources and fresh independent eyes on each department's standards. Denver must recertify next year and as they prepare they are looking at updating their standards to meet the new ISO 2015 standards that ISO released this fall.

The costs to be recertified under ISO include the need to hire an independent third-party consulting firm to be the ISO registrar. The consulting firm will check if everything the city has done complies with the standards. The cost of the consultant services is based on how much time it takes to do the assessment. It usually costs around 30,000 dollars per year. For the city and county of Denver, this is very complicated certification to assess because it is a very big city with different types of operations and activities and over 11,000 employees.

The DEH noted that despite the high fee, they city is saving even more money through the improvements in building energy efficiency and savings in gas, transportation fuel and water consumption. They have been able to track the dramatic decreases in costs through the ISO system and provide this evidence to the public.

After being first elected in 2011 the current mayor created the sustainability office and tried to create more community sustainability goals. The DEH is trying to integrate the sustainability office's community goals with DEH's government agency goals.

They looked at the STAR, but thought ISO and EMS are better route for Denver. ISO program enable them not only to communicate with the public and mayor about the standards and the potential money and resource saving. Denver is a particularly environmentally conscious city, which helped DEH communicate and generate acceptance for the ISO standard setting work.

One potential barrier for some cities to do the ISO 14001 EMS is that it is a very rigorous tool and needs to involve every single employee of the city. Usually, the bigger agencies have better capacity and opportunity to implement the standard. The biggest challenge is how to clearly demonstrate that they have met the standards. ISO 14001 demands considerable objective evidence and achievable targets and the right metrics to measure and demonstrate to the regulators, as well as considerable involvement of the whole city government from the mayor on down. It must become part of the whole city's management and operation culture. Today in Denver all new city employees must get an orientation on EMS and environmental policy.

There are 7 staff in the mayor's sustainability office and 7 in the EMS section of DEH. DEH also partners with many nonprofit organizations to work on ISO 14001 standards. Getting the coalition and network built to get this large number of players working together can be challenging. According to the DEH staff the success of getting sufficient participation to complete the ISO14001 begins with starting small and getting top manager support. It is also important to get regular review and feedback from all the various participants.

Box 4. ISO Case Study #2: Dallas

In 2004 the U.S. EPA launched legal action against the city of Dallas for industrial-scale dumping of animal waste into Cedar Creek. In 2006 the U.S. Department of Justice fined City of Dallas \$800,000 for this pollution and required 11 city departments to pursue the ISO 14001 certification environmental management standards (EMS) so as to avoid future incidents.

The 2006 mandate to pursue ISO 14001 certification not only helped city managers prioritize environmental protection, but the process also triggered a “culture shift” for the city. Although it was very difficult to bring every city employee on board, the decree did help the Dallas’s Office of Environmental Quality (which had only been set up in 2004) to proceed the certifying process within the city government. It also helped the city regain some confidence of citizens and other stakeholders by obtaining a certification from a third party. The city government received its first certification in 2008 and is seeking its third certification in 2015 voluntarily. The city staff found EMS a positive driver for change.

The ISO certification also shaped the Dallas Sustainability Plan, which has 5 categories: air quality; land use; water quality; materials management (waste, recycle, green purchasing); and energy management. Materials management is an uncommon category in a city’s sustainability plan but it is consistent with the ISO 14001, which requires cities and organizations purchase products with minimum chemicals.

The Office of Environmental Quality is not a mayor’s initiative. The Office reports to an assistant manager. There are total 4 assistant managers who govern different department and they report to the City Manager. One of the ISO requirements is to have leadership involved in the city’s EMS. The ISO certification is often described as a journey and not a destination with plans checked annually both internally and by outside consultants, so there is always fine tuning going on to improve the city’s performance.

Key points about ISO 14001

- The ISO standards are about conformity, not ranking. However, ISO 14001 is still important and informative to CAA because a handful of American cities have chosen ISO 14001 to help them move toward better sustainable development policies and outcomes. By getting ISO-14001 certified, cities can verify that they are complying with every environmental law in the federal, state, and local levels.
- ISO’s guidelines are not free and must be purchased online. A partial preview of ISO 14001 guidelines can be found at: <https://www.iso.org/obp/ui/#iso:std:iso:14001:ed-3:v1:en>.
- ISO 14001:2015 applies to those environmental aspects that the organization/city identifies that it can control and influence. ISO notably does not state specific environmental performance criteria in its standards.
- Cities clearly know how much money is saved and what kinds of impacts are generated from complying with the ISO-14001 certification. We were told that cities’ savings by changing their

operation and behavior have exceeded their certifying fee or consulting fee they had to pay for ISO.

- City sustainability officers see ISO as a trusted third-party independent investigator whose reputable certification attracts mayors and citizens to pursue ISO 14001.
- Cities often start with certifying one government agency under the Environment Management System (EMS) to be a model. Other government agencies gradually expand the certification process to many or all municipal operations.
- EMS is designed for organizational management and operation. It is not meant to be a broad certification of citywide sustainability like STAR, rather a tool to evaluate and sharpen how the city’s agencies are managed and perform their operations.
- Cities consider ISO EMS, unlike STAR, as a risk preventive approach. The EMS provides objective evidence achievable targets and good metrics that can demonstrate the city’s efforts to the regulators, investors, and the public.
- ISO 14001:2015 is intended for use by an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability, so it is narrower in comparison to STAR in terms of what it is certifying.
- Unlike STAR and other sustainability-related certification programs, ISO does not provide experts or consulting services to the cities. Cities obviously can hire their own consultants. At the final stage, ISO sends inspectors to sites to certify environmental management procedures.
- Both ISO and STAR help build a culture that influences city employees on how to integrate planning for sustainability. We were told that ISO was a “culture shift” for the Dallas government and helped the Denver government build culture to build a path toward sustainability, and it is “a driver for change” in the Dallas government. Both ISO and STAR help cities track performance.

Table 2. Comparisons of STAR, ISO 14001, and Sustainable Jersey

| Program | Type | Nature | Certification Cost | Scope | Technical Assistance Provided? | # of City Members | Start |
|--------------------|-------------------------|------------|---|---------------|--------------------------------|--------------------|-------|
| STAR | City certification | Indicators | \$7,500 - \$10,000/3 years | National | Yes | Nearly 100 | 2012 |
| ISO 14001 | EMS for organizations | Conformity | \$30,000/4 years | International | No | 2 (Dallas, Denver) | 2004 |
| Sustainable Jersey | Community certification | Indicators | Little or none. (SJ provides small grants to members) | New Jersey | Yes | 429 | 2009 |

4. LEED City—A Program under Development

The LEED building program has been very successful and became the gold standard in the United States and internationally for energy efficient building certification. Building on this success, LEED decided to expand the concept of the green building program to the city level, according to Mark Ginsberg, Senior Fellow at the U.S. Green Building Council who is working on designing the LEED City pilot with counterparts in China. Given the robustness and reputation of the LEED building program has gained, it will not be surprising if the LEED would create a strong city certification of sustainability. The LEED City certification may not be affordable for all cities to access, but the methodology behind the ranking would be robust.

By modeling, LEED engineers have been testing what indicators to include in the system as well as how to weight each indicator. There are 60 preliminary indicators that could possibly be extended to 120 indicators to well reflect the sustainability status of a city, including air quality indicators. Like other environmental indicators, LEED City will likely use the concentration of various air pollutants. Currently, the LEED City is designing and revising the indicator system with 16 pilot cities, including international metropolitans and second-tier Chinese cities. It is worth noting that the LEED City program is still under development and could potentially be a competitor or a partner to CCAP.

B. Single-Issue Ranking

1. ACEEE City Ranking

ACEEE has been publishing its state energy efficiency scorecard for 10 years and its ranking has catalyzed some friendly competition among states to lower their energy intensity. Building on the success of the State scorecard, ACEEE launched the city scoreboard three years ago covering 34 cities. In 2015, ACEEE published its second report of the city scorecard, covering 51 cities, which include some of the most populous cities in the country. Like the State program, ACEEE thinks that the city scorecard will sparks a healthy competition among US cities and make cities want to improve.

Similar to other ranking and certification programs, ACEEE city scorecard rewards city for policy actions rather than policy outcomes for three reasons. First, surprisingly, energy performance data are not widely available across U.S. cities. By contrast, data on energy policy are more readily available. Second, ACEEE seeks to encourage cities to improve their energy efficiency. Through collecting and submitting data on municipal energy efficiency policy, cities learn how to improve energy efficiency by planning. Third, rewarding actions can ignore city size in ranking. Every city can make building energy efficiency policy and set up goals regardless city size and climatic conditions.

ACEEE provides general technical assistance to help cities set up energy saving goals, but they do not audit the data that cities submit. To help cities gather data, ACEEE will soon launch tool kits for local governments and utilities to establish partnerships on data access and collection.

2. Energy STAR City Ranking

Started in 2009, the U.S. EPA annually ranks metro areas based on their number of ENERGY STAR certified buildings that are recorded by the U.S. Census “core based statistical areas” in the past year. In addition to tallying the total number of certified buildings, each ranking also measures

total floor area (million square feet); cost savings; and equivalent homes' electricity use for 1 year. For 2015, among the top 5 of the "Top 25 Cities," in order of ranking, are Washington, DC; Los Angeles; Atlanta; New York, and San Francisco. Other rankings include "Top Mid-Size Cities" and "Top Small Cities."

C. Partnership and Transparency Strategies

1. CityLinks—A Peer-To-Peer Partnership

City-to-City Cooperation (C3) program is one of the core elements of the CCAP and among the various kinds of urban peer-to-peer partnership programs. One insightful model is CityLinks, which is neither an air quality nor certification program, but instead is a peer-to-peer partnership program that pairs Asian and African cities with U.S. cities. How CityLinks has been implemented and what they have learned from pairing cities could be very useful for the C3 program.

