

Fast Facts

Activity: Carbon footprint calculation and carbon offsetting

Launch Date: Philadelphia launched its version of the CarbonPlus Calculator (CPC) tool, *Erase Your Trace*, in August 2009. The Westminster, CO version of the CPC will be launched in 2011. The four other regional versions of the tool have yet to be officially made available to the public.

Purpose: The CPC is an online tool that pairs greenhouse gas emissions calculation and carbon offsets with support for local greening and sustainability projects.

Tree Ownership: Ownership of trees planted varies based on the organizations and agencies involved with each city or state's version of the CPC.

Funding: The CPC was funded by the U.S. Forest Service. Total expenditures amount to approximately \$250,000, about evenly divided between external agreements providing support to collaborators and salaries of Forest Service employees working on the project.

Protocol: The CPC is modeled on the U.S. Environmental Protection Agency's (EPA) Personal Emissions Calculator with customized parameters for each region's specific version. No official protocol was used.

Verifier: Each region's CPC project administrators have the liberty to separately address verification of actual offsets. Only one out of the six sites has a plan to do so, through the Regional Greenhouse Gas Initiative (RGGI).

Payment Mechanism: In the five out of six cases where payment collection is an objective, each city or state's specific version has a payment mechanism that is dependent upon the nonprofit and municipal partners within that region that will receive that donations from the CPC and also upon each version's administrative structure.

Price: \$20/mtCO₂e for the Philadelphia and Westminster versions (both launched as of 2011).

Climate Benefits: While the nonprofit organizations and municipal sustainability initiatives that are supported through donated funds are specific to each city, in general the CPC has been designed to address climate change by increasing the storage of carbon through urban tree planting and other greening projects. Each CPC version's website also provides information and tips pertaining to energy conservation in an urban environment.

Co-Benefits: In addition to the benefits addressing actual greenhouse gas (GHG) emissions, the CPC aims to support local economies and communities by allocating donated funds to local nonprofit organizations and municipal sustainability initiatives. Green jobs creation, cleaner air, aesthetic enhancement of urban areas, and avoided GHG emissions through shading are just examples of the potential co-benefits, or the "Plus", associated with the CPC.

Overview

The CarbonPlus Calculator (CPC) is an online emissions offset tool. It has been funded by the U.S. Forest Service and developed in collaboration with the Davey Institute of Tree Sciences (Davey Institute). While the first version of the CPC was created for Boston, MA, subsequent versions were created for Baltimore, MD, Philadelphia, PA, New York City, NY, Westminster, CO, and the state of Vermont. The goal of the CPC is to allow residents of each respective region to support local greening and other sustainability projects through an online carbon footprint offset tool. Modeled after the U.S. EPA's Personal Emissions Calculator, each version of the CPC is further customized to best represent the GHG emissions, energy usage, and specific data about greening and existing urban canopy cover of that region. Specific nonprofit organizations, municipal sustainability initiatives, and, in the case of Vermont, state agencies are the intended recipients of donations from the CPC, promoting both climate change action as well as community development and supporting local economies through green jobs creation. As of 2011 Philadelphia is the only city to have officially launched its version of the CPC, which has resulted in roughly \$900 towards tree planting in its parks system. All CPC versions can be accessed at <http://www.itreetools.org/carboncalculator/entry.cfm>.

The Program

In early 2007 at a Northeast Urban Research Organizational Network (NEURON) meeting in Boston, that city's Chief for Environment and Energy Services, Jim Hunt, was the keynote speaker and introduced an idea to gain support for urban tree planting through engaging residents and businesses in offsetting their carbon footprints. The participants of the meeting, mostly representatives from nonprofit organizations, municipal offices, and universities of the major northeastern cities and U.S. Forest Service employees, brainstormed and came up with the CarbonPlus Calculator, an online tool that would be based on local data to support local greening projects with local funds.

The Forest Service's Northern Research Station pledged financial support to develop an initial version for Boston since the City was in the process of developing the *Grow Boston Greener* initiative to increase the city's overall

tree canopy. The Davey Institute and the National Center for Digital Government were contracted to develop the model, the calculations, and the website design for the CPC while the partners in Boston and at the Forest Service collaborated to brand the tool, write the accompanying text, and determine how it would be implemented. By the fall of 2007 an initial edition of the CPC was complete and soon thereafter, in response to interest from other NEURON participants, the Davey Institute began to work on versions for Baltimore, New York City, Philadelphia, and the state of Vermont. By early 2009 the additional versions were finished and had been passed on to the local project leads. In late 2010 a version was developed for the City of Westminster, CO after its urban forestry committee discovered the tool, became interested, and contacted Mark Twery, Forest Service research scientist and CPC project lead (16, 17, 30, 37).

