

# Chicago's Guide to Completing an Energy Efficiency & Conservation Strategy

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*Chicago's Guide to Completing an Energy Efficiency and Conservation Strategy draws heavily on an earlier report, "Lessons Learned: Creating the Chicago Climate Action Plan," December 2008. The authors of Chicago's Guide to Completing an Energy Efficiency and Conservation Strategy include the following:*

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# Introduction

## PLANNING

BUILDINGS • TRANSPORTATION &amp; LAND USE • CLEAN ENERGY • REDUCED WASTE

**T**he purpose of the Energy Efficiency and Conservation Block Grant (EECBG) program is to assist communities to implement energy efficiency and conservation strategies:

- To reduce fossil fuel emissions in a manner that is environmentally sustainable and maximizes benefits for local and regional communities
- To reduce total energy use; and
- To improve energy efficiency in the transportation, building, and other appropriate sectors.

The Energy Efficiency and Conservation Block Grant (EECBG) program was passed as part of the Energy Independence and Security Act of 2007.

Within 120 days after receiving initial funding, eligible communities must submit a proposed **Energy Efficiency and Conservation Strategy** that describes the energy goals and proposed plan for the use of the EECBG grant.

*Chicago's Guide* will help cities and counties to thoughtfully plan for long-term and sustainable energy efficiency and conservation and maximize the opportunity EECBG planning dollars represent. The requirement to develop a plan is **also** a great opportunity. A strong strategy can provide not only a roadmap for reducing energy use, but also for lowering government, business, and resident energy costs, and promoting economic development and job creation.

Developing a comprehensive up front strategy is especially important because only year one EECBG funding can be used for strategy development; funding in subsequent years is only for implementation of city and county strategies. Using funding to access expert assistance can help communities maximize savings, leverage, and other benefits.

Chicago has undertaken this kind of planning and this Guide builds on the lessons of the Chicago experience. The very inclusive Chicago process took more than a year to complete, but the time dedicated to systematic assessment and broad engagement had a high payoff. Taking advantage of the work that Chicago did and the reports posted on Chicago's climate action website ([www.chicagoclimateaction.org](http://www.chicagoclimateaction.org)) is one way to expedite the energy efficiency and conservation planning process. While it may take more than 120 days to complete a long-term and sustainable plan, cities and counties can use EECBG planning dollars to design a planning process that produces not only a longer term plan, but also sufficient results early on to submit their energy efficiency and conservation strategy to US DOE on schedule.

The purpose of *Chicago's Guide* is to help cities and counties to develop a long-term and sustainable energy efficiency and conservation plan and maximize the opportunity for cost savings, environmental benefits, financial leverage and economic development.



## Realizing the Value

PLANNING

BUILDINGS • TRANSPORTATION &amp; LAND USE • CLEAN ENERGY • REDUCED WASTE

In Chicago, the process of developing an energy efficiency and conservation strategy as part of a broader climate change planning process resulted in multiple benefits, which all communities can achieve.<sup>1</sup>



Energy efficiency and conservation planning can help a city or county to:

- ✓ Determine how to organize, strengthen and build on existing city programs.
- ✓ Discover and tap into new program ideas that are working for other cities.
- ✓ Target the most cost-effective opportunities to reduce energy use and improve energy efficiency (and ones that help achieve economic and environmental benefits).
- ✓ Do the most possible to help residents make it through the current economic cycle by reducing their housing and transportation costs.
- ✓ Leverage funding from other federal, state, and private sources that can be combined with EECBG and which require plans (for example, the Green Jobs Act).
- ✓ Pursue new economic development and job creation opportunities.
- ✓ Engage civic and business leaders and residents to bring their skills and resources to the table.
- ✓ Simultaneously complete a climate action plan and sustainability plan.
- ✓ Produce a roadmap for achieving these benefits and benchmarks that will help the city/county and its stakeholders stay on course.
- ✓ Put in place a means to track energy saved, renewable energy installed, greenhouse gas emissions reduced, funds leveraged and jobs created, which cities and counties are required to do in their EECBG annual reports to USDOE and the public



<sup>1</sup> For more information on the Chicago Climate Action Plan, see [www.chicagoclimateaction.org](http://www.chicagoclimateaction.org).



# Model Plan Outline

**T**his model outline for an energy efficiency and conservation strategy reflects the experience of Chicago in developing the Chicago Climate Action Plan, which is part of Chicago's economic prosperity strategy.

## *Model Outline for an Energy Efficiency and Conservation Strategy*

1. Community Vision for Energy Efficiency and Conservation
2. Recognition of Stakeholders Who Were Part of the Planning Process
3. Baseline and Projected Energy Sources and Uses
4. Overall Goals
  - 4.1. For reducing fossil fuel emissions in a manner that is environmentally sustainable and maximizes benefits for local and regional communities
  - 4.2. For reducing total energy use; and
  - 4.3. For improving energy efficiency in the transportation, building, and other appropriate sectors.
5. Plan for Maximizing the Benefits to the People and Businesses of the Region
  - 5.1. Household and business cost savings
  - 5.2. Community and economic development
  - 5.3. Livability and environmental quality
  - 5.4. Greenhouse gas emissions reductions
6. Priority Actions by Sector:
  - 6.1. Building Energy Efficiency
  - 6.2. Clean and Renewable Energy
  - 6.3. Transportation and Land Use
  - 6.4. Reduced Waste
  - 6.5. Other
7. Implementation Action Plans
8. Budget, Funding, Leverage, and Sustainability Plan
9. Communications and Engagement Plan
10. Jobs and Economic Development Plan
11. Alignment with Plans of Adjacent Municipalities and the State
12. Plan for Tracking and Sharing Progress





# Planning Process Guide

It can seem a big task to gather the data and prioritize the actions for a sustainable Energy Efficiency and Conservation Strategy. A four-phased process has worked for Chicago and many other cities. Chicago documented its four-phased process so that other cities can adapt it.<sup>2</sup> The four phases are:

- I. Organize the Team, Stakeholders and the Planning Process
- II. Complete the Inventory and Analysis
- III. Choose Energy Saving Goals, Actions, and Milestones
- IV. Design Implementation Plans and Structures

Appendix A (p. 27) to this Guide is a sample RFP for soliciting assistance for the research phase or the whole process.

## *I. Organize The Team, Stakeholders And The Planning Process*

Creating a team of government, private and nonprofit leaders makes it much easier to maximize the cost saving, economic development, and environmental benefits of energy efficiency and conservation planning. This requires some up-front work to put in place the structures and processes for reaching broad agreement and support for ambitious, but achievable goals and actions. This phase addresses how a city, county, or region can manage the planning process and gather input; involve experts in the assessment of existing resources and capacities; and involve all stakeholders in brainstorming actions.

1. Choose a staff champion for the development of the Energy Efficiency and Conservation Strategy.
2. If possible, hire or assign a skilled facilitator for the public engagement process.
3. Charge a public-private task force to oversee the planning process.
4. Identify key stakeholders in the community who should be engaged:
  - People who will be impacted (positively and negatively);
  - Potential investors;
  - Essential decision makers;
  - Foundations and other funders.(Foundations are valuable sources of (1)



With the help of a facilitator, Chicago convened the following groups

to (1st) get feedback on the planning and research process, (2nd) collection ideas for actions, (3rd) prioritize actions, and (4th) develop implementation plans for actions:

- ✓ Multi Stakeholder Task Force of Public and Private Leaders (9 to 19 people)
- ✓ City Departmental Steering Committee and Work Groups
- ✓ Expert “Sector” Groups for Buildings, Transportation, Energy, Waste, Landscape, Etc. (9 to 25 people)
- ✓ Summits for the Community, Business, and Labor (70 to 125 people each)

<sup>2</sup> Julia Parzen, Lessons Learned: Creating the Chicago Climate Action Plan, City of Chicago, Global Philanthropy Partnership, and ICLEI Local Governments for Sustainability, December 2008.



funding for planning and research and (2) connections to potential partners and resources. Foundations funded most of the analysis that guided Chicago's process.)

5. Design a government and public engagement process to:
  - Gather lots of ideas from all parts of the community;
  - Identify potential resources and partners;
  - Get help to prioritize ideas. (See p. 17, *Structures for Getting Input and Advice*.)
6. Hold first stakeholder meetings.

## ***II. Complete the Inventory and Analysis***

To get the most leverage from its resources and capacities, a community must understand its biggest energy users; prioritize energy saving actions that are cost-effective and have other benefits, such as jobs and cost-savings for residents; identify ambitious, but doable goals; produce a credible basis for demonstrating that goals are achievable and actions are good for the city; and generate useful information for engaging the public in implementation.