Funded by USAID, CityLinks is a five-year program that started in 2011 and focuses on three main issues vital to sustainable cities: climate change, food security, and global health. The International City/County Management Association (ICMA)—a professional and educational association serving local government administrators around the world—received support from USAID to design and implement CityLinks.³

CityLinks builds on ICMA's decade-plus experience in running urban partnerships. Under this USAID-funded CityLinks ICMA has been focusing heavily on climate adaptation. USAID provides input on what cities from Asia and Africa should be selected, but ICMA has a great flexibility in choosing host (learning) cities and resource cities in the United States, as well as deciding the activities that would be carried out in the partnerships.

According to Jessica Cho, CityLinks Program Manager, the selection of host cities is sometimes subject to national governments in Asia and Africa. For example, the Philippines allows CityLinks to choose host cities, while Cambodia prefers selecting their own local city participants for CityLinks. Jessica and her colleagues stressed that successful partnerships are demand-driven with cities that are motivated to learn from peers are the best host cities. Some Asian and African cities want to improve but do not know the best way to move forward. During a recent trip Jessica and her team took to Indonesia they found that local governments there still had the handbook ICMA delivered ten years ago and were still using them and held regular meetings since ICMA had advised. Notably, ICMA noted how communication between these Indonesia cities had continued with their international partners. According to USAID, they found that the pairing cities built lasting partnerships that continued after the project funding ended.

Long-term trust is important to a partnership. No cities want to show their disadvantages and areas of improvement quickly to others. Another key is the involvement of a facilitator. ICMA plays a facilitator role and makes sure a partnership is gradually formed between two cities and all projects are carried out. Most of host cities are coastal cities that are vulnerable to sea level rise. ICMA brings in experts of GIS and Excel to host cities to show them how adaptation plans can be. It is also crucial to award a champion city that other cities can look up and learn and get motivated.

³ <http://icma.org/en/icma/home>

In Leadership Academy, an intensive workshop to recruit Asian cities and where they can learn from each other, it is important to have the right mix of attendants, including elected officials, technical personnel to do analyze for cities, and community leaders. ICMA met with local NGO before the Leadership Academy to learn more about local problems in order to have a successful Leadership Academy.

The motivation for resource cities is mainly professional development and their passion for public service. ICMA pays travel expense, and city staff donates their time to travel to host cities and pass down their knowledge and experiences.

2. Consulting Service

a) EcoDistricts

EcoDistricts (ED) is a grassroots urban development standard launched by a consulting company in Portland Oregon in 2009 that aims to propel sustainable urban planning through social, economic, and ecological innovation. ED uses neighborhood action to leverage sustainability projects in a cost-effective and efficient manner. These actions help communities take action when there is a lack of policy or political willpower at the municipal level to help foster community-led development. ED believes that success hinges upon a comprehensive approach that jointly includes active community participation, assessment, new forms of capital, and public policy support.

ED's neighborhood project design is marked by four stages: district formation, assessment, projects, and management. It supports and rewards district-scale projects in two key areas: setting rigorous performance goals and institutionalizing effective process management. It also seeks to empower practitioners in the field by offering professional certification and accreditation, aimed to facilitate and reward district-scale leadership in urban regeneration.

In addition to empowering practitioners, ED offers a Protocol that is an integrated design and delivery process framework to align key stakeholders' and investors' interests, build robust governance, promote rigorous and holistic assessment, and accelerate catalytic district-scale projects over time. The Protocol is molded by a multi-field, international network of over 150 committee advisory members, strategic advisors and peer reviewers.

One of EcoDistricts' pilot programs is Target Cities. Launched as a Clinton Global Initiative Commitment in June 2014, Target Cities is a new one-year partnership with ten development projects across eight North American cities that aim to create replicable models for next-generation urban revitalization. Another program is EcoDistricts Incubator, a three-day intensive, project-based workshop designed to accelerate district-scale sustainability across North America. Since 2012, 26 teams and 30 projects have been trained under this workshop across the continent.

b) The Clean Energy Project

The Clean Energy Project is a joint project of Natural Resources Defense Council (NRDC) and the Institute of Market Transformation (IMT), which provides grants, local staff, and technical assistance to 10 major American cities to improve the energy efficiency of buildings. The project is unique in three ways. First, the Clean Energy Project received \$9 million from foundations for 3 years (2013-2015) for NRDC and IMT to run the Project and distribute money to participating cities. Second, to help provide technical assistance to the 10 cities, the Clean Energy Project hires 1 to 2

on-site, mid-level technical staff in every city. These technical advisors were mostly hired locally and they work city officials and employees to work out a city plan for building energy efficiency. In essence they become staff working for the city. Third, the Project encourages the awarded cities to work with local and regional environmental NGOs to build local capacity in building energy efficiency and foster the sustainability of the impact that the Project has brought to the cities. When working with local governments to improve building energy efficiency, the Project has incorporated ACEEE's city scorecard and partnered with the US Green Building Council.

Salt Lake City evidently made great strides in cleaning its air through this project. Our NRDC interviewee informed us that the Project has helped to create jobs and attract businesses after cities pass benchmarking ordinances. However, even a project with grants could counter barriers. Not every city wants to change regulations or pay for higher building energy efficiency. In one case that was shared with us, a state government bans retro-commissioning of building and this has become a political barrier preventing cities in that state from adopting ordinances to retrofit buildings and improve energy efficiency.

3. Data Disclosure Programs

a) CDP

CDP, previously known as Carbon Disclosure Project, works with investors, companies, and governments to encourage them to disclose their carbon policy and behavior. The goal of CDP is to use information transparency to raise awareness of these carbon reporters about carbon emissions spark them to adopt more low-carbon technologies and policies to help deliver a more sustainable economy. Headquartered in London, CDP this nonprofit has offices in North America, Latin America, Europe, and Asia. Initially, CDP focused on large- and medium-sized enterprises distributing questionnaires to them to voluntarily record their annual greenhouse gas emissions. In 2010, CDP and C40 joined together to expand CDP's business to survey and promote disclosure of greenhouse gas emissions from cities. CDP modifies the questionnaires slightly every year based on consultation with stakeholders. The revision intends to provide improved guidelines to cities and enterprises about environmental practices and help participating entities establish carbon benchmarks.

By July 2015, CDP had 318 reporting cities and expects to have about 600 participating cities next year. Currently, CDP has 70 Asian cities, including 41 in Korea. Korea is strong in members because CDP has partnered with a Korean nonprofit organization, Korea Productivity Center, which already has great connections with cities. This highlights the importance for CAA to also find strong local partners to help them spread their certification program in each country.

CDP cleans data after cities submit the questionnaires, but CDP does not audit the data. CDP also does not provide any methodology for data collection. There are notably no questions on air quality in CDP's current questionnaire, but they did express an interest in adding them, which could be a good partnership opportunity for CAA.

CDP is not a certification program nor does it provide technical assistance to cities. However, CDP's program has much in common with the goals of CCAP. First, CDP works with cities, and some concerns of cities that CDP is dealing will be similar to difficulties that CCAP will face. For example, cities do not want to look bad if they decide to submit the questionnaires. Cities want to

know what other cities are doing, especially those in the same country/region. The CDP process helps cities learn about the best practices on what kinds of info they should collate carbon data. Second, from the experience of CDP, data from Asian cities are not as robust as Europe or North America. CDP is struggling to collect quality data from Asian cities. In addition, Asian countries are top-down and centralized. Sometimes submission of city data needs approval from central governments, making data submission complicated and political.

b) World Council on City Data/ISO 37120

Launched in May 2014, ISO 37120 Sustainable Development of Communities: Indicators for City Services and Quality of Life is another certification related to city sustainability in the ISO family. Evolved from Global City Indicators Facility, the ISO 37120 consists of 100 indicators that measure a city's quality of life. Implemented by World Council on City Data (WCCD), the certification program provides standardized methodology that allows for comparability of global city performance. In other words, ISO 37120 certifies the data submission of city. The goal is to encourage cities to report reliable data and information. WCCD provides written guidelines and methodology for cities to collect and submit data as well as holds workshops to teach cities.

WCCD took 8 years in planning and coordination with 45 cities to set up the framework. The indicators are comprehensive and are categorized under 17 themes on city services and quality of life: economy, education, energy, environment, finance, fire and emergency response, governance, health, recreation, safety, shelter, solid waste, telecommunication and innovation, transportation, urban planning, wastewater, and water and sanitation. Indicators of air quality are under the Environment category, including concentration of PM_{2.5}, PM₁₀, NO₂, SO₂, O₃, and noise pollution, and change in native plant species.

The certification of ISO 37120 requires cities to apply on an annual basis. Currently, there are 20 foundation cities around the world, including Shanghai, Makati, and Haiphong in Asia. Boston and Los Angeles are the only two US cities certified by ISO 37120. Both are certified as Platinum, the highest certification level. There are five certification levels: Aspirational (30-45); Bronze (46-59); Silver (60-75); Gold (76-90); and Platinum (91-100).

The program was started as a World Bank project and then moved to University of Toronto. Three years ago, because some cities suggested that it would be good to have third party certified data submission and the project was brought to ISO. Afterwards WCCD was created as a nonprofit in Toronto to help administer the standard. Now WCCD hires third party certifiers and trains them to certify city data. The cost of certification and data verification is \$7,500.

City administrators have been motivated to join the program after hearing positive comments from participating colleagues in other cities. Cities that have already been working on open data issues also have been enthusiastic about joining. Mayors are often the catalyst for joining this program, such as the mayor of London who is a big fan of data. However, in some cities around the world, mayors do not have much authority and would need to wait for approval from central governments to undertake such an ISO program.

STAR has published a document explaining the difference and the alignment between STAR and ISO 37120. (See Appendix 6).