The CPC follows the concept and much of the actual programming of the U.S. EPA's Personal Emissions Calculator. Additionally, parameters for each specific city/state such as electricity emission factors and regional natural gas rates are customized. Currently, each version varies based on the specific objectives of the partners. For example, the New York City CPC version has not been set up to accept financial contributions since its intended use was to educate about GHG emissions and track reductions.

The basic structure of the CPC is set up to give users the option of calculating household emissions, car emissions, air travel emissions, and/or business emissions. Household emissions calculations are based on the number of people in the household, the main method of house heating, average electricity, gas, and fuel oil bills, and types and amounts of waste recycled. By providing vehicle type, average miles per gallon, and annual driving miles per vehicle, car emissions are calculated. Similarly, air travel emissions are calculated by inputting estimated miles traveled by air annually. Business emission calculations are based on business type, heating methods, number of employees, square footage of the facility, details of energy usage (such as Kwh of electricity or gallons of propane used over a time period), waste generated and recycled, subsidized commuters, vehicle and air travel, freight emissions, and business equipment emissions. Business emissions can also be calculated and compiled for multiple sites.

Thorough descriptions of how every calculation has been determined are included on CPC version websites under the heading “How it Works” (4, 27, 30).

While the calculation features of each version are standard, what happens after a user determines an emissions total depends on the end-use goals of each city/state’s CPC project leads. Where the funds that are used to offset the emissions go and how they are tracked are up to the organizations and city agencies involved with the separate CPC versions.

CPC Versions

Boston

The *Grow Boston Greener* campaign was developed based on data collected from a 2005 tree inventory (14). Boston’s Department of Environment and Energy Services, the U.S. Forest Service, and the Urban Ecology Institute (UEI) were collaborating on raising funds and awareness for the initiative’s goal to plant 100,000 trees in the city by 2020 and were eager to use the CPC in this endeavor. The UEI became the project lead in Boston and as the development of the CPC progressed throughout 2007 the need to support other emergent city sustainability initiatives was evident. Thus, in addition to *Grow Boston Greener* the Boston CPC incorporated the *Solar Boston* project to support the increase of solar technologies in the city and *The Boston Energy Alliance* (this has since been renamed *Renew Boston*), which was focused on improving energy efficiency throughout the city. Also, in 2008 Conservation Law Foundation Ventures, Inc. (CLF Ventures), an environmental consulting nonprofit, was hired to perform programming and accounting services for the Boston CPC (16, 18, 33, 34).

After months of communication and collaboration, in 2008 the mechanics of the Boston CPC were finalized.



The Boston Urban Forest Coalition was formed in 2007 to support *Grow Boston Greener* and transform Boston’s urban forest in order to improve the urban forest ecosystem, public health, and quality of life for Boston’s residents. The above picture was taken from that group’s website.

This is how it would work: When users had calculated their emissions, they would be given the opportunity to offset them by purchasing any number of tax-deductible Boston Green Certificates. Each Boston Green Certificate would represent 1 ton of CO₂ equivalent (tCO₂e) and would cost roughly \$20. \$3-\$5 from each certificate could go towards the purchase of a verified carbon offset on the Regional Greenhouse Gas Initiative (RGGI) market, which would be administered by CLF Ventures and the remainder would be entered into a Boston Green Fund. This fund would then be dedicated to supporting the three previously mentioned initiatives (2).

By 2009, the parties involved were all comfortable with the design, validity, and transparency of the Boston CPC and an advisory board was established. Despite this, after June of that year the momentum for officially introducing the tool to the public slowed and as of early 2011 the website has yet to be launched. Most Boston partners interviewed for this case study remain hopeful that the Boston CPC will be used in some capacity in the future (16, 18, 28).