1. Choose and assign an Energy Efficiency and Conservation research team to calculate baseline energy use and projected growth in energy use. (See p. 13, *Details of the Energy Efficiency and Energy Conservation Analysis Process*, and Appendix B. *Methodology for Calculating Baseline Energy Use and Greenhouse Gas Emissions*.)
2. Scan existing local initiatives, resources, and capacities.
3. Scan best practices from other cities that might be applicable. ICLEI, Energy Star, Sustainlane, C40cities.org, Smart Communities Network and other resources are summarized on p. 25, *Where to Go for Resources and Help*.
4. Inventory local, state, and federal initiatives that could help fund initiatives (such as Community Development Block Grant for Infrastructure, Transit and Highway Funding, Water and Wastewater grants, School Modernization Funds, Public Housing Modernization Funds, etc.).
5. Identify the goals and plans of adjacent municipalities and the state and potential ways to collaborate.
6. Organize ideas for actions and strategies collected through the public engagement process and the steps above.



Here are two examples of how Chicago's research team at the Center for Neighborhood Technology (CNT) summarized data for decision makers. These summaries were supported by longer analyses of possible implementation strategies for each proposed action. Complete analyses are available at [www.chicagoclimateaction.org](http://www.chicagoclimateaction.org), Research and Reports, Baseline and Mitigation Options.

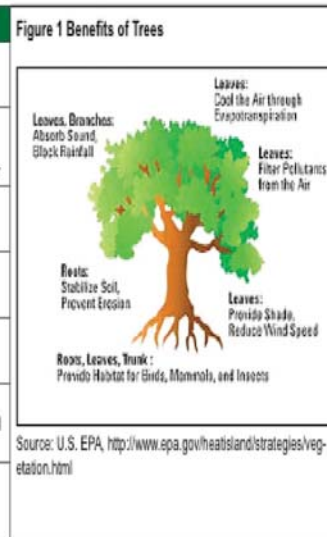
### Residential Building Retrofits

Strategy Summary	Scale	Value
CO <sub>2</sub> e Savings Against BAU	+++	1.3 MMTCO <sub>2</sub> e
Scale of deployment	+++	400,000 homes
Timing	+++	beginning with 6,000 homes in 2008
Regional Impact	+++	2.5 MMTCO <sub>2</sub> e
Financial Savings in relation to Cost	+++	12.5 – 30% ROI
Additional Benefits in relation to Burdens	+++	affordable housing
Feasibility assessment	+++	proven models



### Trees and Green Roofs

Strategy Summary	Rating	Value
CO <sub>2</sub> e Savings Against BAU	+	0.10-0.17 MMTCO <sub>2</sub> e
Scale of deployment	+++	Plant one million new trees by 2020 and add 500 green roofs per year
Timing	+++	Start in 2008
Regional Impact	+	Full data unavailable
Financial Savings in relation to Cost	+++	Low costs, energy savings
Additional Benefits in relation to Burdens	+++	Many documented environmental and social benefits to greening
Feasibility assessment	++	Large in scale, but politically and culturally popular



7. Analyze and prioritize ideas collected through steps 1 through 6 based upon:
  - Estimates of size of energy savings for potential actions;
  - Cost and cost effectiveness of potential improvements;
  - Feasibility of improvements (technical, legal, and financial);
  - Potential Other Benefits: costs savings for residents and businesses, job creation and economic development opportunities, quality of life improvements, greenhouse gas emissions reductions, and funds leveraged.

Based upon its analyses, Chicago prioritized the following actions:

#### Energy Efficient Buildings

1. Retrofit commercial and industrial buildings (performance contracting, recognition (Green Office Challenge), loan funds, incentives, loans)
2. Retrofit residential buildings (one-stop shops, loans, grants, ombudsmen)
3. Trade in appliances (collections, incentives)
4. Conserve water
5. Update City energy code
6. Establish new guidelines for renovations
7. Cool with trees and green roofs
8. Take easy steps

#### Clean & Renewable Energy Sources

1. Advocate to upgrade power plants

2. Improve power plant efficiency
3. Build large-scale renewable electricity
4. Enable distributed generation and combined heat and power
5. Promote household renewable power

### **Improved Transportation Options**

1. Incentives and service improvements to increase transit ridership
2. Promote transit-oriented development
3. Make walking and biking easier
4. Car share and carpool
5. Improve fleet efficiency
6. Achieve higher fuel efficiency standards
7. Switch to cleaner fuels
8. Support intercity rail
9. Improve freight movement

### **Reduced Waste and Pollution**

1. Reduce, reuse, and recycle
2. Capture stormwater on site

*(For more information, see the Chicago Climate Action Plan  
at [www.chicagoclimateaction.org](http://www.chicagoclimateaction.org).)*

## **III. Choose Energy Saving Goals, Actions, and Milestones**

Local leaders—government, business, civic, environmental—that are engaged in the process of setting and choosing priorities are more likely to contribute to implementation. This phase is about engaging leaders in establishing priorities; fully vetting the proposed priorities within City government; teeing up the many partners essential for successful implementation; and choosing performance measures for each action.

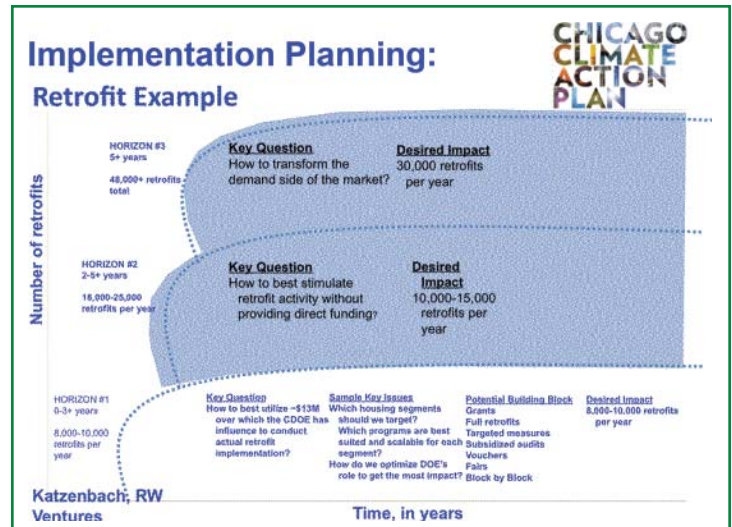
1. Based upon findings from the research team, use the public engagement processes established in Phase I to choose priority actions.
2. Once you choose priority actions, ask the research team to:
  - Calculate energy savings for each action and the total for all of the actions—the total is the long-term goal for the energy efficiency and conservation strategy.
  - Develop annual benchmarks for progress and a data collection plan. Metrics for the EECBG program are energy saved, renewable energy capacity installed, greenhouse gas emissions reduced, funds leveraged, and jobs created/saved.

## **IV. Design Implementation Plans and Structures**

Only when the details of a plan are fleshed out does it become clear what is doable, the timeframe, and the budget. Implementation planning often requires additional data and analysis and definitely requires the support of broad stakeholder groups. Energy efficiency and conservation strategies are likely to include not only new programs and projects to save energy, but also a communications strategy to engage the public, report on and celebrate progress, and engage residents and companies in specific programs; a jobs and economic development strategy to capture benefits for local residents; and

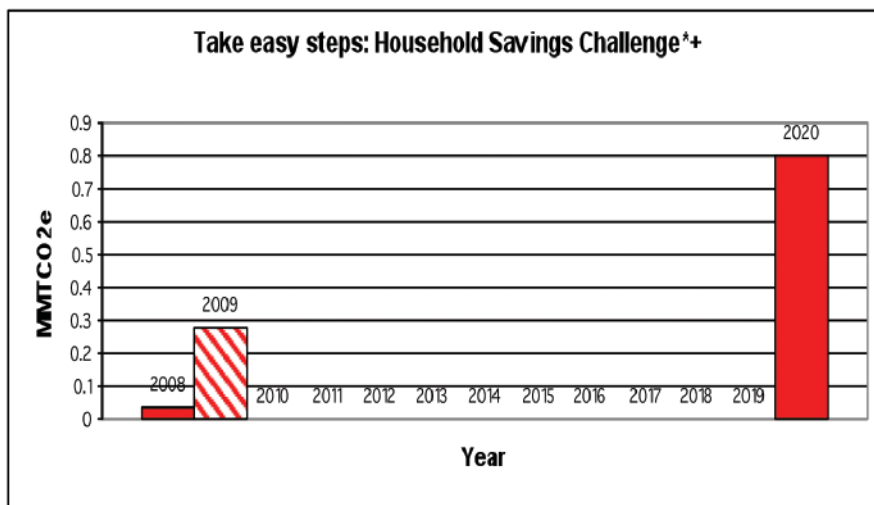
a process for on-going review of results and adjustment to stay on course towards achieving energy, environmental, and economic development goals.