4. Programs in Europe and Asia

a) *QUEST in Europe*

QUEST is a Quality Management tool developed to help small and medium-sized cities to set up and further develop their sustainable mobility policies and actions with the assistance of the QUEST Auditor. QUEST supports European cities in making real progress towards a more sustainable urban transport system by creating a common problem understanding among local stakeholders and facilitating the internal processes within governments in order to help the cities to help themselves. The QUEST process goes through 4 stages:

- **Quest Audit** - the auditor works with the city to collect objective information on local transport policies and identifies areas for improvement.
- **Self-Assessment with Stakeholders** - The QUEST auditor works with a group of stakeholders to share views on the city's performance.
- **Report & Action Plan** - the auditor drafts the Action Plan with the input from the self-assessment.
- **Certification** - After the city council implements the recommendations, the city will be awarded with a QUEST Certificate.

b) *World Bank's the Low-Carbon Livable Cities (LC2) Initiative*

The Low-Carbon, Livable Cities Initiative helps rapidly growing cities plan for smart, sustainable, green, and inclusive growth. This initiative aims to reach 300 of the largest developing country cities over the next four years offering a comprehensive suite of tools and activities tailored to cities' specific needs and level of progress on their climate-smart development path, ranging from greenhouse gas inventories and assessments to low-carbon investment planning and financing solutions. World Bank is working with C40 network, ICLEI, WRI and other partners to build up an evidence base through Global Protocol for Community Scale Emissions, which is a new methodology to quantify citywide GHG emissions and will be introduced later in Section 5. Under LC2, an accreditation program will be developed to train city officials and private sector professionals to conduct greenhouse gas inventories and enable them to identify the mix of policies and investments in order to achieve their emissions reduction potential.

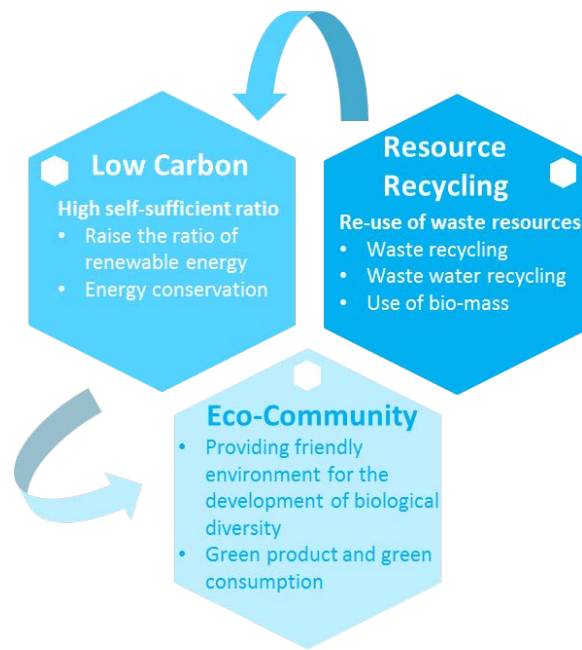
c) *Taiwan's Low-Carbon Community Evaluation Criteria System*

Taiwan Environmental Protection Administration (TPEA) is in charge of developing low-carbon communities in Taiwan. Proposed in "Report for Project of Developing the Low-Carbon Communities (2011) (in Chinese)", the drafted Low-Carbon Community Evaluation Criteria System assesses the level of low-carbon development from six categories, and the evaluated community gets a total score by summing up the scores in six categories. The difference between urban and rural areas in terms of measuring low-carbon development is considered in the evaluation system by assigning a α_i factor to each of the six categories to adjust the score. For example, urban communities usually have better transit system than rural areas. The α_3 in the green transportation category is designed to give rural areas additional 15 points to fairly compare to urban communities. In some low-developed communities, appropriately scoring carbon emissions in all the six categories are very difficult due to overall limited development. Therefore, an alternative version of dynamic index is also proposed by the LCC project to convert a community's electricity consumption, water

use, gasoline and gas consumption, and waste products into carbon emissions. The dynamic index can track the progress of carbon reduction along time within the community. More information about the LCC project will be provided later in this article.

In another document, “Towards Low Carbon Cities in Taiwan: Scheming the Low Carbon City Program (2010)” the concept of low-carbon community was defined as an area with a high ratio of energy self-sufficiency and re-use of waste resources that works to promote the development of biological diversity, green products, and green consumption. (See Figure 1). In this document, major and secondary indices are used to assess and classify low-carbon cities and communities in terms of its energy self-sufficiency (the percentage of renewables as part of total energy consumption). The cities and communities are classified depending on the ratio of self-sufficiency (from lowest to highest): fail (10%), primary (10-25%), normal (25-50%), good (50-75%), excellent (75-90%), or outstanding (90%) level. It is important to note that the major indices for accessing the development of low-carbon community have different standards for rural and urban areas. The major index for rural communities examines the ratio of energy self-sufficiency by taking household electric consumption, fossil fuels consumption, and renewable energy consumption into account. In contrast, the major index for urban areas calculates the GHG per capita in tons produced by the evaluated city or community and requires that household electricity consumption is 10-50% less than those in rural areas. Both urban and rural communities are judged by supplementary/secondary indices looking at the recycling rates of solid waste and wastewater, which should be 10% higher than the national average. See Box 4 for the low carbon community work in Taichung, Taiwan.

Figure 1. The Correlation between Low Carbon and Eco-Community



Box 5. Indices for Low-Carbon Community in Taichung, Taiwan

Under the national framework of developing low-carbon communities, Taichung City in Taiwan proposed a certification system for low-carbon communities within its jurisdiction. Before doing the online registration for certification a community first must establish a green team that will analyze the current status of local sustainability and discuss with stakeholders to set priorities for low-carbon development. Next the green team will register the communities current and planned low-carbon actions on the certification website. A committee formed by the Taichung City government reviews the applications and audits the community's on-site performance. The Taichung committee will grant the communities a silver, bronze, or finalist level certification. The certification lasts for three years.

Box information drawn from: July 27, 2015, Second Technology Consulting Meeting by Sustainable Development and Management Team passed Taichung Low Carbon and Sustainable Homeland Monitoring and Evaluating Plan

d) Report of Indicators for Sustainable Cities⁴

The European Commission published this report was published in late 2015 and it aims to provide policymakers from local governments with a concise guide to the best currently available indicator tools for environmentally sustainable cities. It introduces the term “urban metabolism” in the first chapter, indicating that the metabolism for cities and animals are similar in that both are facilitated by the cooperation of different significant elements in their respective organic systems. The definition of sustainability is depicted as an integration of environmental, social and economic aspects. The report listed out a number of scalable and useful sustainability indicator tools applied by cities from different countries, mostly designed for European cities. A comprehensive evaluation is conducted to each indicator tool with its pros and cons for policymakers to compare and choose their most appropriate tool.

5. Framework for City/Community in Single Issue:

a) Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) for Cities

GPC was created by a joint coordination among GHG Protocol at WRI, C40, and ICLEI. Recognizing that the ability of cities to mitigate climate change and monitor progress hinges on their access to accurate GHG emissions data, GPC offers a comprehensive framework of methodologies to help in accounting city GHG emissions.

GPC requires cities to collect and disclose their GHG inventory through two complementary approaches. The first collection is to record emissions from production and consumption activities within their cities based on six main sectors: stationary energy; transportation; waste; industrial processes and product use; agriculture, forestry, and other land use; and other emissions occurring outside the geographic boundary as a result of city activities. The second method is to categorize

⁴ http://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf

emissions occurring within and outside the city boundary into “scopes.” This framework groups emissions occurring within the city boundary (scope 1), those occurring outside the city (scope 3), and those produced from the use of electricity, steam, and/or heating or cooling supplied by grids which may be transboundary (scope 2).

GPC offers flexible reporting, monitoring and verifying methods that cater to a city’s needs and capacity. Cities are able to select between two reporting levels: BASIC or BASIC+. BASIC level covers scope 1 and scope 2 emissions from stationary energy and transportation sectors, and scope 1 and scope 3 emissions from the waste sector. BASIC+ is more complex and requires more data collection and calculation. The GPC helps cities:

- Develop a comprehensive and robust greenhouse gas inventory in order to support climate action planning
- Establish a base year emissions inventory, set reduction targets, and track their performance
- Ensure consistent and transparent measurement and reporting of greenhouse gas emissions between cities, following internationally recognized greenhouse gas accounting and reporting principles
- Enable city inventories to be aggregated at subnational and national levels
Demonstrate the important role that cities play in tackling climate change, and facilitate insight through benchmarking – and aggregation – of comparable data

For monitoring, cities are encouraged to align their mitigation goals with their GPC inventory. While the GPC framework does not require cities to verify their emissions inventory, cities are given the option to self-verify through the same organization conducting the GPC assessment or verify through an independent organization if they wish.

b) Rapid Assessment Framework -Tool for evaluating energy efficiency opportunities in cities

In 2008 the Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank launched the Rapid Assessment Framework as the centerpiece of the Energy Efficient Cities Initiative (EECI) The World Bank’s objective is to provide a sectoral analysis in a developing country of a city’s energy use, including energy profile and performance. This “rapid assessment” helps to identify areas or sectors of energy use for further study, outline an energy efficiency plan, and areas for potential future investment by ESMAP. Sectors include water/waste management, buildings, transportation, public lighting, etc. City management practices of the sectors are considered for cross-sector integration and to achieve overall efficiency in an urban system. This framework includes three main components:

- A city energy benchmarking tool;
- A process for prioritizing sectors that offer the greatest potential in energy efficiency; and,
- A “playbook” of tried-and-tested energy efficiency recommendations.

Clean Air Asia could look to these frameworks for help in designing city air quality framework. For example, GPC provides mechanisms for compliance including setting reduction targets, performance tracking and overall transparency as well as accounting for transboundary emissions across cities. The Rapid Assessment Framework is strong in identifying and assessing the

performance of areas or sectors of energy use (allowing for cross-sector and comprehensive integration).

D. Local Air Quality Programs and Measures

Local air quality programs are not certification or ranking systems, but local actions are the basic step of air quality management. In this section, we first introduce outstanding local air quality programs and measures by leading cities, including Boston and New York City, followed by programs and measures adopted by agencies with limited resources and lack of political support. U.S. EPA has published a menu of control measures for various air pollutants (see Appendix 5). Recommendations based on this list are discussed below in Point 3 below.

1. PlaNYC and Greenovate Boston—Best Sustainable Planning Practices

a) PlaNYC

PlaNYC was created as a bold agenda to involve and engage all New Yorkers to build an environmentally and economically sustainable city—one that can be resilient in the face of a growing population, changing climate conditions, an evolving economy, and aging infrastructure. This initiative was created by former NYC Mayor Michael Bloomberg in 2007 and involved 25 NYC agencies and many stakeholders. To showcase the interdisciplinary engagement, PlaNYC is supported by the Campaign for New York’s Future—a coalition of civic, business, environmental, labor, community and public health organizations.