Philadelphia

Mayor Michael Nutter took office in 2007 and introduced his ambition for Philadelphia to become the “greenest city in America”. The Mayor’s Office of Sustainability was established in 2008 and in early 2009 the city’s sustainability plan, *Greenworks Philadelphia*, was released. With a goal to plant 300,000 trees by 2015, the CPC was seen as a way to increase education and awareness about energy use as well as a means to raise funds for tree planting (5, 13).

The CPC project lead at the Forest Service, Mark Twery, corresponded with staff from the Mayor’s Office of Sustainability and the Fairmount Park Conservancy, a nonprofit organization that supports Philadelphia’s park system and a CPC version was soon created for the city, using local parameters and different mechanics from the Boston CPC. When a user or business chooses to offset their GHG emissions on the Philadelphia CPC they will automatically be directed to the Fairmount Park Conservancy website, where they could make a tax-deductible donation to a general carbon fund. Those funds would then be sent on to the city’s Parks and Recreation department for tree planting in parks and along streets. The cost to offset was set at \$20 per tCO₂e (10, 30).

In August of 2009 Mayor Nutter officially launched the Philadelphia CPC, which had been renamed *Erase Your Trace* (available at www.eraseyourtrace.org). The launch received minor press coverage at the time and since then no further marketing has occurred. The Fairmount Park Conservancy reports that roughly \$900 has been donated through *Erase Your Trace*. In 2010, restructuring in the Mayor's Office of Sustainability resulted in the hiring of Alex Dews, the current Policy and Program Manager. He became the lead on *Erase Your Trace* and sees potential for the tool being better incorporated into the Greenworks Philadelphia plan in the future (5, 8, 15).



Philadelphia's expansive park system covers roughly 9,200 acres and claims 10% of the city's land. 63 regional and neighborhood parks are managed through Philadelphia's Parks & Recreation Department, assisted by numerous stewardship associations and nonprofit organizations. The Philadelphia CPC aims to raise funds to support the planting of trees throughout the city's parks.

New York City

Staff from the City of New York Parks & Recreation Department requested a version of the CPC soon after work on the original Boston version began. Jacqueline Lu, Director of Research & Analysis for Forestry, Horticulture, & Natural Resources for the department was assigned to take the lead on the project. At the time, the *MillionTreesNYC* Initiative to plant and care for a million trees across the five boroughs of the city within the next decade was taking shape and those involved were open to ideas about garnering support for the urban canopy (19, 21).

The New York City CPC was from the beginning intended to be a tool to raise awareness about the need to reduce emissions through changes in behavior and about the role of trees in energy conservation and climate change mitigation. Aligned with Mayor Bloomberg's long-term

sustainability plan, *PlaNYC*, the CPC was never considered a mechanism for fundraising but was seen as a tool for public education. The City's general stance regarding sustainability, says Ms. Lu, is about real reductions of emissions and that selling offsets would not fit within the *PlaNYC* framework.

A New York City CPC version was developed by the US Forest Service and the Davey Institute but as of 2010, the City of New York Parks & Recreation Department and the Mayor's Long Term Planning & Sustainability Office had not moved forward with adopting or launching the CPC. Ms. Lu noted that significant changes would needed to be made to the appearance of the site to align with *PlaNYC* and the capacity to achieve this does not currently exist. There were talks of hiring an intern to adapt the site to the *PlaNYC* branding, but this has yet to occur (19, 23, 25).

New York City's ambitious goal to plant and care for one million trees in a decade was officially launched in December 2007. The NYC CPC would not raise funds for actual tree plantings but, if officially adopted, rebranded, and launched, would be used as an educational tool. Real emissions reductions and a greater awareness of trees' role in energy conservation would be the main objectives.



Baltimore

Similar to the New York City story, a Baltimore version of the CPC was requested soon after Boston had its tool. Staff from the Parks & People Foundation, a leading non-governmental organization thought that the CPC would fit well for Baltimore, so after contacting the Forest Service, a version was developed. Anne Draddy, coordinator for the city's urban forestry initiative, TreeBaltimore was designated the Baltimore CPC project lead and has had contact with the Forest Service's Mark Twery since late 2009 regarding the best way to move forward with the tool (1, 9, 30).