1. Create working groups to help flesh out implementation plans for each priority action that include representation of the stakeholders needed to achieve the goal:
  - Sector leaders from government, business, and non-profit sector
  - Financing experts/potential investors
  - Communications and engagement experts
  - Representatives from adjacent municipalities and the state with programs relevant to the action plans
2. Charge working groups to develop implementation plans, which may include:
  - Buildings: Building energy efficiency (including design and operation of energy efficiency retrofit programs and development and implementation of building codes and inspection services to promote building energy efficiency) (See p. 34, Appendix C. *Developing a Large Scale Building Energy Efficiency Retrofit Strategy*)
  - Transportation: Transportation energy conservation programs (including telecommuting/flex time, Transit Oriented Development (TOD) and other energy efficient development, infrastructure for biking and walking, traffic signal efficiency, and other)
  - Clean and renewable energy: Application of technologies including distributed generation and district heating and cooling; development, implementation, and installation on or in government buildings of onsite renewable energy technology
  - Waste: Material conservation programs, including source reduction, recycling, and recycled content procurement programs that lead to increases in energy efficiency; the purchase and implementation of technologies to reduce, capture, and, to the maximum extent practicable, use methane and other greenhouse gases generated by landfills or similar sources
  - Other
  - The implementation plans might include:
    - a. Program description
    - b. Long-term goal for each program
    - c. First year plan for each program
    - d. Desirable implementation partners
    - e. Recommended plan for on-going monitoring and evaluation
    - f. Preliminary funding/financing plans, including funding leverage
    - g. Preliminary marketing and engagement strategy
    - h. Assessment of economic development potential and strategy





Using data that the researchers at CNT collected, Chicago developed benchmarks and a reporting process for each action and for the overall plan.



- Finalize progress benchmarks, process to collect data, and the outline for the required annual progress report to the community and USDOE (cities must submit a progress report every year that addresses energy saved, renewable energy capacity installed, greenhouse gas emissions reduced, funds leveraged, and jobs created/saved)



Among Chicago's Public Engagement Tools are:

- The \$800 Savings Challenge
- Green Office Challenge
- Green Museums Initiative
- Green Hotels Initiative

(see [www.chicagoclimateaction.org](http://www.chicagoclimateaction.org))

#### Take the \$800 Savings Challenge!

Each person can make a difference. Take the \$800 Savings Challenge and see how your small steps, taken together, can reduce emissions, save money and have a transformative impact on Chicago.

Take the first step towards making your difference by choosing some (or maybe even all) of the actions from the list below and see how your savings in both money and greenhouse gas emissions adds up. Your total will be calculated and appear at the bottom of the page. Send us your list and we'll add you to our email list to receive monthly updates.

Measure	Cost	Co2e Impact/ Participant (metric tons)	Annual Savings/ Participant/ Household
<b>BUILDINGS</b>			
<input type="checkbox"/> Reducing heating temperature by three degrees*	None	0.522	\$129
<input type="checkbox"/> Increasing cooling temperature by three degrees*	None	0.075	\$13
<input type="checkbox"/> Save four gallons of water a day, by turning off the water while brushing teeth or reducing shower time by one minute.	None	0.003	\$5

- Develop Communications and Engagement Strategy
  - Plan for overall engagement and awareness of the benefits to the community
  - Engagement strategy for key participants in specific programs created or expanded (Ex. residential retrofits)



## Chicago Green Jobs for All Plan

As many as 5,000 direct jobs in areas like:

- Energy auditors and efficiency measure installation workers
- Landscape design, installation and maintenance
- Recycling and reuse
- Renewable energy installation

Smart economic development efforts could yield 1000s more jobs:

- renewable energy components
- green building products

Changes in skills needed for thousands of existing workers:

- Green construction
- Building operations techniques



Researchers at the Center for Urban Economic Development at University of Illinois analyzed potential jobs impacts and recommended workforce and economic development implementation steps for Chicago.

5. Work with economic development and work force leaders to develop jobs and economic development strategies related to the actions (see p.21, *Additional Steps to Completing a Green Jobs & Economic Development Plan*)
6. Develop plan for publication of annual progress reports to the community and DOE



# Analysis and Prioritization

The analysis and prioritization process is the heart of a good energy efficiency and conservation strategy. This section describes the questions communities need to answer and the analysis that will answer these questions. Key planning steps are I. Inventory; II. Brainstorm; III. Evaluate; and IV. Measure.

## I. Inventory

### Key Questions To Answer

- How is your community using energy now?
- How will your community use energy in the future if you continue business as usual?

### Analysis That Will Answer the Questions

Steps 1 and 2.

Calculate baseline energy use based on accepted protocols and projected growth in energy use for energy in buildings (residential, commercial and industrial), transportation, waste industrial processes and agriculture (where appropriate). For example, in Chicago's baseline, 70% of energy use was associated with energy consumption

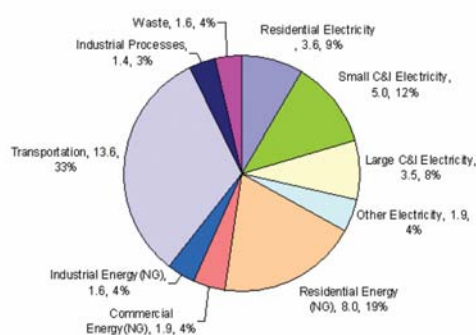
in buildings, and a range of building energy efficiency strategies were pursued. This assessment requires data such as fuel sales and, especially, utility data.

Data analysis can be a powerful planning tool in developing an energy efficiency and conservation strategy, but there are a number of issues that may need to be addressed. Account level utility data can be difficult to obtain, and asking utilities for it should be a priority early on in the process. Linking utility data to tax assessor and other building attribute databases can open up opportunities for setting priorities through more detailed analysis, but requires resources. To ensure consistent and quality analyses over time, municipalities should seek long-term data sharing agreements. This may require legislative action because some public utility legislation or utility regulatory bodies protect account level data.

National and state data sources can be used where local data is not available. For example, the U.S. Census tracks residential building age, which, with assessor information, can help identify aging buildings for efficiency improvements. The Commercial

### Step 1: Understand your baseline.

How is your community using energy now?



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Building Energy Consumption Survey from the U.S. Department of Energy is another source that has regional energy use data. These sources can be used in combination with citywide energy use data for planning if account level data is unavailable.

Communities cannot ignore transportation. Transportation can be as high as 50 percent of the energy use in a community. The Energy Efficiency and Conservation Block Grant includes transportation. Cities can partner with local transportation planning agencies and tax authorities to secure vehicle miles traveled, energy use, and energy sales data.

Involving key data providers such as utilities and transportation planners early, giving them a sense of investment in the project, and helping them understand the benefits will improve the likelihood of communities getting the data they need.

Finally, it often is possible to make use of the work of others. If there are already climate, energy, air quality or transportation studies done for a community, region, or state, communities can make use of those resources and don't have to recreate the wheel.

Once a community has completed its baseline inventory, it can use local demographic forecasts and historic data to project the growth in energy use in future years under a "business as usual" scenario.

## II. Brainstorm

### Key Question To Answer

- What strategies could make sense for your community?

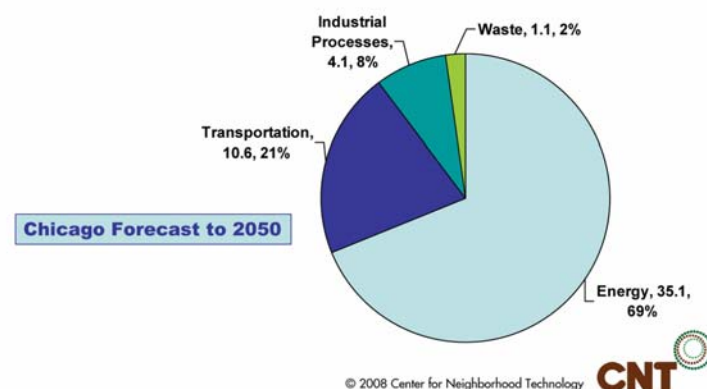
### Analysis That Will Answer the Question

Step 3.

- Ask local stakeholders.
- Scan existing local initiatives, resources, and capacities.
- Scan best practices.
- Inventory local, state, and federal initiatives that could provide resources.
- Find out the goals and plans of adjacent municipalities and the state.