PlaNYC’s emphasis on innovation and the application of new techniques to challenges will help keep the city’s residents and businesses in the role of global economic leaders. Goals are set for 2030 in 10 sectors: Housing and neighborhoods, Park and public space, Brownfields, Waterways, Water supply, Transportation, Energy, Air quality, and Climate change. 29 sustainability indicators are identified to track the process and milestones.

PlaNYC is made up of three components:

- **OpeNYC** – preparing for NYC’s growing population, forecasted to increase to 9.1 million residents by 2030;
- **MaintaiNYC** – repairing aging infrastructure, including city bridges, water mains, mass transit, building codes and power plants, and;
- **GreennyC** - conserving NYC natural resources, with a goal of reducing carbon of 30 percent by 2017.

As part of the initiative’s goal to reduce GHG in NYC by 30 percent by 2017, the city signed a \$10 million agreement with TRIGAGA (acquired by IBM) to dispatch IBM TRIGAGA’s environmental and energy management software across more than 4,000 municipal buildings. IBM TRIGAGA will be implemented as the Sustainable Energy Property Tracking System that will monitor the energy and water use of city buildings, to identify resource-intensive areas and find energy-efficient solutions.

There is some controversy over the idea of congestion pricing, wherein vehicles entering the city during peak hours would be subject to a levy fee. Its implementation would provide funds for

NYC's underfunded metro system – MTA – though challenges remain in the system's capacity for increased riders.

b) Greenovate Boston – 2014 Climate Action Plan

Greenovate Boston is a city initiative that seeks to build grassroots engagement by engaging a host of grassstops and grassroots actors who include Boston public schools, Renew Boston, Public Works Department, Department of Neighborhood Development, Boston Public Health Commission, and Office of Food Initiatives, and many more.

Adopted under Massachusetts' Global Warming Solutions Act, *Greenovate Boston* set the city's 80x50 vision (long-term goal of reducing greenhouse gas emissions 80 percent by 2050). This plan invigorated the city's mission to improve building energy efficiency, public transportation, and overall urban planning and operations. In June 2014, the Massachusetts Department of Public Utilities ordered the modernization of the electric grid. Interim carbon targets work alongside other 2030 planning efforts, like *Go Boston 2030* and *Housing a Changing City*. See Box 6 for more information.

Box 6. Greenovate Boston – Peer Exchange and Civil Society Solutions to Combat Climate Change

The mayor's office of Boston has recognized the impacts of climate change on the city and has set out to integrate comprehensive policies, like the Climate Action Plan, into its urban planning and climate change prevention. Among these set of policies, *Greenovate Boston (GB)* – initiated by the mayor – brings together sectors across the city to come together to problem-solve climate change and other pressing environmental issues.

Working toward inclusive solutions, the government seeks to bridge its city planning with diverse communities' agendas. Through greater stakeholder involvement, the city of Boston provides a key example for synergistic cooperation to abate climate change and propel sustainable development, beyond its own borders.

At GB's very crux, data collection highlights the coordination among institutions at the top and bottom. The Boston Environmental Department has facilitated data gathering across various departments. For example, the Department of Neighborhood Services works closely with neighborhood representatives, doing fieldwork on identifying the specific needs of and assessing the climate impacts on each community. Partnerships with nearby universities, like Boston University, offer the capacity and resources for data analysis. Collectively, these institutions offer critical research to inform policy.

Civic Engagement

As a cornerstone of GB, civic engagement, in particular, emerges as an instrumental actor in identifying diverse issue areas, gathering information, and contributing to the planning process. At the program's inception, the city's administration viewed citizens' involvement as a critical means to reaching climate goals. As a result, it sought to provide a grassroots channel for sustainable development, instead of a top-down approach.

Further illustrated by its year-old planning process, GB aims to be thorough and transparent. An open commenting period precedes the steering committee's final review and submission to the mayor's office. In its preliminary phase, the steering committee, environmental groups, and other community leaders jointly facilitate discussions on proposed policies. From there, citizens are invited to share their concerns within their communities, as well as with GB's draft proposals, strategies, and goals toward the city's Climate Action plan.

The government serves as a resource portal through which citizens and communities can gain and exchange resources, as well as to inform policy. It further acknowledges that an open and engaged public requires an informed and passionate citizenry. For example, Bostonians recognize the impacts of rising sea levels on coastal communities. To further inform the public, GB offers scenario maps, while also breaking down specific impacts of climate change on food security, human health, and vulnerable populations like children and the elderly.

Leading by Example

Recognizing climate as a global issue that respects no political boundaries, Boston has worked closely with state and non-state actors, domestically and globally to facilitate greater exchange and cooperation.

Domestically, the city has worked very closely with the state of Massachusetts and at the federal level with the U.S. Environmental Protection Agency. Furthermore, the city is part of a coalition of mayors under the Metropolitan Area Planning Council (MAPC) that evaluates the regional impacts of and capacity needed to combat climate change, and from which the Metro Boston Climate Taskforce was formed.

Expanding cooperation and exchange into a larger nationwide and global network, Boston is part of the Urban Sustainability Directors Network (USDN) which is a peer-to-peer network made up of city professionals from across the U.S. Most notably, Boston has been recognized as a leader on greenhouse gas reductions programs, under the C40 Cities Climate International Group.

From its grassroots engagement to leadership under the national and global peer networks, Boston has laid the groundwork for successful resource exchange and capacity building necessary for combatting climate change. Learning from the success of Greenovate Boston, cities across the globe can too, realize the potential and mutual benefits from building civic engagement toward more inclusive, sustainable urban planning. As a testament to the success of this program, at the Paris Climate Conference the City of Boston and Greenovate were awarded the 2015 C40 Cities Award for Smart Cities and Smart.

2. North Central Texas Council of Governments—A Regional Agency with Limited Resources

Many U.S. city and regional governments lack the large budgets and political support that Boston and New York enjoy to mitigate air pollution. Despite its limited resources, Air North Texas, the air office within the North Central Texas Council of Governments, has been forcefully pushing the state government, local governments, and residents hard to change their behavior and attitude towards air quality. The Air North Texas regional office's dedication towards air quality

improvement can be a great example for some Asian cities that are facing severe air pollution with limited budgets and capacity.

The Dallas-Fort region is a non-attainment area under the Clean Air Act. An agency like Air North Texas must be innovative, positive and persistent to improve local air quality to meet the EPA standards. The state government (Texas Committee on Environmental Quality) does not have strict air regulations and is not willing to do so either, and people do not want to change their behaviors and the ways they live. The Air North Texas office has worked to promote clean air as a means to attract business, for otherwise, state and local governments refuse to spend money on improving air.

There is no silver bullet for air quality improvement. Multifaceted programs are required in place to aggregately improve air quality. Even each program might account for 1% or lower improvement and the effectiveness of air programs is in question, every air program counts, no matter how small of a contribution it makes toward energy efficiency. The most serious air pollution problem in eastern Texas is ozone, and the main source for ozone is mobiles on road. Consequently, Air North Texas has developed many, multifaceted programs to tackle mobile emissions. For example, Air North Texas has a small program which aims to prevent cold starts (the temperature difference between the ambient when car engines start and the hot temperature that car engine runs at the most efficiency). In another program, Air North Texas applied an EPA grant to inspect gas stations and heavy duty vehicles, to assess simple upgrades that can improve a vehicle's mileage. Recently, the staff started a preferred parking space for alternative fuel vehicles (AFVs) in the city council's parking lot.

In order to raise the awareness of improving air quality, sometimes the officials propose unrealistically ambitious strategies or pilot programs to improve air quality that. For example, some cities in Europe mandate cars with even plate numbers can only be driven Monday, Wednesday, and Friday, and cars with odd plate numbers can drive on the alternate days. This policy would be an unpopular and extreme measure in Texas but it would bring the education and awareness of the air pollution problem to a majority of citizens.

Using an outside committee to review applications, Air North Texas office holds annual "Partner of the Year" competition to award an organization that implements great outreach programs about air quality. Air North Texas uses the award press release as an opportunity to highlight efforts by the winner and other organizations to clean the region's air.⁵ Besides recommending converting all city transport, police, and school buses to clean fuels, Christopher W. Klaus, Senior Program Manager at Air Teas also thought buy-back vehicle programs in which cities/states pay owners to retire vehicles that fail smog tests to get the worst polluters off the road. In California, car owners get \$500 if they decide to fix their cars or \$1500 for car retirement. To cross-subsidize the program in Texas cities have increased the price of emission inspection fees. Clean city fleet, e.g. buses, service vehicles, police cars, and school buses.

3. U.S. EPA Menu of Control Measures

The U.S. EPA has provided a List of Potential Control Measures for PM_{2.5} and Precursors that include over 300 actions states and cities can take to reduce the pollutants (see Appendix 5).

⁵ More air programs can that the Air North Texas has been implemented can be found here: <http://www.nctcog.org/trans/air/programs/>

These informational documents are intended to provide a broad, though not comprehensive, listing of potential emissions reduction measures for direct PM_{2.5} and precursors. The purpose is primarily to assist states in identifying and evaluating potential measures as states develop plans for attaining the PM_{2.5} under the National Ambient Air Quality Standards (NAAQS).

The tables provide overall control costs and control efficiency estimates derived from the references, although there are inherent uncertainties in any estimates of this nature. These documents also do not provide specific emissions monitoring and testing information. The U.S.EPA encourages the use of source-specific assessments that will be more reliable.