Westminster

Members of Westminster's Green Team Committee, a group of municipal employees, were approached in 2010 by a local company interested in offsetting its carbon footprint by contributing funds to support tree planting. The partnership was a success and prompted the Green Team Committee to implement a permanent carbon offset service to residents and local businesses. After only a few

months of considering options, researching what other groups were doing, and speaking with Forest Service employees, the team decided that the CPC was the best fit for their city and by the end of the year they had a CPC version developed (provided free of charge by the Forest Service) it passed through City Council, and was posted on the municipal website. Each tCO₂e offset through the Westminster CPC costs \$20 and funds are directed to the *Living Legacy Program* to support memorial tree plantings. Individual donors have a choice of purchasing enough offsets to cover the entire cost of planting one tree (\$250) or having their offset funds combined with others to reach the necessary amount. As of early 2011 the Green Team is considering ways to move forward with marketing and officially launching the tool (17, 36).

Vermont

Danielle Fitzko, Urban & Community Forestry State Coordinator, first heard of the CPC at a time when funding for her department's community grants program had been cut. The CPC was seen as a novel mechanism for raising funds to support communities throughout the state in their greening efforts through the *Trees for Local Communities Program*. A CPC version was developed but by 2009, the Urban & Community Forestry Program had decided not to move forward with exploring options for the tool in Vermont. One reason for this decision was the lack of organizational capacity to administer and adapt the CPC for statewide use. Additionally, the Urban & Community Forestry office received unexpected funding for the *Trees for Local Communities Program* and no longer had an immediate need to use the CPC. Though Ms. Fitzko remains interested in the potential for using the CPC as an educational emissions reduction tool, as of early 2011 there is no one assigned to the task and there are no resources available for project development (12, 35).

Participant Perspectives

The lead author of this case study conducted twelve interviews with individuals that have been closely involved with the development of the CPC, both at the federal level and as city and state partners. While the progression of each version of the tool has followed its own path, it is clear that everyone involved has seen great potential in what the CPC could offer local populations, businesses, and urban forestry efforts.

The Forest Service's Mark Twery, the overall project lead for the CPC said that "the real initial driver was the idea of getting people to think that they could buy voluntary offsets for local projects. . . and there was the possibility of incorporating urban forestry and getting more trees out there."

Rod Larsen, the Westminster CPC project lead, expressed that he and his colleagues were looking for something "that people could understand and that wasn't very complicated. None of us here are scientists so we needed to rely on the system itself to provide the scientific background . . . to use something that was developed by the Forest Service added a lot of credibility." Jacqueline Lu from NYC Parks & Recreation noted that "we had some big idea that this could definitely be leveraged as an educational tool as part of the mayor's larger sustainability plan." Vermont's Danielle Fitzko "heard about it and loved it" and the CPC's appeal for the Mayor's Office of Sustainability was "giving Philadelphians the chance to offset their carbon locally with a cause that's local."

The various challenges facing each CPC version can perhaps be summed up by Lynne Westphal, Forest Service collaborator on the project, who considered "how do you start a market for something that hasn't had one before?" Also, the Forest Service's Mark Twery has recognized that "there are a variety of things that stand between a finished piece of software and it actually being used."

Alex Dews from the Philadelphia Mayor's Office of Sustainability noted that, while he understands that the CPC is designed to collect contributions, it is difficult now to consider allocating resources to redesigning the appearance of the site and marketing it, especially since funds for actual tree plantings have been scaled back in recent years. Additionally, Meg Holscher from the Fairmount Park Conservancy said that "one challenge we all faced with this program is that there was no budget for any marketing. I think that it's a wonderful program . . . but if people don't know about it then it's really limited." TreeBaltimore's Anne Draddy stated that it would be helpful to have prepared materials and guides on the voluntary carbon market, comparable projects, and marketing methods to aid the city partners in getting the CPC off the ground. For the Boston CPC, CLF Ventures' Jasmine Tanguay noted that "it was just a challenge from a financial perspective to get the money to really

launch the program properly and so we lost a lot of momentum.” However, Boston’s Department of Environment and Energy Services’ Jim Hunt still considers the CPC to be an active project and there are hopes to resume work on it in the future. Similarly, Jacqueline Lu said that NYC’s Mayor’s Office of Long Term Planning and Sustainability is still planning to use the CPC, but that logistical issues exist “around how we could take the CPC as it exists and incorporate it and

brand it as part of the *PlaNYC* initiative.” For Vermont’s UCF coordinator Danielle Fitzko, “I think the economy is what hurt it the most. . . . we lost a lot of state employees . . . and really had to pick and choose what we could do and we already had enough on our plate”. Fitzko also noted concerns that the price of planting and maintaining urban trees would not be covered by the sale of carbon offsets.