### Step 2: Forecast your consumption to the future.

How will your community use energy in the future?



### Step 3: Survey the energy efficiency and conservation strategies.

Identify the strategies that make sense for your community

- ✓ Reduce energy use in buildings
- ✓ Transit and neighborhoods
- ✓ Sustainable industry and business
- ✓ Green infrastructure
- ✓ Reduce emissions from vehicles and air travel
- ✓ Move to a clean and efficient energy supply

### III. Evaluate

#### Key Question To Answer

- What should your priorities be for reducing/shifting energy use?

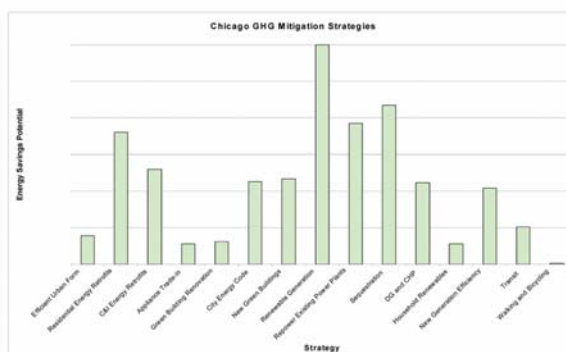
#### Analysis That Will Answer the Question

Step 4.

Organize and analyze ideas collected through a public engagement process for each action based upon:

- (1) Impact of potential improvements (energy savings),
- (2) Feasibility of improvements (technical, legal, and financial),
- (3) Potential costs and cost savings, and
- (4) Potential economic development, cost savings for residents and businesses, and other benefits.

#### Step 4: Estimate the potential savings from each strategy and identify feasible implementation scale.



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#### Key Question To Answer

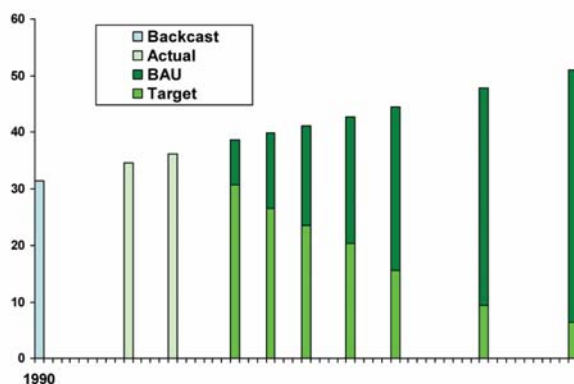
- What are feasible total energy efficiency and conservation goals for our community?

#### Analysis That Will Answer the Question

Step 5.

Calculate potential energy savings from each priority action and total energy savings from priority actions eliminating double-counting.

#### Step 5: Set reduction targets



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## IV. Measure

### Key Question To Answer

- How will we know if we are achieving these goals?

### Analysis That Will Answer the Question

Step 6.

Once action plans are developed, go back and develop annual goals, measureable performance indicators, and a process for ongoing data collection, monitoring, and evaluation.

**Step 6: Go back and develop annual goals and measurable performance indicators based upon implementation plans for each action.**

	Activity	Implementation Plan										Deliverable
		2008		2009								
		November	December	January	February	March	April	May	June			
Task 1: Program Ramp-Up												
	Attend Kick-Off meeting and Regular Project update meetings											Meeting minutes
	Develop program materials including SOP, technical documentation and Marketing Materials											Program final technical documentation approved
	Develop marketing plan											Marketing Plan approved
	Begin implementing the marketing plan											Marketing Materials approved and used, reports on marketing activities
	Develop Reporting Mechanisms											Financial flat fee, measure flat fee, draft invoice, draft progress report approved
	Develop Quality Assurance/Quality Control plan, including Measure Verification plan											Program quality metrics and customer satisfaction metrics approved
	Develop Program Quality Metrics											Final program and E, M & V documents, including contractor requirements, safety plans, etc approved

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For ideas on where to get help with analysis and prioritization, see p. 17 *Structures for Input and Advice*, p. 19 *Execution Options*, and p. 25 *Where to Go for Resources and Help*.





## Structures for Input and Advice

Getting broad input from the community pays off in many ways:

- Gather lots of ideas
- Help to prioritize ideas
- Build support for the plan
- Identify potential resources and partners for implementation

Communities need engaged civic, business, and community leaders and residents to implement most energy saving programs.

Chicago engaged all of these stakeholders:

• City Departments	• Workforce Organizations	• Building Industry
• Energy Industry	• Sister Agencies	• Waste Interests
• Transportation Leaders	• Energy Planners	• Corporate Leaders
• Community Groups	• Labor	• Economic Development Groups
• Environmental Groups	• Housing Groups	• Industrial Retention Groups
• Environmental Justice Groups	• General Public	• Philanthropy

Chicago found it valuable to engage stakeholders in four aspects of the energy planning process:

- Getting feedback on the planning and research process itself
- Collecting ideas for energy efficiency and conservation actions, strategies, resources, and funding
- Prioritizing actions to fit community capacities and interests
- Developing implementation plans

Chicago's structures for seeking input and advice included the following:

### Task Force

A task force of local leaders adds expertise, linkages to resources, and legitimacy. In Chicago, Mayor Daley charged a task force of 19 well-informed leaders from the business, faith, civic, environmental, philanthropic, and other nonprofit communities. They enriched the planning process and added to its credibility.

### Internal Steering Committee

Department heads and sister agencies needed early briefings on the research and planning process and on-going meetings to hammer out goals and strategies. In Chicago, the Mayor's office created a Green Steering Committee of commissioners to develop departmental goals and plans. The Green Steering Committee meetings helped to show departments how what they were already doing contributed to energy efficiency and how further action could help them advance their efforts to improve city infrastructure and services.



### Technical Advisories

The City of Chicago created a 5-person committee of research experts to guide the research process and assure that the research results would be credible and useful.

### Public Meetings/Summits

Creating an energy efficiency and conservation strategy for a city requires a great deal of buy-in from a variety of stakeholders. The City of Chicago kept an on-going list of key stakeholders and scheduled meetings to stay in touch throughout the planning process. Bringing together 50 to 100 key stakeholders every four months made for a much richer process, many additional ideas, higher energy, and an array of collaborations around implementation of the Plan.

### Working Groups

The City of Chicago formed specific sector groups around anticipated priority sectors for action. These sector groups—New Buildings & Developments; Existing Buildings; Energy Supply; Waste; Transportation; and Green Urban Design—included both city personnel and other stakeholders. The Sector Groups provided useful input about actions and the practicalities of implementation. Many participants stayed involved through the transition to implementation.

### Utilities

Utilities have an important role in energy efficiency and conservation planning, including providing data and helping cities to understand energy consumption patterns. Some utilities have market and load control studies that can inform the process with more detailed information about customer energy use. In addition, utilities have direct access to all energy users, and can be valuable partners in communications and consumer education. Existing utility energy efficiency programs may provide a base for expanded energy efficiency efforts. Utilities should be considered as task force or advisory group members and sponsors.

# Execution Options

## PLANNING

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A city or county can use its staff and volunteers and publicly available tools to prepare its energy efficiency and conservation strategy, but the effort is substantial. Cities that have done the analysis on their own using staff and interns have found it complex and time consuming. Some cities have been able to secure pro bono analysis and facilitation from local businesses and universities.

One of the many pluses of the Energy Efficiency and Community Block Grant program is that year one funding can be used to retain consultants to assist in the development of the energy efficiency and conservation strategy. Funding in subsequent years is only for implementation of the strategy. Using funding to secure expert help can maximize savings and other benefits.

One way to reduce the cost of retaining consulting services is to jointly hire consultants with surrounding communities. Communities are required to align their strategy with that of adjacent municipalities.

Appendix A on p. 27 is a sample RFP for soliciting assistance for the research phase or the whole process.



## Additional Steps to Completing a Climate Action Plan

Once a community has data on its energy uses, it has most of the data for assessing its climate change impact. Energy use and transportation account for nearly 90 percent of greenhouse gas emissions in the United States.

Transforming energy use data into greenhouse gas emissions involves applying emissions factors to the data. Emissions factors are coefficients that represent the average emissions per unit of energy consumed. So the basic equation for calculating emissions from energy use is  $\text{Energy use} \times \text{Emissions Factor} = \text{Emissions}$ . There are many resources and tools to help identify the right emissions factors for each community and perform these calculations, some of which are described in Appendix B, *Methodology for Calculating Baseline Energy Use and Greenhouse Gas Emissions*.