As PM_{2.5} is one of the dominant pollutants plaguing Asian cities it merits mention that this document also contains several tabular lists of 392 PM_{2.5} control measures. For most measures, the tables provide an estimate of the control efficiency and the cost per ton of pollutant reduced. The tables also identify reference sources that the user can consult for more information. These control measure lists include:

- Stationary Source Measures Lists
- On-road Mobile Source Measures Lists
- Non-road Mobile Source Measures Lists
- Supplemental Appendix on On-road Ammonia and VOC Measures
- Fugitive Dust Measures List

E. Attributes of Successful Certification and Ranking Programs

While many of the above programs differ in scope and focus, we found that successful certification systems and ranking programs have some similar attributes, which we list below:

- **Programs should be easy to communicate and presented to cities with clear goals.** Some programs sell themselves as an “integrated approach” for a city to pursue healthy and clean environment. For example, STAR markets itself as an integrated approach to cities with both environmental and economic benefits. STAR used to have 81 goals that made it difficult to succinctly explain and “sell” to local governments. Now STAR has 7 goals and 44 objectives, which is a more manageable size for cities to understand and accomplish. In addition, the STAR system is designed in a way that is coherent with local plans. For example, local governments and citizens can easily understand the hierarchy of goals, strategies, and targets. Raleigh staff told us that the city team considered an old ICLEI program when investigating different rating systems. However that program had more than 80 metrics, so the Raleigh staff chose the less complicated STAR program. Certification programs also need to rephrase their broad goals in ways that capture local priorities. For example, instead of “sustainability” or “clean air” state that the priorities are “clean air for attracting investment” or “cleaner air to protect public health.”
- **It takes time for cities to adapt toward greater data transparency.** Certification programs need to build in plenty of training and user friendly guidance documents to help educate cities on how to collect and submit reliable data.

- **Successful certification or ranking programs have robust indicators however it can be challenging and time consuming to develop and properly weight them.** Developing a proper-weighting certification system requires engineers to carefully model and test different indicators and the interactions among indicators. It also needs urban management practitioners and experts to make sure the indicators reflect the real world operations of cities and do not create unintended air pollution problems. For example, encouraging drivers to buy hybrid vehicles may have the unintended consequence of encouraging drivers to drive more since they see their cars as cleaner (the so-called rebound effect). Another example of complicated interactions is using biogas, which reduces greenhouse gas emissions but increases NO_x. Interdisciplinary knowledge is required to capture the overall picture and avoid unintended consequences when designing a certification's robust indicators.

It takes at least three years to design and plan the first draft of a program, for the process needs to include considerable consultation with city experts, industrial practitioners, and community stakeholders. Getting sufficient feedback on the program is also vital. It can be useful to launch small and then expand once you have built greater capacity. For example, ACEEE ran the State Energy Efficiency Scorecard for 10 years before launched its City Scorecard. The program benefited from the reputation it built in the State-level work and ACEEE had built its own capacity to manage the city-level work.

In addition, setting up robust indicators is a process that requires updates from time to time. STAR took 4 years to develop their program (2008-2012). Recently STAR started to do benchmarking to show how cities are doing compared to national standards. Among their 3E-goals (economy, environment, and equity) of sustainability, equity is the most difficult part for cities to achieve. After three-year implementation, STAR is working to integrate the element of equity in the STAR 2.0 that launches in the fall of 2016 by adding the elements of public engagement.

- **Identifying best practices offers a model and inspiration for cities to follow.** In general, city governments compare themselves more readily with their neighboring or peer cities, rather a prestigious tier-1 "world cities" like New York City, Chicago or Los Angeles. Size and prestige do not necessarily make a city successful on sustainability indicators. For example in the ACEEE city ranking program the top-ten cities included a mixture of large tier 2 cities as well as medium and medium-small cities.

Section II.

MOTIVATION FOR CITIES TO PARTICIPATE IN CERTIFICATION PROGRAMS

In creating a city certification system, it is not simply a situation of “Field of Dreams” model of “build it and they will come.” Nearly every organization we interviewed discussed the challenges cities face faced with many years of preparation and experimentation with mechanisms and tools to attract cities’ participation in the program. Cities have different climate, political, and economic conditions, and their motivations for participating city sustainability programs vary, which we have captured below in nine categories.

A. Gain Technical Assistance Guidance

Most programs (e.g., ICLEI; CityLinks; U.S. EPA State and Local Climate and Energy Program; EcoDistricts; STAR; City Energy Project; and Sustainable Jersey) offer some type of technical assistance to cities. ICLEI is a well-known international organization that promotes local government sustainability and provides technical assistance. In addition to providing small grants, U.S. EPA State and Local Climate and Energy Program direct local government grantees to other EPA departments for detailed technical assistance. STAR and EcoDistricts both provide consulting services to city governments. Among all of these programs, NRDC’s City Energy Project is the most special case in that the Project hires mid-level city advisors who work on-site closely with city government sustainability offices to evaluate every city’s building energy efficiency challenges and tailor solutions. Sustainable Jersey provides detailed description on what cities and communities can do to get credits and they provide workshops and trainings.

By participating in these certification programs, cities are able to work with experts affiliated with the programs. For example, the STAR staff offered guidance to the city of Raleigh in understanding STAR requirements and how to properly submit the ranking form. Once the documents are reviewed, the staff offered constructive feedback and identified areas where criteria are not met. This process can take time, for example, Raleigh staff received training in January and submitted the documents in December and were certified the following March. The whole process took 15 months.

Fulfilling all of the requirements to meet ISO 14001 and ISO 37120 can also take over a year to complete, but these programs do not directly provide technical assistance, but they do provide detailed guidelines and descriptions for cities to follow before inspection, which is a valuable checklist for cities.

Most of the city officials and experts we interviewed noted that most cities find one sustainability certification sufficient, particularly if they are learning and making improvements in the city. It is hard for cities to change course switch to a new system or take on a second one due to administrative time and cost concerns. Thus, CAA should be aware that some cities may be less enthusiastic to participate if they are already involved in some other certification program. However, there are still opportunities for CAA to build partnerships with existing sustainability certification or ranking systems being employed in Asia.

Despite being certified, cities always have room to improve. Notably, leading cities do not just “graduate” or rest on their laurels after getting high certifications, they tend to continue participate in certification programs or even become mentoring cities. For example, even if a city is certified with 5 star rating under STAR if they pass the 600 point threshold, some cities will work to get the total possible 720 points. STAR has developed some optional goals with additional credits for some high-performing cities that encourage innovation not directly related to sustainability, for STAR wants to encourage cities to innovate in every possible way.

Internally, city staff gains professional development through these programs. For example, staff in American mentor cities in the CityLinks program receives no compensation in return for mentoring their partner Asian cities, but they gain professional development experience. Staff from San Diego and San Jose shared that the mentoring gave them mutual learning experience.

B. Assess Where Cities Stand

For practical considerations, certification or ranking systems help cities to understand their status of environmental quality among other cities. Quantitative metrics or single indicator of city performance helps cities know where they stand in terms of overall sustainability compared to other cities. In the various interviews that we have conducted, LEED City, ACEEE, and World Council on City Data each described at least one their program goals to quantitatively measure city performance and compare city performance in sustainability, building energy efficiency, policy making, public service, and quality of life. Cities use tools that provided by certification or ranking programs as management tools to communicate with stakeholders, coordinate internal departments and staff. The comprehensive examination provided by assessment tools also helps cities design strategic plans to improve local environmental quality as well as track city performance over time. After several years, cities would accumulate data to show citizens and business that they have stable and improving environment for living and investment.

Taking STAR for an example, city planning departments use the metrics and scores to show other departments and to mayor’s office what areas their city excels compared to other cities and where they need to do better. Some cities use STAR tools as a reference to update their climate action plans and even align their climate action plans with the STAR metrics.

Certification and ranking programs also entice and teach cities to collect reliable data. It is surprisingly difficult to collect data from different city departments. Participating certification or ranking programs can spark city actions on data collection. One city employee may not know what other departments are doing, especially in a big city. For the STAR Community system, some cities (e.g., Washington DC and Raleigh) could be certified higher but planning departments could not or had no time to collect efficient information across departments. Information collection is a time-consuming process and requires research and coordination with other agencies and communities to collect data for assessment.

C. Grants

Cities often face limited budgets and staff resources, which means any program that provides monetary incentives for sustainable development certification appealing. Among all the programs we have found, only a few provides grants to cities. The U.S. EPA State and Local Climate and

Energy Program provide \$100,000-\$150,000 to each grantee, with the condition that the grantee city matched the amount of grant—either in cash or they can alternatively match staff hours. Sustainable Jersey sometimes has small grants available for community projects. The Clean Energy Project by NRDC and IMT do not directly give away grants to cities, but the Project provides every city one to two technical staff to design local strategies of building energy efficiency.

D. Strong Political Leadership

We found that strong political leadership is a significant factor in city sustainability. With mayor support, sustainability agency has the authority to coordinate other departments to implement sustainability programs and policies. Some mayors even create a sustainability department or agency in mayor's office. The high position of the sustainability staff in the city organization chart gives the staff more authority to pass and implement local sustainability programs. Cities with strong political leadership in sustainability initiatives include Cambridge, Baltimore, New York City, Denver, and Raleigh.

Regardless of the motivation of a city's environmental department, they will need to persuade the mayor/mayor's office of the value of pursuing sustainability certification programs. With great passion but limited resources, staff can present scientific evidence and policy recommendations to persuade their mayors to take action on environmental issues. Examples include San Diego and San Jose. Both are big cities in California, a leader state of environmentalism, but they are not as liberal as San Francisco or Los Angeles. Another example is North Central Texas of Council of Governments (NCTCG). The regional agency, lacking strong support from the state government and residents, has created various small programs to improve the regional air quality. NCTCG frames the issue and raises public awareness of air pollution by discussing it as barriers to attract business to invest locally and threats to the health of children and the elderly. By taking these baby steps, NCTCG tries to improve local air quality with limited resources, stimulate policy actions at higher levels, and change residents' behavior to mitigate air pollution.

E. Mandates

Some local sustainability initiatives are voluntary and some are not. In the United States, the Clean Air Act offers strong incentives to force compliance to the EPA air standards. In some rare cases, the EPA has mandated cities to pursue sustainability certifications to get into compliance with the CAA standards. City of Dallas pursued the ISO 14001 certification (or environmental management standards, EMS), surprisingly, because they were mandated by the Department of Justice in 2006. The ISO 14001 was chosen by the Department of Justice, and 11 city departments were mandated to get ISO 14001 certified.⁶ City of Dallas was fined \$800,000 because the city ironically polluted the local river itself while city laws told the private sector not to violate water regulations. The mandate changed the culture of the Dallas government and forced every city employee to get on the train of sustainability. Now, Dallas is pursuing its third time re-certifying by ISO 14001. The action is purely voluntary.