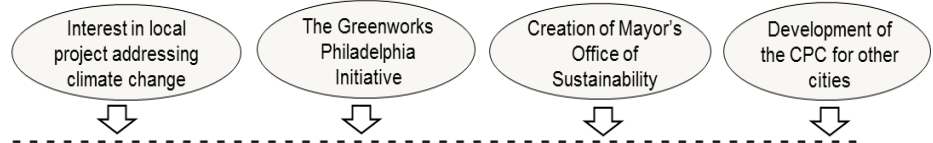
Market Chain Map

The market chain map summarizes the roles of participants and contributors to market-based initiatives (26). The Enabling Environment section indicates the external factors that facilitated the development of this urban forest carbon program. The Market Chain Actors and Linkages section includes the producers, purchasers, facilitating intermediaries and flow of funds. The Supporting Institutions section lists entities that provided critical support, but were not part of the market transaction. Because forest carbon markets are newly emerging, the same organizations may show up in more than one capacity as they work to develop all of the components needed for a successful, market-based program. The dollar signs indicate flow of funds and the leaves indicate trees planted.

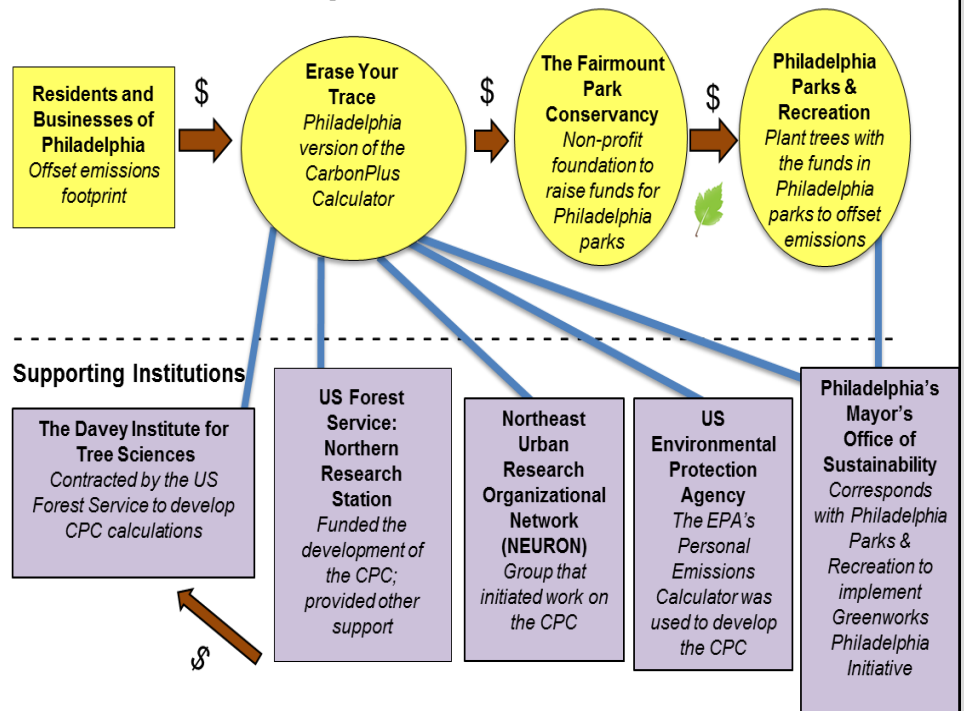
Since the Philadelphia CPC is the only version of the tool that has officially and publicly been

launched as of 2011, it is the focus of this case study’s market chain mapping exercise. The creation of the Mayor’s Office of Sustainability and the Greenworks Philadelphia Initiative paired with the availability of a CPC version and a general public interest in local projects to address climate change were all conditions that contributed to the development of *Erase Your Trace*, Philadelphia’s version of the CPC. Residents and businesses of the city use *Erase Your Trace* to calculate their emissions and have the option of paying \$20 per tCO₂e to offset; the funds are directed to the Fairmount Park Conservancy, a foundation that raises money for Philadelphia’s parks. From there, the funds are allocated to plant trees throughout the city. *Erase Your Trace* was developed by the U.S. Forest Service and the Davey Institute for Tree Sciences, who worked with the Philadelphia Mayor’s Office of Sustainability. The developers of the tool were supported by the Northeast Urban Research Organizational Network and used resources from the U.S. EPA.