In addition to energy use and transportation, sources of greenhouse gas emissions in a community could be industrial processes such as cement production, use of greenhouse gases in products like refrigerants, waste disposal, wastewater treatment, agriculture, land use and forestry, and fugitive emissions from pipelines. A complete greenhouse gas emissions inventory for a community would include data on these activities (See Appendix B).

To determine an achievable goal for reducing a community's greenhouse gas emissions, the first step is to look back at the actions identified for the energy efficiency and conservation strategy. The energy use savings from buildings, transportation, and renewable energy actions can be transformed into greenhouse gas emissions reductions. The next step is to consider action steps for activities that produce greenhouse gas emissions not related to burning fossil fuels. For example, waste disposal in landfills produces methane gas and air conditioning systems produce HFCs. Additional considerations in choosing an emissions reduction target are:

- What emissions reduction targets have similar communities already chosen?
- What level of emissions reductions do most scientists agree is needed?

One potential target is the 7 percent below 1990 levels by 2012, which is in the US Mayor's Climate Protection Agreement endorsed by more than 900 mayors. Many scientists agree that what is needed is a 50 percent to 80 percent reduction below 1990 levels by 2050.

If the activities already chosen to reduce emissions are not enough to achieve the goal, communities will need to increase the size of programs or add additional programs.

## Additional Steps to Completing a Green Jobs & Economic Development Plan

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**P**ursuing efficiency and renewable energy will drive the development of new products, services, companies and markets. Many specific strategies (such as large-scale building energy efficiency retrofits or promotion of renewable energy) have natural economic development potential, stimulating both new businesses and jobs. These jobs come from both (1) new enterprises and jobs doing the work and (2) energy cost savings for residents that are spent in the community.

Using the framework of the Climate Prosperity Project<sup>3</sup>, a region can capture the economic benefits of its energy planning in the form of:

- energy & financial savings: lower costs for buildings, transportation, and waste
- expanded business opportunities: increases in new companies, sectors, revenue and valued added, venture capital, patents



3 Doug Henton and John Melville, Collaborative Economics, Regional Climate Prosperity Framework, February 21, 2009, soon to be available at [www.climateprosperity.com](http://www.climateprosperity.com) or [www.globalurban.org](http://www.globalurban.org).

- growth in green talent and jobs (new sectors, new occupations, new skills, new career ladders)

The table below summarizes steps to build the market for clean and green products and services that might be part of an Energy Efficiency and Conservation Plan:

Improve Building Efficiency	Increase Community Resource Efficiency and Reuse	Grow Renewable Energy Use	Expand Cleaner Transportation Options	Provide a New Energy Infrastructure	Green Infrastructure
<ul style="list-style-type: none"> <li>• Green building standards and programs</li> <li>• Building efficiency programs</li> <li>• Procurement</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient water use and reuse</li> <li>• Waste recycling and energy generation</li> <li>• Efficient land use</li> <li>• Procurement</li> </ul>	<ul style="list-style-type: none"> <li>• Financial incentives</li> <li>• Regulatory streamlining</li> <li>• Utility-scale shifts</li> <li>• Procurement</li> <li>• Address barriers to distributed generation</li> </ul>	<ul style="list-style-type: none"> <li>• Shift to alternative fuels vehicles and build infrastructure for it</li> <li>• Expand and promote public transportation and other lower emissions options</li> <li>• Transit Oriented Development</li> <li>• Procurement</li> </ul>	<ul style="list-style-type: none"> <li>• Build a smart grid</li> <li>• Implement smart metering</li> <li>• Procurement</li> </ul>	<ul style="list-style-type: none"> <li>• Green procurement (green roofs, green alleys, etc.)</li> <li>• Stormwater ordinance</li> <li>• Landscape ordinance</li> <li>• Tree planting, composting</li> </ul>



A strategy to grow the regional base of clean and green industries and jobs could include some or all of the following elements of best practice economic and workforce development activities:

Encourage Green Innovation	Facilitate Green Startups and Expansion	Promote Industrial Efficiency	Build the Green Value Chain	Create a Pro-Green Regulatory Climate	Educate and Train the Green Workforce
<ul style="list-style-type: none"> <li>• Demonstration projects</li> <li>• R&amp;D Investment</li> <li>• Secure patents</li> <li>• Facilitate intellectual property commercialization</li> <li>• Seed start-ups</li> <li>• Make global linkages to spur innovation</li> <li>• Green entrepreneurship strategies</li> <li>• Investment funds for clean technologies</li> <li>• Sustainable technology investor forums and networks</li> </ul>	Help firms with: <ul style="list-style-type: none"> <li>• Site location</li> <li>• Expansion financing and technical assistance</li> <li>• Green business incubators</li> <li>• Support community enterprises for energy efficiency, composting, deconstruction, etc.</li> <li>• Support community development related to TOD</li> </ul>	Help existing firms to: <ul style="list-style-type: none"> <li>• Modernize</li> <li>• Improve Efficiency</li> <li>• Become green suppliers</li> <li>• Turn waste to profit through byproduct synergy</li> </ul>	Broker linkages among: <ul style="list-style-type: none"> <li>• Green industry segments</li> <li>• Buyers and suppliers</li> <li>• Regional firms and global partners</li> <li>• Support clusters in key sectors of comparative advantage (Ex: sustainable business coalitions and roundtables)</li> </ul>	<ul style="list-style-type: none"> <li>• Align local standards, policies, and processes</li> <li>• Remove barriers</li> <li>• Advocate state-level changes in policy to expedite green economic development</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare new workers and retool existing work force for:</li> <li>• New green jobs</li> <li>• Existing jobs with new skills</li> <li>• Multi-stakeholder training partnerships</li> <li>• Regional workforce Intermediaries</li> <li>• Development of career pathways to quality jobs</li> </ul>

A first step is to create a green jobs and economic development committee made up of key business, government, economic development, environmental and community leaders, including educators and university researchers to assess the economic development and job creation potential of the actions considered for inclusion in the Energy Efficiency and Conservation Strategy. Where the committee sees potential, economic development and workforce analysis may be needed to assess the extent of the opportunity. This analysis could include:

### Green Economic Development Analysis

- Assessment of potential impacts of the Energy Efficiency and Conservation Strategy based upon:
  - **Job potential:** What is the potential for creating good jobs in your region? On what scale?
  - **Market leverage:** How much capacity does the community, on its own, have to

“make the market” for a particular product or technology, either through its procurement or incentives or regulations for private market adoption?

■ **Market maturity:** To what extent is the market for a product or technology “locked in” around one or a small number of producers? Where it is, it may be difficult (or expensive) to influence the location dynamics of the industry.

■ **Displacement effects:** Are new, “green” technologies and products displacing other products made locally, or those previously imported from other regions or countries?

■ **Industrial/occupational fit:** Do the businesses and jobs related to these products and technologies fit with the community’s existing industrial base, labor force skills?

- Analysis of other local assets and advantages for green economic development
- Analysis of regional sustainable industry sectors and their needs
- Analysis of existing economic development programs, how they can service these sectors, and gaps
- Analysis of existing funding investment capital available in the region and gaps
- Analysis of regional intellectual property assets for sustainable IP development
- Potential for organizing sustainable business coalitions and roundtables
- Recommendations for a combination of “demand side” strategies such as procurement and market incentives, and “supply side” strategies such as technical assistance, recruitment and new business development to capture these opportunities.

### Green Workforce Development Analysis

- Assessment of potential impacts of the Energy Efficiency and Conservation Strategy
  - New jobs at all skill levels
  - New jobs for disadvantaged workers
  - Opportunities to improve the quality of existing low wage jobs
  - New training required for existing jobs
- Other green jobs demand analysis
- Potential uses of policy levers to increase opportunities
- Potential for the creation of career pathways and skill standards
- Assessment of local education and workforce development capacity

# Where to Go for Resources and Help

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Cities and counties don't need to go it alone. A variety of local resources are available to help with energy strategy analysis and community process. Local task forces or work groups can bring experts to the table. Colleges can help with interns, class projects, and faculty research. Local foundations can provide resources and connections. Nearby communities and the state will have additional expertise and resources.

Two national nonprofits are leaders in how to do the analysis necessary for effective energy planning. ICLEI-Local Governments for Sustainability is a membership organization of local governments committed to advancing climate protection and sustainable development. ICLEI offers a variety of tools and information to its members. For example, the ICLEI "International Local Government GHG Emissions Analysis Protocol" provides guidance for communities wishing to complete an emissions inventory. ICLEI's Cities for Climate Projection program provides tools and resources for its member governments to create climate action plans. ICLEI has programs to help cities and counties to set up an energy office, a revolving energy fund implementation guidebook, EECBG information, and more.