⁶ <http://www2.epa.gov/enforcement/city-dallas-storm-water-settlement>

F. Recognition and Reputation

Certifications from third-party verifiers endorse city policy actions. City officials we interviewed deem sustainability certifications as recognition that city staff can proudly present to mayors, city councils, and voters. City staff sees both ISO 14001 and STAR as ways of giving a city greater recognition on sustainability. . Especially for cities that do not lead in sustainability initiatives as New York City and Boston, a label of green cities verified with external organizations would help them establish a good reputation, as seen with San Diego and San Jose. For industrial or port cities that have a long-standing pollution history, like Dallas, Baltimore and Kitakyushu, Japan, a sustainable air quality certification can also be an important demonstration to citizens and potential investors that the tide is turning. Being a mentor city to pass the experience of cleaning air or promoting local sustainability also establishes reputation for cities.

G. A Dire Situation/Citizens' Pressure/Attract Business

Because of the long-standing dire situation of air pollution, citizens can become the catalyst to push a city government to pursue a certification or ranking program. In Salt Lake City, a city often covered by a layer of thick smog, pressure from citizens to improve the air quality motivated City of Salt Lake City to take an aggressive approach by applying for grants and assistance from both EPA State and Local Climate and Energy Program and the Clean Energy Project by NRDC and IMT. The former program aims to cut carbon emissions and the second aims to increase building energy efficiency in cities. Both yield the co-benefit of air quality improvement. Kitakyushu in Japan is a port city. The city started to clean air in 1955 when a women's grassroots organization raised awareness of air pollution as a serious social and health problem. The city then began successful efforts to not only clean up its own air pollution but also has participated in numerous city-to-city environmental cooperation on air quality with a number of cities in the region (Haiphong in Vietnam, as well as with Dalian and Wuhan in China).

H. Barriers to Participation

The findings of our interviews are consistent with numerous studies about why cities should adopt or engage in sustainability initiatives and innovation. Local governments may experience various barriers to designing, adopting, and implementing energy, GHG, and sustainability initiatives.⁷ First, cities need finance capacity to adopt or engage in sustainability initiatives.⁸

The process of getting STAR certified requires an upfront and administrative cost and ranges from \$7,500 to \$10,000, which some cities may find too costly. Raleigh paid \$10,000 to get the STAR label, which covered all training session/ traveling. Once a community receives STAR certification, it will cost another \$1,000-1,500 to be recertified. They pay \$500 every year for the membership. Cities like Dallas, who already have an ISO 14001 certification, as discussed earlier, may find that one certification is sufficient and may not pursue STAR, as a result.

⁷ Kwon, Myugjung, Shui-Yan Tang, and Cheongsin Kim. "Examining Strategic Sustainability Plans and Rigorous Sustainability Actions in California Cities." Under journal review, 2014.

⁸ Wang Xiao Hu, Christopher V. Hawkins, Nick Lebrede, and Evan M. Berman. "Capacity to Sustain Sustainability: A Study of U.S. Cities." *Public Administration Review*, Vol. 72, No. 6 (2012): 841-53.

Second, knowledge is a key. City staff may not have sufficient knowledge to understand what environmental problems they have, what cause the problems, and how the problems could be solved. Technical assistance from external associations is found to be a significant factor that increases city policy actions on climate protection and renewable energy development.^{9,10} In our interviews, STAR, US EPA State and Local Climate and Energy Program, and other projects create tool kits, information sheet, and publish case studies to inform cities and help them design local sustainability actions.

Third, political leadership is a key to local sustainability initiatives.^{11,12} Without strong political support, cities may face barriers to implement local sustainability programs. In some cities we have interviewed, sustainability is not mayors' or city councils' policy priority. Not every city is like Boston having a mayor who recognized climate change as an urgent issue and initiated Greenovate Boston. In the less fortunate cases, city employees, even with sufficient environmental knowledge, may not be able to implement local sustainability initiatives nor pursue any sustainability certifications without mayors' supports.

I. Motivations and Experiences of Four Cities

Table 3 compares the motivations and experiences of Dallas, Denver, Raleigh, and Baltimore in what motivated them to get certified in sustainability, how they selected a certification program between ISO 14001 and the STAR Communities, and what impacts happened after they get certified. These four cities were selected because they share similar sizes, ranging from 430 thousands to 1.3 million. They do not have as many resources as metropolitans such as New York City and Los Angeles for policy actions and have more motivations to seek recognition in the field of local sustainable development. In our interviews, we found that cities are more easily influenced by peer cities.

⁹ Hsu, Jenneille. "Adoption of Local Renewable Energy Policies and Solar Installations in California." Working paper, 2015.

¹⁰ Wang, Rui. "Adopting Local Climate Policies: What Have California Cities Done and Why?" *Urban Affairs Review*, Vol. 49, No. 4 (2012): 593-613.

¹¹ Hsu, Jenneille. "Adoption of Local Renewable Energy Policies and Solar Installations in California." Working paper, 2015.

¹² Wang, Rui. "Adopting Local Climate Policies: What Have California Cities Done and Why?" *Urban Affairs Review*, Vol. 49, No. 4 (2012): 593-613.

Table 3. Motivations and experiences of the four cities—Dallas, Denver, Raleigh, and Baltimore

| | ISO 14001 | | STAR Communities | |
|--|--|--|---|--|
| | Dallas | Denver | Raleigh | Baltimore |
| First certified | 2008 | 2010 | March 9, 2015 | April 12, 2015 |
| Population | 1.26 million | 650650,000 | 432,000 | 621,000 |
| Motivations | A mandate from Department of Justice. | One agency received the certification first and other city agencies learned from its experience. | To learn from other U.S. city members. | To learn from other cities and became a mentor city to teach other members; access to networks. |
| Selecting a program that meets local policy need | The ISO 14001 program was selected by the mandate. | The ISO program provides preventive costs and clear guidelines. -Staff knowledge on the ISO 14001 program. | STAR metrics is comprehensive and consistent with city language that is helpful for strategic planning. | -STAR metrics is comprehensive and consistent with city language that is helpful for strategic planning. -Employees have personally known an executive of STAR. |
| Changes after getting certified | -Sustainability plan is written consistent with ISO - Culture shift -Currently seeking third certification -Don't consider STAR | -Incremental certification agency by agency and operation by operation -Currently seeking third certification -Don't consider STAR | Achieve a higher rating - from 4 to 5 stars. | Achieved and was certified with a 5-Star rating. It has another 120 points to go to reach the highest bar. |

Section III.

RECOMMENDATIONS

A. Recognizing Air Quality as a Regional Issue

Air pollution is a regional problem and cities need to collaborate with their neighbors—sometimes even far neighbors across the Pacific—as well as NGOs, universities, business, citizens, and stakeholders to solve the problem. In other words, actions by a single municipal government are not sufficient to solve regional air quality or emission reduction problems. Some certification systems and ranking programs (e.g., ACEEE city scoreboard) reward city actions on energy efficiency that are meant to lower air pollution, but the cities are not evaluated on air pollution concentration. Thus, it is possible that cities get a high-level certification or ranking for all the policy actions they have taken but in fact they have poor environmental quality. A city can put forth considerable policy efforts to achieve a high ranking on a sustainability certification s without attaining clean air, for even with the right policies in place it may not lead to compliance due to lack of city staff, low capacity, or penalties .

In interviews with regional air quality agencies, city governments, and professional organizations that provide technical assistance to cities they all noted how it is difficult how one city’s air quality program is impacting regional air quality. Even when cities in a region all work together to lower air quality emissions it could take years to see significant progress because of the complexities in transboundary pollution. In some cases, air quality improvements are offset by population growth. For example, both Salt Lake City and Los Angeles have been seriously fighting against local smog by adopting many transportation measures. However, expecting the additional air pollution contributed by the increasing population, these measures may not dramatically improve local air quality.

However, we are not suggesting that rewarding city action in CCAP is a bad idea. Based on our research and interviews, we found some merits in rewarding city policy action in a certification or ranking program. In short, rewarding city policy action encourages cities to collaboratively take action to tackle air pollution. In addition, local authority is limited, and it usually needs regional or national authority to mitigate air pollution. A certification program cannot ask cities to do what is out of their hands. For example, American cities can promote energy efficient buildings and better and cleaner public transport, but controlling the placement and management of coal fired power plants or setting standards for vehicle efficiency is not usually under their control.

It would be important for CCAP to account for regional air quality in the design of its Asian cities program to facilitate wide stakeholder involvement. Cities can work with international universities, scholars, researchers, national NGOs to learn the best practices and get assistance. Cities can work with local NGOs that possess local knowledge and foster the capacity of local NGOs to form a long-standing collaboration. For example, local governments can work with local universities to conduct health impact report to identify local air pollution sources and air cleaning strategies.

It is also important to encourage cities to set up institutions enabling further improvements; for instance, passing ordinances, creating a local air agency, setting up penalties, monitoring systems, reliable air data and released to the public, and enabling public-private partnership. New York City is

a great example. NYC has high turnover rate that city employees come and go quickly. To ensure continuity in sustainability plans the City of New York makes them law. In New York City, for example, since the launch of the New York Sustainability Plan, it is legally mandated that an annual progress report needs to publish every year. Every mayor has to follow the rule, and the rule maintains the sustainability of NY Sustainability Plan. The example reinforces the importance of setting up permanent institutions and governance structures for sustainability programs and air quality management.

CCAP can have two alternatives to credit cities, similar to the outcome-and-local-actions system of the STAR program. In the indicator of outdoor air quality in the STAR program, a community rewards 100% of points through outcomes. Two options are in the outcome.

Option A: Achieve attainment or maintenance status for all measured criteria pollutants

Option B: has to three components:

- **Part 1:** Demonstrate a decrease in the annual concentration of the non-attainment criteria pollutant(s) that have the greatest impacts on public health, specifically PM_{2.5}, PM₁₀, and ozone.
- **Part 2:** Demonstrate a decrease in the annual number of days in which the Air Quality Index (AQI) exceeds 100 over the past 5 years [Partial credit applies]
- **Part 3:** Communities that do not meet the two options of outcomes can earn up to 70% of points available through actions. See appendix for the total 11 actions.