Enabling Environment



Market Chain Actors and Linkages



Common Barriers

While each of the six CPC versions developed between 2007 and 2010 has its own story, there are commonalities between them all. It is evident that the

people and organizations involved have seen potential in the CPC and have invested significant time and resources to its development. However, the fact remains that as of early 2011, the tool is for the most part inactive. Factors that have played a part in the loss of momentum

of the CPC include:

- ◆ *The state of the economy:* As the domestic economy slowed in the late 2000s and funding for staff and projects became tighter, the development of the CPC versions slowed as well. That economy also affected the ability of individuals and businesses to spend money on voluntary carbon offsets.
- ◆ *Lack of resources and low prioritization:* Directly related to the state of the economy, when resources became stretched and groups were not able to hire interns or employees to work on the CPC, it became less of a priority.
- ◆ *Employee turnover:* Since the CPC was developed over a multi-year period, some of the original interested parties no longer hold the same position with the office or group at which they worked when they first heard of the tool. In Boston, Philadelphia, Baltimore, and Vermont employee turnover, restructuring, and the fact that new employees have been put in charge of a CPC version without being familiar with it have been significant factors in slowing its progress.
- ◆ *Project management:* A major logistical issue that each CPC version's local leads have had to consider is how the tool would be administered: who would receive the funds, how the money would be directed to the appropriate party, how the contributions would be accounted for, and who would monitor the projects associated with the CPC. With small staff sizes and stretched resources, the accounting and administration tasks have weighed heavy on the non-profits and agencies involved.
- ◆ *Readiness and defining end-use goals:* Since each version of the CPC is ultimately associated with local institutions, the project leads in each city and also in Vermont have stressed the importance of incorporating the CPC into local sustainability objectives and branding models. Well defined end-use goals and clear ideas for how the tool will contribute to local sustainability initiatives for each specific version should be in place before making it available to the public.
- ◆ *Marketing:* In Philadelphia, the CPC was officially launched in August 2009. Yet, the tool has seen minimal use. A major reason for that is the lack of marketing. If local residents and businesses do not know about the CPC they will not use it. Effective marketing requires funding, professional experience, and user testing; these elements have largely been missing for the CPC.
- ◆ *Accountability:* While collaboration between the federal, public, and private sectors has been key in the overall development of the CPC, lack of shared accountability may have hindered its progress. Since the Forest Service funded the development of each version of the CPC and no real financial investment has been made by the municipal and state offices and their local nonprofit partners, the latter may have felt little pressure to launch the site and see a return on the investment. Further, as mentioned earlier, some of the CPC versions are now the responsibility of employees that are unfamiliar with it and have no real motivation to prioritize the project.
- ◆ *Ambivalence with offsets as a climate action strategy:* Some CPC partners and individual staff had ethical, political, or strategic concerns regarding the use of carbon offsets in the project, including worries about how the public would receive the tool in a particular locale. These and other uncertainties that surround the use of voluntary carbon markets to address climate change have been factors in the slow development and unsure outcome of the CPC.

Looking Forward

Through interviews with project participants it is clear that those involved continue to think that the CPC, in theory, is a good idea, despite its current generally idle state. The potential remains for the CPC to motivate urban residents to learn about and respond to climate change through personal and business emissions calculations that are based on local data and to offset those emissions by supporting local greening and sustainability initiatives. In 2010 officials from the City of Westminster recognized that potential and within a short amount of time had a CPC version developed, passed through City Council, and linked to the municipal website. The availability of the CPC model and the fact that it has been supported by the US Forest Service since the beginning may appeal to other municipalities that are interested in adopting a voluntary carbon market mechanism.

The story of the CPC is not over. While as of 2011 each version's development is at a slightly different stage and has been influenced by a mix of factors, the participants have all at least considered appropriate next steps, which for many of them include dedicating the financial resources to interns, marketing, rebranding, or administration.

considerable. By recognizing and advertising the multiple environmental, economic, aesthetic, and social benefits trees provide, the Boston, Philadelphia, and Westminster CPC versions promote premium offsets that sell for a higher price (\$20/tCO₂e).