The Center for Neighborhood Technology (CNT) is a national nonprofit organization that pioneers new approaches to climate action, energy efficiency, transportation, and green infrastructure. CNT led the mitigation research team for the Chicago Climate Action Plan, which is the model for Chicago's Guide. CNT developed an energy and greenhouse gas emissions baseline for the city and region, and documented 33 different strategies with measurable reduction potential. CNT is one of a number of nonprofit consulting firms that provides these services. The template for an RFP in Appendix A may be helpful to communities that decide to solicit proposals from technical consultants.

Project 2° ([www.project2degrees.org](http://www.project2degrees.org)) was created to give communities around the world practical tools to measure and reduce their greenhouse gas emissions. The project's web-based Emissions Tracker software enables cities to calculate the carbon footprint of both municipal operations and the communities they service in a uniform way. Project 2° is a collaboration of the Clinton Climate Initiative (CCI), Microsoft Corporation, Ascentium Corporation, ICLEI – Local Governments for Sustainability, and the Center for Neighborhood Technology (CNT).

Sources of information that cities rely on for energy related planning include:

- ✓ USDOE, Energy Efficiency and Renewable Energy, Block Grant:  
[www.eecbg.energy.gov](http://www.eecbg.energy.gov)
- ✓ USDOE, Energy Efficiency and Renewable Energy, Block Grant:  
[www.eere.energy.gov](http://www.eere.energy.gov)
- ✓ ICLEI, Local Governments for Sustainability: [www.icleiusa.org](http://www.icleiusa.org)
- ✓ The U.S. Green Building Council: [www.usgbc.org](http://www.usgbc.org)

- ✓ The United States Conference of Mayors: [www.usmayors.org/bestpractices/](http://www.usmayors.org/bestpractices/)
- ✓ Clean Air–Cool Planet: [www.cleanair-coolplanet.org/](http://www.cleanair-coolplanet.org/)
- ✓ Sierra Club Cool Cities: [www.coolcities.us/](http://www.coolcities.us/)
- ✓ Worldchanging: [www.worldchanging.com](http://www.worldchanging.com)
- ✓ Grist: [www.grist.org/](http://www.grist.org/)
- ✓ treehugger, A Discovery Company: [www.treehugger.com](http://www.treehugger.com)
- ✓ Playbook for Green Buildings + Neighborhoods: [www.greenplaybook.org](http://www.greenplaybook.org)
- ✓ C40 Cities Climate Change Leadership Group: [www.c40cities.org](http://www.c40cities.org)
- ✓ Institute for Sustainable Communities: [www.iscvt.org](http://www.iscvt.org)
- ✓ EPA Energy Star Community Challenge: [www.energystar.gov/](http://www.energystar.gov/)
- ✓ US Environmental Protection Agency, Clean Energy, Rapid Deployment Energy Efficiency (RDEE) Toolkit: [www.epa.gov/solar/energy-resources/ee\\_toolkit.html#helpline](http://www.epa.gov/solar/energy-resources/ee_toolkit.html#helpline)
- ✓ Green for All Green Jobs and Service Clearinghouse: [www.greenforall.org/resources](http://www.greenforall.org/resources)



# Appendix A. Template for An Energy Efficiency and Conservation Plan RFP

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**C**ommunities may choose to request help with any aspect of the Energy Efficiency and Conservation Block Grant or all of it. This template is for an RFP for the Comprehensive Planning Process, but can be excerpted to include only those aspects of the planning process for which a city or county wants help.

## Request for Proposals

### For Development of an Energy Efficiency and Conservation Strategy

Date \_\_\_\_\_

#### Overview

\_\_\_\_\_ is accepting proposals from qualified organizations to help create an Energy Efficiency and Conservation Strategy, as required under the Energy Efficiency and Conservation Block Grant (EECBG) program. The purpose of the EECBG program is to assist communities to implement energy efficiency and conservation strategies:

- to reduce fossil fuel emissions in a manner that is environmentally sustainable and maximizes benefits for local and regional communities
- to reduce total energy use; and
- to improve energy efficiency in the transportation, building, and other appropriate sectors.

The Energy Efficiency and Conservation Block Grant (EECBG) was passed as part of the Energy Independence and Security Act of 2007.

Within 120 days after receiving initial funding, eligible communities are required to submit to the Department of Energy (DOE) Secretary a proposed Energy Efficiency and Conservation Strategy that describes the energy goals and proposed plan for the use of the EECBG grant.

The strategy can include all or some of the following activities:

- **Buildings:** Building energy efficiency (including design and operation of energy efficiency retrofit programs and development and implementation of building codes and inspection services to promote building energy efficiency)
- **Transportation:** Transportation energy conservation programs (including telecommuting/flex time, TOD and other energy efficient development, infrastructure for biking and walking, traffic signal efficiency, and other)
- **Clean and Renewable Energy:** Application of technologies including distributed generation and district heating and cooling. Development, implementation, and installation on or in government buildings of onsite renewable energy technology.
- **Waste:** Material conservation programs, including source reduction, recycling, and recycled content procurement programs that lead to increases in energy efficiency.

The purchase and implementation of technologies to reduce, capture, and, to the maximum extent practicable, use methane and other greenhouse gases generated by landfills or similar sources.

### ***What We Want Our Energy Efficiency and Conservation Strategy to Include***

- I. Community Vision for Energy Efficiency and Conservation
- II. Recognition of Stakeholders Who Were Part of the Planning Process
- III. Baseline and Projected Energy Sources and Uses
- IV. Overall Goals
  - a. For reducing fossil fuel emissions in a manner that is environmentally sustainable and maximizes benefits for local and regional communities
  - b. For reducing total energy use; and
  - c. For improving energy efficiency in the transportation, building, and other appropriate sectors.
- V. Plan for Maximizing the Benefits to the People and Businesses of the Region
  - a. Household and business cost savings
  - b. Community and economic development
  - c. Livability and environmental quality
  - d. Greenhouse gas emissions reductions
- VI. Priority Actions by Sector:
  - a. Building Energy Efficiency
  - b. Clean and Renewable Energy
  - c. Transportation and Land Use
  - d. Reduced Waste
  - e. Other
- VII. Implementation Action Plans
- VIII. Plan for Maximizing the Benefits to the People and Businesses of the Region
- IX. Communications and Engagement Plan
- X. Jobs and Economic Development Plan
- XI. Alignment with Plans of Adjacent Municipalities and the State
- XII. Budget and Funding Plan
- XIII. Plan for Tracking and Sharing Progress

### ***Goals We Want to Achieve Through the Development of the Energy Efficiency and Conservation Strategy***

- Develop a comprehensive plan for energy efficiency, reducing energy use, and reducing fossil fuels use
- Organize, strengthen and build on existing city programs that contribute to these goals
- Tap into new ideas that are working for other cities
- Find ways to align our efforts with those of nearby communities
- Identify the most cost-effective opportunities to reduce energy use and improve energy efficiency (and ones that help achieve economic and environmental benefits)
- Do the most possible to help residents make it through the current economic cycle by reducing their housing and transportation costs
- Leverage funding, as there are other federal, state, and private funds that can be combined with EECBG and which require plans (for example, the Green Jobs Act)

- Identify and plan to pursue new economic development and job creation opportunities
- Engage civic and business leaders and residents so that they bring their skills and resources to the table
- Simultaneously complete a climate action plan/sustainability plan because the steps are largely the same
- Produce a roadmap for achieving these benefits and benchmarks that will help the city/county and its stakeholders stay on course
- Put in place a means to track energy saved, renewable energy installed, greenhouse gas emissions reduced, funds leveraged, and jobs created, which cities and counties are required to do in their EECBG annual reports to DOE and the public.