B. Recommendations for Designing the CCAP program

Following is some recommendations for the CCAP to consider when design the program.

1. Third-party Verifiers VS. Cities Certified by STAR/ISO VS. City Self-reporting

It is our understanding that CAA intends to incorporate “Voluntary Sustainability Standards and Labels” (VSSLs) into CCAP’s city certification design. Using VSSLs and bringing in third parties to assess the air quality data submissions of participating cities may enhance the credibility of the CCAP certification and differentiate the CCAP from ISO, STAR, and other programs that inspect members’ performance themselves. However, based on our interviews, cities consider ISO and STAR as reputable third-party verifiers of certifications. In other words, we are unsure if cities would appreciate the value that VSSLs could offer a city air quality certification program.

Instead of bringing in third-party verifiers, ISO, STAR, and some other programs inspect the accuracy of data submission themselves. For example, ACEEE has experts check cities’ self-reporting data for the city scoreboard. Some programs do not verify the data of city performance. For example, CDP only cleans the city data once submitted but does not verify the data’s accuracy. CDP cities are not required to verify their inventory results but are recommended to choose the level and type of verification based on their needs and capacity. One may take into consideration that because ACEEE and CDP are not certification programs, they may not prioritize data accuracy as heavily as certifications. However, again, cities may simply care more about the rankings they achieve and not the robustness of the verification behind the labels.

It has been observed that cities are more interested in the learning outcomes from a city sustainability program than from the reputation gained from a certification. Whether data submission is verified by third parties, the program or not at all, as long as the metrics and guidelines of the program is clear and helpful, cities are more willing to participate in the certification or voluntary programs.

2. Recruitment of Multidisciplinary Experts to form the CCAP Committee

Many successful certification programs we have found have committees that consist of experts from various fields. To be a well-recognized certification program, CCAP should form a multi-disciplinary committee to help CAA design CCAP, help cities assess air problems, and identify solutions. CCAP could benefit tremendously from experts on Asia who specialize in urban planning in Asian cities, air pollution and climate, policymaking, and communications.

Air experts, for example, can layout clear technical assistance guidance for Asian cities. CCAP could assign on-site advisors who work with cities closely to assess and come with solutions that fit local conditions. From the experience of the Clean Energy Project by NRDC and IMT, hiring local staff who works with local governments to tailor strategies and plans can be very successful in solving local problems. Communication experts who can sell the certification program to cities and persuade them this is an important thing to do but not a burden to cities. Also make cities feel they can certainly contribute and make change

3. Stakeholder Engagement and Transparency

Creating stakeholder engagement processes is not only important for city air quality management, but also essential for the certification program. Mechanisms that involve stakeholders in strategic planning for the certification program development are also the key for the program's success. CAA should consider the follow elements for a transparent progress of stakeholder engagement:

- Recruitment of key cities.
- Implementation of self-assess tools (like STAR and ACEEE) and online website that serves as a resource portal sharing successful stories of the best practice cities to inform cities what the certification program value and explaining clearly to cities how to collect reliable data. This would increase the credibility of CCAP and also make the certification program less threatening to new cities.
- Inclusion of a broad range of stakeholders in the certification process. Partnerships with local NGOs familiar with the political and sustainability challenges of the city.
- Involvement the business community.

The biggest challenge for sustainability is making a business case. It is important to frame clean air as win-win to cities and business and link the issue of air pollution with jobs and economic growth.

First, clean air is essential for an employee's health. Not every company sees air regulation as costs when selecting company sites. Foreign executives are concerned about Beijing's poor air quality. Ford Motor Company Executive, Whitney Foard Small expressed how she loved China and her job

as a regional director, but severe urban air pollution forced her to visit the hospital several times, which ultimately drove her out of China.¹³

“Given a choice, senior managers are asking to work in Shanghai rather than Beijing, in part because of the difference in air quality,” says Don Lee of the *LA Times*.¹⁴ There is no official data on the numbers leaving, but executive recruitment companies have said that it is becoming more difficult to recruit top candidates from both expat and Chinese nationals educated abroad communities. In the *LA Times* article, individuals from Ford Motor Company, Stanton Chase, IHS, and the global law firm Major, Lindsey & Africa have also expressed concerns about staff retention in China because of pollution. However, job opportunities are so plentiful and poor air quality is not a deal breaker for many still. The American Chamber of Commerce’s membership grows in Shanghai, different from Beijing where growth is stagnant. American and European chambers have raised their concern about companies being able to do business in cities with such poor air quality.

Second, local air policies and programs can be designed in a way that creates market opportunity for business. In other words, connect policy to business behavior. For example, New York City requires commercial buildings to have energy audits every five years. Some energy suppliers audit buildings with a charge below market price to maintain a good relationship with business. When business wants to upgrade their equipment to save energy, business is likely to approach the energy suppliers for upgrades. That’s how these energy suppliers get business. This example shows how the audit requirement creates a market for energy suppliers without posing too much cost on commercial building owners. On average, commercial offices have a 10-year lease which deters business owners from investing in more energy efficient upgrades. As a result, New York City requires business to upgrade lighting fixtures at least every 20 years to meet higher energy efficiency standards. This is a great example that demonstrates the effectiveness of city regulation as informing and changing business behaviors.

Third, some air cleaning measures do not increase business’s cost but actually save business money, as well as foster strong business community. For example, high energy-efficiency buildings consume less energy from the grid and save electricity bills. Businesses can provide technology to clean air (e.g., bicycles in the bike share program in Taipei are provided by Giant bike company). In the future, CCAP workshops can invite business participants and match business partnership. In this way, CAA can incentivize public-private partnership and stimulate local economic development.

4. Rewarding Policy Action as Solution to Ubiquitous Data Gap Problem in Asian Cities

City governments do not have all data about their cities. Taking building data as an example, in the United States, sometimes cities do not know how many buildings they have within their boundaries. Similarly, data on building energy consumption are not always readily available. Not to mention that Asian cities are very likely to have missing data on the building sector and environmental performance because they are less developed than their U.S. peers. In addition, when collecting required data to get certified, city employees usually know which city departments oversee specific

¹³ Associated Press. (April 13, 2015). “Execs Fleeing Bad Air.” CBS Money Watch.
<http://www.cbsnews.com/news/execs-fleeing-china-because-of-bad-air/>

¹⁴ Don Lee. (June 20, 2013). “As Beijing Pollution Worsens, Some American Expats Clear Out. *Los Angeles Times*.
<http://articles.latimes.com/2013/jun/20/world/la-fg-china-escape-20130620>

data. However, it still takes time for cities to collect and standardize reliable data and benchmark municipal performances of buildings, air quality, energy consumption, emissions, and other issues.

Lack of data is one of the reasons why many certification systems and single-issue ranking reward cities with policy actions but not actual environmental performance. For one, cities themselves do not know policy impacts. For the other, back to the case of building energy efficiency, data of building energy performance are not available in every U.S. city. Therefore, rewarding cities policy action would be more realistic and encouraging for a ranking or certification system.

5. Clear and Achievable Design of Certification Levels

A certification program motivates cities to move up to the next tier. However, ascension is made difficult if different levels are not clearly articulated to cities. An appropriate level design should certify the best practice cities with the highest level. In this way, top-performing cities are awarded, while other cities would be motivated to catch up. A threshold can be set up. The lowest level of STAR is 3 stars. Participating cities that fall below the threshold point to be certified as 3 stars are classified as reporting cities.

Levels can continuously be developed over time. Sustainable Jersey (SJ) currently has 2 levels and is developing the third—gold, which will be the highest level. Developing actions behind the gold level requires a year of research to study the state regulations and identify sustainability elements.

6. Collaboration with CDP, World Council, and Other Organizations

Some of the organizations running programs to promote municipal green practices or certify green communities are already engaging with Asian cities and partnering with these organizations could offer CAA some access for recruiting the cities into the CCAP. We did not find any air-focused city certification program in Asia. ISO certifies environmental management service of organizations around the world, CDP encourages the disclosure of carbon emissions of cities and businesses, and World Council on City Data designs a framework for indicators of life of city quality. Working with one or all of these programs could help expand CAA's city clientele for CCAP or to find some substantive collaboration.

For example, to lighten the burden on cities to submit data, IMT has worked with CDP to co-design questions on building energy efficiency. Cities can therefore submit data in a single form and do not need to alter data outputs for two parties asking for city data. This saves cities time and energy to do real work on improving sustainability. CAA could suggest the CDP to include air quality questions in its annual questionnaire to cities it works with in Asia.

Section IV.

A. The Roadmap for CCAP

Studies have found that U.S. cities build managerial capacity when executing local sustainability initiatives. In other words, cities' sustainability practices are driven by municipal organizational capacity in management, finance, and professional and technical expertise.¹⁵ Many successful organizations and programs we interviewed shared a common roadmap that develops sustainability programs, builds capacity of staff, and over time, expands their scale of operation. We believe this is applicable to CAA, too, that it takes time to build its capacity to implement CCAP. EcoDistrict started from Portland and then expanded to other cities in the United States. Sustainable Jersey focuses on single state but it took three years to build out and deepen the program, which now works with sister cities in Taiwan. The planning process of developing a certification or ranking program also takes time. STAR spent 4 years to set up the program, and ACEEE has been publishing state scoreboards for 10 years before they started the city scoreboard. The U.S. Green Building Council was established 20 years ago and the LEED certification has been their signature program that is now used in nearly 150 countries. Drawing on these years of work on LEED for certifying green buildings, U.S. Green Building Council has recently begun developing the LEED City system.