♦ *Logistical details will require time and resources:* One reason there has been slow progress on the CPC at the local level is that after the Forest Service and the Davey Institute completed each version, it was left up to the local project leads to decide how the tool would be used, the funds administered and tracked, and how the projects would be monitored. This is an extremely important aspect to which significant resources do need to be allocated up front.

♦ *Identified end-use goals for each specific version of the CPC are essential:* Since the intended users of the CPC versions are local residents and businesses, the end-use goals of the tool should be appealing to that audience and consistent with the overall environmental policies, practices, and sustainability initiatives of each city/state.

♦ *Determine the level of accuracy and traceability desired:* In terms of accounting for each tCO₂e offset, how important is it to the agencies, the nonprofit organizations, and, ultimately, the users to be transparent and valid? The Boston CPC would (if launched) address concerns around validity by using a portion of each tCO₂e to purchase a verified carbon credit from the RGGI market, but there has been little indication of how the other versions would address this element. This approach could present a good model providing accountability in offset projects.



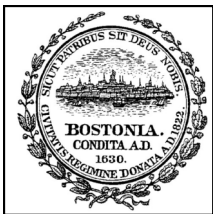
The home page for the Boston CPC. Options exist for offsetting household, car, air travel, and business emissions and the site offers extensive information on the science behind the calculations as well as tips for

Lessons Learned

The CPC is an innovative tool, demonstrating that:

- ♦ *Federal leadership and support can produce results:* Despite the CPC's general inactivity between 2009 and 2011, the development of the model, the calculations, and the website and the recruitment of city/state participants occurred over an impressively short period of time: the idea was introduced in January of 2007 and within the year the initial Boston version was complete.
- ♦ *To fund urban forestry, premium offsets are necessary:* The trading price of carbon on voluntary markets can be low while the costs involved with planting and maintaining urban trees are

Project Partners



Boston
The City of Boston's Department of Environment and Energy Services
 This office provides services in the areas of natural and built resource management, program and policy development related to the environment, and advocating for energy efficiency and

reliability. Jim Hunt, the chief of the department, was involved with the development of the CPC from the beginning (16).



The Urban Ecology Institute

The UEI is a nonprofit organization that was established in 1998 to develop, organize, and participate in education and community action to promote a healthy ecosystem in

Boston. Formerly linked to Boston College, now the UEI is affiliated with Lesley University and provides students with opportunities to become involved in its programs. The UEI was a driving force for the development of the Boston CPC; its Executive Director at the time, Charlie Lord, worked diligently with a group of graduate students on the project. Mr. Lord has since left the organization (18, 33).



Conservation Law Foundation Ventures, Inc.

CLF Ventures is a nonprofit environmental consulting group that is affiliated with the Conservation Law Foundation.

Since 1997, CLF Ventures has provided a wide range of services to assist with the development and implementation of sustainability initiatives, programs, and businesses. CLF Ventures was hired to assist in the development and administration of the CPC, including presenting the project to various stakeholders. Jasmine Tanguay was the staff member most intimately involved in this process (6, 28).



Boston's Urban Forest Coalition

The BUFC is comprised of city, state, and federal government, universities, and nonprofit organizations. It was formed in 2006 to support the Greater

Boston Forest Inventory and was involved with the development of the *Grow Boston Greener* campaign (3).



The Urban Ecology Collaborative

The UEC was formed in 2002 and is a partnership between municipal, state, and federal

entities, nonprofit organizations, and universities from Boston, MA, Baltimore, MD, New Haven, CT, New York, NY, Philadelphia, PA, Pittsburgh, PA, Providence, RI, and Washington, DC. Partners from these eight urban areas

collaborate on sustainability initiatives. Resource sharing and partnerships through the UEC played a part in the development of the CPC (32).



The National Center for Digital Government

NCDG was established in 2002 and is based at the University of Massachusetts (UMass) Amherst in the Center for Public Policy and Administration and the College of Social and Behavioral Sciences. NCDG aims to support and encourage research capacity and practice at the intersection of governance, institutions, and information technologies. Charles Schweik, Associate Director of NCDG and professor at UMass Amherst, was involved in the development of the Boston CPC calculations and also ensured that the Boston CPC website would be hosted by UMass (the other cities' sites are hosted by the Davey Institute) (22).