### ***Tasks for Which We Are Seeking Assistance***

- 1) Develop a Time-Task Schedule for the completion of the Energy Efficiency and Conservation Strategy
- 2) Design and facilitate a public engagement process to collect input about the planning process, actions to include in the plan, and ways to implement the actions. Include:
  - a. A multi-stakeholder Task Force (at least 3 meetings)
  - b. An internal steering committee of department heads and sister agencies (at least 3 meetings)
  - c. Large public meetings or summits to get input from a broad range of community leaders (at least 3 meetings)
  - d. Expert sectoral working groups to flesh out implementation plans for each priority action that include the stakeholders needed to achieve the goals (at least 3 meetings)
- 3) Form a research team to:
  - a. Collect and prepare utility, fuel use, and other data needed for the calculation of energy use (The community will provide access to the data.)
  - b. Calculate baseline energy use and projected growth in energy use
  - c. Scan existing local initiatives, resources, and capacities with special attention to current initiatives that are cost-effective and can be scaled up
  - d. Scan best practices from other cities that might be applicable to local context
  - e. Inventory local, state, and federal initiatives that could help fund initiatives (such as CDBG for Infrastructure, Transit and Highway Funding, Water and Wastewater grants, School Modernization Funds, Public Housing Modernization Funds, etc.)
  - f. Find out the goals and plans of adjacent municipalities and the state and potential ways to collaborate
  - g. Organize ideas for actions and strategies collected through the public engagement process and the steps above
  - h. Analyze and prioritize ideas collected through the steps above based upon:
    - a. Estimates of size of potential energy savings for proposed actions
    - b. Cost and cost effectiveness of potential improvements
    - c. Feasibility of improvements (Technical, Legal, and Financial)
    - d. Potential Other Benefits:
      - i. Cost savings for residents and businesses
      - ii. Job creation and economic development
      - iii. Quality of life and environmental improvements
      - iv. Greenhouse gas emissions reductions

- i. Once the city has chosen priority actions, calculate energy savings for each action and the total for all of the actions. Based upon the total for all actions, recommend a reasonable and achievable energy savings target.
  - j. Recommend progress benchmarks, a process to collect data, and an outline for the required annual progress report to the community and US DOE
- 4) Help to form and facilitate committees to craft:
  - a. Broad implementation plans for each action that include:
    - i. Program description
    - ii. Long-term goal for each program
    - iii. First year plan for each program
    - iv. Desirable implementation partners
    - v. Recommended plan for on-going monitoring and evaluation
    - vi. Recommendations for potential funding and financing sources
    - vii. Marketing and Engagement Strategy
    - viii. Assessment of Economic Development Potential
  - b. Communications and Public Engagement Strategy for:
    - i. Overall engagement and awareness of the Plan and benefits to the community
    - ii. Support for specific programs created or expanded (Ex. residential retrofits)
  - c. Economic Development and Job Creation Strategy by:
    - i. Reviewing actions in the plan for their potential to create jobs
    - ii. Develop recommendations for how to capture these jobs for the community and region

### ***RFP Submission Requirements***

Please submit a thoughtful, clear and well-organized proposal that includes all the components listed below. Expenses incurred in preparing the submission are to be covered by the applicant.

1. Provide a brief, compelling summary as to why your organization is best suited to help develop our energy efficiency and conservation strategy.
2. Describe your experience relevant to the assignment both for the research and community processes.
3. Describe your proposed approach to the assignment. This narrative should include:
  - a) the steps you will take,
  - b) how you will staff the process,
  - c) a timetable including dates for delivery of interim products
4. Provide a detailed bid for the cost to complete the assignment, including expenses for sub-contracting.
5. Provide key team member resumes with an outline of each person's specific duties.

### **Deadline for Submission**

\_\_\_\_\_

### **Questions regarding the RFP**

All questions regarding the RFP process and proposal content should be directed via email to \_\_\_\_\_ or by phone at \_\_\_\_\_ by \_\_\_\_\_.

## Appendix B.

# Methodology for Calculating Baseline Energy Use and Greenhouse Gas Emissions

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Understanding local energy use and greenhouse gas emissions is key to prioritizing energy savings. The Center for Neighborhood Technology calculated Chicago's baseline energy use and associated greenhouse gas emissions using:

- (1) The United Nations Intergovernmental Panel on Climate Change (IPCC) methods
- (2) Local data sources
- (3) Extrapolation from national data using local demographics
- (4) For the estimate of projected growth in energy consumption, the U.S. Energy Information Administration's Annual Energy Outlook, which is released quarterly

The baseline energy inventory should include direct use and greenhouse gas emissions for natural gas, fuel oil, propane, kerosene, wood, other fuel oils, as well as for transportation, industrial processes and product use. Indirect emissions need to be calculated for electricity and waste. Because most electricity generation and waste handling facilities are located outside of city boundaries, emissions for the electricity used and waste generated by local residents often are calculated based on local consumption. On-road transportation energy consumption and emissions can be calculated using vehicle miles traveled or fuel sales data. Aircraft fuel consumption and emissions for airports can also be calculated based on fuel sales data, although the FAA is currently developing a new protocol for this sector.

While CO<sub>2</sub> is typically the largest contributor to a city's GHG emissions baseline, greenhouse gas emissions can be calculated for the six major categories of greenhouse gases regulated under the Kyoto Protocol: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). The greenhouse gas impact of the various greenhouse gases usually is converted to equivalent CO<sub>2</sub> emissions or CO<sub>2</sub>e emissions. Emissions can be converted into CO<sub>2</sub>e using global warming potentials from the IPCC Third Annual Assessment Report.

The following sections describe how energy consumption and emissions estimates are made by sector.

### Energy Consumption in Buildings (Non-Transport Energy) and Associated Emissions

Energy data for buildings can be collected from local utilities, from the local regulatory authority reports, or estimated based on U.S. Department of Energy (DOE) reports. Although there are significant variations across the U.S., typically the analysis of non-transport energy will include electricity, natural gas, kerosene, propane, fuel oil and electricity. Consumption data is gathered by sector (commercial, industrial and residen-

tial) and then converted to greenhouse gas emissions based on the emissions factor for each fuel and the IPCC 2006 Guidelines for National Greenhouse Gas Inventories. Electricity emissions are calculated by gathering electricity consumption data from the local utility, and applying CO<sub>2</sub> emissions factors associated with the local North American Electric Reliability Council region from the U.S. EPA's Emissions & Generation Resource Integrated Database (eGRID). Electricity consumption, in terms of kilowatt hours (kWh), can be measured at the user account data level, if available. A decision about the inclusion or exclusion of transmission and distribution losses must be made.

The regional power pool average emission factor is preferable to the factor reported by the utility for this research, because it is becoming more standard to look at the emissions associated with electricity consumption in the same way the market looks at electricity consumption. Power plants take years to build and last decades, so a decrease in electricity demand in one location, like Chicago, does not generally result in a power plant shutting down. Most likely it means that the power generator will simply sell that electricity elsewhere. If demand is reduced system-wide, generators might reduce production. Over time, if there is less demand for electricity, fewer new fossil fuel power plants might be built.

## Transportation

Energy consumption from transportation and the associated emissions can be estimated using vehicle miles traveled data from the state department of transportation and Amtrak; fleet mix data from local air quality departments; vehicle efficiency data from the Federal Highway Administration; and fuel sales and usage data from the city, county or state, the U.S. Department of Energy, and the National Transit Database. Emissions factors for transportation are from the U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks and State Inventory Tool. Energy consumption and emissions associated with off road transportation (like recreational vehicles) are estimated based on fuel.

## Aviation Emissions

There is currently no specific guidance or generally applied practice for computing airport-level energy consumption and GHG emissions. The Transportation Research Board (TRB) has commissioned a study to develop a guide to preparing airport source-specific inventories of greenhouse gas (GHG) emissions. When that guide is completed, it will provide a framework for undertaking this type of analysis.

## Industrial Processes

The industrial processes sector includes all non-energy related GHG emissions, such as those generated in the process of cement or zinc manufacturing. The U.S. Census Bureau's Economic Census and Annual Survey of Manufacturers is used to determine the proportion of U.S. GHG producing industrial activity in a city or region. First, GHG producing industries located in a city can be identified by North American Industry Classification System (NAICS) code. A city or county's employment in these sectors is then calculated as a percentage of national employment by sector, and used to prorate the national energy consumption and GHG emissions in that sector. The potential for error in this method is substantial, but until better data are available for industrial processes at the city scale, this method allows for a fair approximation.

## Product Use

In addition to these industrial activities, there are a number of products used in cities that generate GHG emissions. These include the sulfur hexafluoride (SF<sub>6</sub>), which is used as an insulator in electrical equipment, and nitrous oxide (N<sub>2</sub>O), which dentists use as an anesthetic. Again, local data on these emissions are typically not available. A method similar to the one used for the industrial process emissions can be employed. This involves prorating national emissions to the local level using U.S. EPA National Inventory and U.S. Census data.

## Waste and Wastewater

### *Solid Waste*

When landfills are located outside of a city, the emissions associated with waste disposal are considered indirect emissions. Solid waste takes decades to decompose, which is why closed landfills continue to generate methane emissions. The IPCC uses a first order decay method to account for current year emissions from historic waste disposal, but this data may not be available at the local level.

### *Wastewater*

Fugitive methane emissions from water reclamation plants can be calculated using the methodology detailed in the 2006 IPCC guidelines. Most sewer discharge in cities is delivered to water reclamation plants via covered sewer collection systems, which may serve larger geographic areas. It is necessary to estimate the fugitive and source emissions associated with the water treatment related to the target population.