CCAP should start at a smaller scale with cities in 2 to 3 countries to develop a pilot program in which the program identifies problems in design, allow for inputs and through which build consensus. It is important to start with pilot cities to develop the program with recognition of the actual needs of the cities and address their problems. Then the program can move on to include more countries and cities. The goal of 200 cities by 2020 to join the CAAP looks unlikely, given a wide range of problems the cities want to address, and the variety of the legal framework, the infrastructure, and the resources among the cities. CCAP should address its potential clients by interviewing them and doing the research to understand what these cities really need and what certification program can help based on these needs. Designing and weighing indicators should continue as a dynamic and long-term process. It also takes time to identify governance gap of air quality management in Asia and all the culture differences in many countries. CAA's capacity to come up with an action list for cities and decide appropriate weighting for indicators will be gradually built. Like all other programs we have interviewed, it is likely that CAAP will evolve over time and revise indicators and metrics from time to time, according to their implementation experience, increasing credibility, and growing staff capacity.

Speaking to recruiting cities, CAA can start from soliciting cities by using individual networks. This is not an uncommon way to recruit members for most programs we have interviewed. Recruiting will be the most difficult when a program just started. Once the reputation is set up and city members share their positive experience, recruiting will be easier. Second, when recruiting, it is important to benchmark from cities' best practices. Including leading cities in CCAP would attract followers to join and inspire others.

¹⁵ Wang Xiao Hu, Christopher V. Hawkins, Nick Lebrede, and Evan M. Berman. "Capacity to Sustain Sustainability: A Study of U.S. Cities." *Public Administration Review*, Vol. 72, No. 6 (2012): 841-53.

Since CCAP targets cities in all countries in Asia, it is evident that there may be language barriers. For CAA's reference, QUEST in Europe translates documents in different languages. Currently, the primary documents of CCAP are in English and once the program is solidified documents will need to be translated into different languages in the future. Identifying and addressing communication challenges is key to facilitating city-to-city partnerships. In the CCAP meeting in Washington, DC in August 2015 we heard comments from representatives from Kitakyushu, Japan, and Haiphong, Vietnam expressing concern that language could be a barrier in their future partnership.

After goal setting, CAA then sets up targets and actions when designing the CCAP. For example, if CAA decides the priority is to encourage the creation of institutions for air quality management rather than measuring actual changes in air quality, CCAP would be following more the STAR model of valuing "policy/management actions" more than "outcomes/performance" when giving cities credits. Another example can be, if the goal of CAA is to build up city capacity for air monitoring and generate the reliable data, CCAP may focus on the monitoring efforts and data generation first.

B. Technical Suggestions

Cities are at the front lines of fighting air pollution and national environmental and energy policies should provide cities with comprehensive guidelines, regulations, and incentives to help them improve air quality. As cities may face similar problems, there are many international organizations, such as C40, ICLEI and ICMA, and domestic organizations in the United States like STAR and Sustainable Jersey that manage city-to-city partnerships, pairing cities based upon multinational technical subsidiaries that enable cities to learn from their partners and improve their own internal air quality management skills. These city-based partnerships are important, but because air pollution moves across boundaries, improvement of air quality can seldom be achieved only by an individual city's actions. The cooperation of the cities by region is thus crucial in improving overall air quality. Drawing on interviews with U.S. EPA, Southern California Air Quality Management District and other experts, the following paragraphs provide some technical suggestions focused on the city- and regional-level.

1. City Level

a) Define the problem

Air quality management involves solid background information of the target region, taking into consideration local climate, topography, size of city, current air quality, numbers and types of emission sources, and pollution. Most cities in Southeast Asia not only do not have regional organizations to help gather the aforementioned information they also lack recognition of the public health issues related to air quality. Some of the problems facing many Asian cities around air pollution include:

- Lack of environmental awareness (different levels of understanding of air quality management)
- Insufficient air quality data and no real-time monitoring stations
- Incomplete emissions inventory
- Lack of technical equipment, funding, and experts
- Weak policy implementation of any existing air pollution control laws

b) Basic work

In evaluating and ranking the ability of cities to clean the air, one crucial indicator is that it has a solid Air Quality Management (AQM) system that enables the city to monitor air quality and take emission inventories. Building a robust monitoring system is a precursor for understanding air quality trends, pollution sources, and the geographic distribution of the pollution sources. All of this information is vital to create and evaluate the effectiveness of strategies and policies to address ambient air pollutants. Control strategies or actions that are being ranked in a certification should ideally be based on studies of air pollution exposure and health studies, taking cost-benefit/cost-effectiveness into consideration. Air pollution control strategies should emphasize source control rather than trying to control specific pollutants.

c) Recommendations for establishing the certification

Working as a city-to-city partnership can motivate cities to learn from the partners. Ideally a clean air certification is designed to provide a technical and knowledge platform that helps cities improve the air quality. Recommendations for such a certification include:

- The certification system (both ranking and technical assistance) should strongly encourage recommend cities to develop their AQM system with the certification giving some “points” for efforts to set it up.
- For basic or lower level certifications, CAA should focus more on the improvement in AQM rather than actual improvements in ambient air pollution levels.
- It is recommended that the certification system provides a long list of actions and good practices that have been scientifically and practically proven effective in controlling pollutants—such as the list of U.S. EPA Menu of Control Measures (see Appendix 5) and some academic studies.
- For CAA’s certification black carbon control should be a top priority for local and regional air pollution control decisions, for in many of the developing world cities diesel vehicles and wood burning contribute disproportionately to bad air and threaten health. The certification may “reward” cities that adopt policies encouraging the use of higher quality/low polluting fuels or policies and incentives that encourage citizens to ride public transport or buy private vehicles that use clean fuels or renewable energy.
- The indices that are evaluated in a clean air certification program should be divided into different levels, each containing specific actions. For example, actions at the basic level are like “building blocks” of air quality management, which can lead cities to carry out specific actions and address the air pollution sources.
- When developing the certification system, equivalency should be always kept in mind. For higher levels of certification it should be a priority to have cities confirm that all the monitoring data is accurate, reliable, comparable, and transparent. Therefore, the cities should get sufficient assistance (or the certification organization should provide enough assistance) to check the qualification of equipment or operating staff.
- Ensure air quality measurements are equivalent across cities in different countries.

2. Regional or National Level

a) Define the problem

City cooperation within regions will be vital to address broader problems of transboundary air pollution. The U.S. EPA has worked with various pollution-plagued regions to set up regional air quality management districts, which collect pollution and meteorological data and emissions inventories to inform management plans. Districts need to manage issues similar to those CAA's clean air certification program is prioritizing:

- How can cities in the region cooperate or communicate with each other?
- How to assure the equity in air quality across the region?
- How to build up the management authority?
- How to choose for the expert network/committee?
- How to quantify the results?

b) Basic Work

Emissions reduction policies inevitably will impact industries or human activities, and the economy, at large. Some countries may not be willing to deal with air pollution problems at the cost of slowing economic growth. Thus, having consensus on air pollution issue is a key element for cooperation between cities or in the case of Europe, countries. EU member states share information and align pollution policies, such as creating common motor vehicle emissions standards. In Asia there are some regions working to promote policy coordination, such joint air quality management monitoring and planning in the Pearl River Delta region and Hong Kong (Zang et al., 2013).

In order to have a platform to communicate and share information, forums are necessary to facilitate more regular technology sharing and dialogue. Existing forums such as the Convention on Long Range Trans-Boundary Air Pollution (LRTAP), the Acid Deposition Monitoring Network in East Asia, and the Association of Southeast Asian Nations (ASEAN) Haze Agreement provide excellent means of cross-country/region cooperation.

International governance that focuses on regional air quality could also be tapped in promoting the CAA certification program. The Convention on long-range trans-boundary air pollution (LRTAP) aims to reduce air pollution through the exchanges of information, consultation, research and monitoring. This treaty offers a viable example of a science-based, legally-binding and established a stable mechanism for regional cooperation on science, monitoring, policy and assessments. Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka together form the South Asia Association for Regional Cooperation (SAARC), an organization developed to promote regional economic cooperation and could offer another useful outlet for promoting CAA's air quality certification program. Another possible regional mechanism to target is the ASEAN Haze agreement, which calls for haze to be mitigated through concerted national efforts and intensified regional and international cooperation.

c) Recommendation for Establishment of the Certification

Currently the CAA certification is being designed with a focus on individual cities and to expand it to encompass regions/city clusters it will be important to take a phased approach. The certification could eventually give weight to cities creating or participating in a regional air management agreement.

Central in making a regional network of cities function will be the establishment of a regional expert committee or working group to help promote joint learning in areas such as building energy efficiency and automobile emissions and industrial emissions standards. Regional expert committee and working groups could also help in the creation of regional emission inventories and metrological data.

Regional management need to be under the same monitoring assessment regulations, standards and the goals. In order to ensure that a city's emissions levels are in compliance with international health and environmental standards, it is strongly recommended that industrial sector of Asian countries ensure that control equipment are installed at factories or industries. The Southern California Air Quality Management District is based on a monitoring system that was constructed under the federal regulations. CAA's proposed certification program could be designed to reward cities that improve local air pollution and work with neighboring cities to control pollution in the region. The World Bank's framework for city energy efficiency opportunities and C40's community GHG inventory framework both have citywide and city-authority-controlled sector analyses.

With sufficient data input there are models that can distinguish air pollution generated locally from air pollution generated from external sources, which can help CCAP reward cities that improve local air pollution with the factor of outside air pollution controlled. The rating system is recommended to contain two parts, measured in concentration reduction and the amount of effort invested by the city.

To incorporate and rank air quality into the certification the key first step will be for cities to establish a simple infrastructure for monitoring equipment that includes designing a system and training staff in the city. For those cities in Asia that have not yet built monitoring stations, this guideline is a good way to encourage them to join the "City Clean Air Partnership" that utilizes city-to-city partnerships to assist in building an air quality monitoring systems network. Active participation in the partnerships would help improve a city's rating, but ultimately cities that want to get a higher rating will have to achieve reductions in pollution emissions. For those cities that have already built an air quality monitoring system and management plan, they would need to provide appropriate certification forms, matrices or documents to demonstrate the impact of their efforts. Certifications should remain in effect for 3 to 5 years, but progress on air pollution reductions must continue to be tracked.

To truly build the capacity for regional clean air cooperation in Asia that produces results, it will be vital to attract support from international financial institutions or foundations to help create financial mechanisms to attract the needed investment.