Philadelphia



Philadelphia's Mayor's Office of Sustainability

The office was established in 2008 and

has focused on developing, fostering collaborations for, and implementing the *Greenworks Philadelphia* six-year sustainability plan. Previous staff at the office were instrumental in developing the Philadelphia CPC and now the Policy and Programs Manager, Alex Dews, is the main contact for the Forest Service regarding the tool (20).



The Fairmount Park Conservancy

Since 2001 the Fairmount Park Conservancy has raised more than \$19 million for Philadelphia's park system. The Conservancy accepts tax-deductible private donations

and actively supports initiatives that improve the environment and spark community revitalization. For the Philadelphia CPC, *Erase Your Trace*, the Conservancy acts as the intermediary between the individual user and the actual tree planting in Philadelphia: carbon offset contributions are donated to the organization and put into a general tree planting fund, to be utilized by Philadelphia Parks and Recreation (11).

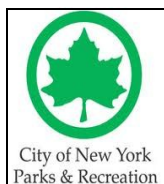


Philadelphia Parks & Recreation

In July 2010 the Fairmount Park Commission and the Philadelphia

Recreation Department merged to form *Philadelphia Parks & Recreation*. In addition to over 9,200 acres of citywide parkland, this department manages all street trees in the city of Philadelphia. With a goal to plant 300,000 trees by 2015 and to work towards 30% urban forest canopy by 2025, the *Greenworks Philadelphia* plan will rely upon Philadelphia Parks and Recreation to increase tree planting. The Philadelphia CPC, *Erase Your Trace*, is intended to support these efforts (24).

New York City



The City of New York Parks & Recreation Department

This department oversees about 29,000 acres of land across the five boroughs and maintains over 600,000 street trees and 2,000,000 park trees. The Department's Jacqueline Lu has been the project lead on the New York City CPC (19).

Baltimore



TreeBaltimore

TreeBaltimore is a mayoral initiative to increase the urban tree canopy throughout the city. TreeBaltimore operates through the Baltimore Department of

Recreation & Parks and works with local communities and nonprofit organizations to foster stewardship. Anne Draddy was the TreeBaltimore Coordinator and contact for the CPC, but is no longer in the position as of late 2011 (29).

Westminster



The City of Westminster, CO

Westminster is a suburb of Denver and home to roughly 110,000 residents with

roughly 15% of the land set aside as conserved Open Space. Members of the Green Team Committee include municipal employees working to maintain and promote the city's open space, parks, urban forests, and sustainability initiatives. Rod Larsen, Parks Supervisor, was the lead in the development of the Westminster CPC (17).

Vermont



Urban & Community Forestry Program

Founded in 1991, the UCF is run through the Vermont Department of Forests, Parks, & Recreation. UCF promotes stewardship of and raises awareness for trees along municipal

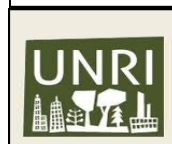
streets, in city parks and on town greens, and in community and town forests. Danielle Fitzko is the State Coordinator for UCF and has been the main contact for the Vermont CPC (12).

Project Partners for all CPC Versions



The U.S. Forest Service's Northern Research Station

The NRS covers the 20-state Northeast and Midwest regions and has its headquarters in Newton Square, PA. With laboratories in each of the 20 states, NRS engages in programming and research to better understand and manage the regions' forests. NRS has been involved with the CPC from the beginning and has funded the development of the CPC versions.



Research social scientist Lynne Westphal and research scientist Mark Twery have

both served as the Project Lead for the CPC. Much of the scientific analysis of urban trees included in the CPC is the work of David Nowak, Forest Service research scientist. Dan Golub adapted the EPA calculator structure to the CPC, researched and modified all calculations necessary, and assisted in writing the text explaining how the CPC works and David Bloniarz, biological scientist, also played a role in the CPC development. *The Urban Natural Resources Institute* (UNRI) is an initiative of the NRS and its research and scientists have been incorporated into the CPC as well (30, 31, 37).



The Davey Institute for Tree Sciences

The Davey Institute was established in 1909 as a research branch of the Davey Tree Expert Company. The Davey Institute specializes in scientific advancements and research and development in trees sciences. It offers carbon project verification services, technical services, and a range of trainings and educational opportunities. Lianghu Tian and Greg Ina were contracted by the Forest Service's NRS to program the local calculations for each CPC version (7).

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