Water reclamation plants recover methane during the water treatment process. This recovered methane is typically used on site for heating and/or electricity generation.

## Agriculture, Forestry, and Other Land Uses

Deforestation and changes in land use contribute significantly to climate change worldwide. Plants take in CO<sub>2</sub> and store it as they grow, so deforestation releases the carbon stored in trees and stops their uptake of CO<sub>2</sub>. Deforestation has other climate impacts as well because it changes the albedo—or reflectivity—of the surface of the earth and the storage and release of water by plants. Recent deforestation has taken place mainly in the tropics and less developed regions of the world. Settlement resulted in deforestation in the U.S. many years ago. More recently, some of those forests have been growing back as land uses change and farm fields go fallow.

Urban forestry—the planting of trees on settled land—can result in carbon uptake. A city's urban forest has a crown cover that can be significant. The IPCC 2006 Guidelines for National Greenhouse Gas Inventories provides an estimated annual carbon accumulation value per hectare of tree crown cover in settled areas. There may be additional carbon uptake from the growth of shrubbery and grasses, which can be accounted for as well.

Trees and other plants have additional energy saving and climate benefits in settled areas including providing shade for buildings and reducing the need for air conditioning, which can be accounted for as an energy saving strategy.

**Appendix C.****Developing a Large-Scale Building Energy Efficiency Retrofits Strategy**

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**C**ommunities have found it challenging to scale up building energy efficiency retrofit programs. Barriers have included contractor/auditor capacity, funding, and low demand from building owners. A systematic approach to building demand and supply still is necessary. Innovation Network for Communities (INC), a national non-profit helping to develop and spread scalable innovations and founder of Urban Sustainability Associates, has summarized the steps that have been part of Chicago's approach to scaling up building energy efficiency retrofit programs.

**I. Analysis of the Existing Building Stock**

Because delivery mechanisms need to fit the market, it is valuable to understand something about the local building stock.

- Analysis of residential housing stock by:
  - Size of units and portion they represent (single family; small multiple unit; large multiple unit)
  - Ownership vs. rental
  - Occupant income levels
  - Age of stock and building materials (e.g. wood frame vs. concrete block)
  - Responsibility for utility costs
- Analysis of commercial/industrial/institutional (CII) stock by:
  - Size of buildings
  - Ownership
  - Use (type of businesses)
- Analysis of energy consumption and energy efficiency of residential and commercial stock. (This will require integration of utility databases with tax databases showing square footage.)
- All analyses should be displayed in both quantitative graphs, as well as GIS format.

**II. Analysis of Existing Retrofit Strategies & Resources**

It is easier to build on existing delivery and financing mechanisms that already are working than to start from scratch.

- Existing retrofit programs and their capacity by type of building (e.g. low income weatherization)
- Utility programs and incentives
- Regulatory incentives
- Private sector players (e.g. Best Buy; Home Depot; large retrofit contractors like Green Homes America; etc.)

- Current financing products

Information about existing buildings and strategies can help a community to set overall targets for its retrofit strategy and prioritize efforts by building segment.

### III. Design of Niche-Specific Products

The core to the retrofit strategy is figuring out which product packages will work for each customer segment. Each piece of the product package needs to be customized to meet the requirements of different segments (e.g. single family residential; multi-unit; small commercial; large industrial/commercial, etc.) Elements of the product package are likely to include:

- *Reliable and objective information.* This includes:
  - Up-front energy audits that advise owners on options
  - Simple metrics to measure energy efficiency
  - Comparative data to other buildings
  - On-going monitoring on building performance
  - Inspection of building improvements and verification of performance impact
  - Certification systems that acknowledge building owners for achieving performance standards
- *User assistance.* Support systems to make it easier for building owners to engage in retrofitting strategies. This includes:
  - Branding and marketing to create product awareness
  - Develop of integrated and simple retrofit “products” and bring all the elements of the work (audit; building envelope & HVAC; inspection).
  - Making sure that the entire transaction, from point of inquiry to completion of work, is user-friendly, timely and results in minimal disruption to owners and occupants.
  - Contractor referrals.
  - Resident energy efficiency education programs.
  - General sources of information.
- *Cost and financing.* Products and services that reduce the cost of retrofits; improve access to capital; and link energy efficiency to equity values. This will include:
  - Availability of simple financing tools to pay for retrofits (whether subsidized or market rate)
  - Affordable cost of financing
  - Convenient ways to pay for the financing (e.g. On Bill Financing; integration into mortgages; payment through property taxes; ESCO financed; etc.)
  - Reliable ROI analysis on relationship between retrofit cost and savings
  - Ways need to be explored so that the energy efficiency of a building is appropriately reflected in its equity value. This currently is often not the case. This will require changes in appraisal methods, and realtor behavior.
- *Access to, and quality control over, contractors to do the work.* This includes:
  - Identification of contractors
  - Contractor development/attraction
  - Contractor certification
  - Standardized contract terms
  - Quality control on work

- *Retrofit technologies.* In most cases, there is a fairly standardized set of building retrofit technologies, but local communities need to decide if they are going to advance different kinds of technologies. For instance in hurricane-prone areas, ability to withstand hurricanes is a part of the retrofit, whereas that is not appropriate in northern environments. Equally, in some south and southwest communities, the economics of residential solar are such that it should be considered as a standard feature, whereas in the overcast Great Lakes states that would not make sense.
- *Regulatory incentives.* Municipalities have to explore how their building/energy codes can be used to incentivize retrofit strategies.

The large commercial building market has significantly different dynamics than those of the residential market. There is a fairly well established set of relationships between building owners, Energy Services Companies (ESCOs), and financing institutions on strategies for retrofitting of large commercial buildings.<sup>4</sup> Energy Service Companies (ESCOs) are companies that provide energy-efficiency related and other value-added services, including Energy Performance Contracting (EPC). ESCOs are typically divisions of building technology providers (such as Honeywell, Seimens; Johnson Controls; etc.), or of energy distribution companies.

Some of the strategies that are specific to this market segment can include the following:

- More detailed segmentation of the C&I market, and identification of sub-segment targets (based on size and amount of energy costs).
- Detailed description of the local ESCO-focused deal flow (deals by size and stage of transaction).
- Interviews with finance institutions and ESCOs to better understand how the barriers to implementation can be implemented.
- Development of a strategy for coordinated retrofitting of municipal buildings.
- Development of strategies to organize building owners, asset managers, and the business community to understand and communicate the value of retrofits.
- Exploration of the role of General Contracting advisors as third party brokers of Energy Performance Contracting relationships.
- Building a partnership with CCI on its Energy Efficiency Building Retrofit Initiative.

## IV. Market-Building Infrastructure

The final step in the process of creating a large-scale retrofit program is to design the market-building infrastructure that stimulates retrofits at a large scale. This will often involve some combination of the following strategies:

- *Centralized information source.* Many communities are considering some version of a “one-stop shop” to have a single point of contact for citizens, contractors and others interested in retrofitting their buildings.
- *Boosting capacity of existing programs.* Many communities already have programs targeted on retrofit strategies for particular segments (e.g. low income weatherization), and the capacity of these programs can be enhanced to achieve higher levels

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<sup>4</sup> Many of these observations are taken from a May, 2007 review of the ESCO market by the Ernest Orlando Lawrence Berkeley National Laboratory: “A Survey of the U.S. ESCO Industry: Market Growth and Development from 2000 to 2006.”

of output, or to incorporate new techniques.

- *New finance products.* New finance products can be created in cooperation with banks, utilities, municipalities, ESCOs and others.
- *Public education campaigns.* These can be useful to heighten awareness and demand.
- *New finance intermediaries.* Some of the sources of potential funding for building retrofits (such as carbon credit aggregation; public bonding; forward capacity credits; private equity Double Bottom Line funds; New Market tax credits; etc.) require sophisticated financial management that is beyond the capacity of any existing player in the market. A new financial intermediary specifically focused on this market could play a capital aggregation and market development role to accelerate the growth of the market.
- *Contractor development and attraction.* Strategies can be put in place to increase the supply of qualified contractors, or to attract private players into the market (as the Clinton Climate Initiative is trying to do with the large commercial ESCO market).
- *Workforce development.* National intermediaries like the Apollo Alliance and Green for All are focused on place-based workforce development strategies that build the talent base needed for a large scale retrofit strategy so that labor supply is not a barrier, and that the maximum level of benefits can flow to local residents.
- *Regulatory incentives.* Some communities have implemented building/energy efficiency codes that require upgrading at the point of transaction. In other cases, enforcement for existing codes has been improved.