

# CONDUCTING A MUNICIPAL GREENHOUSE GAS EMISSION INVENTORY: A PRACTICAL GUIDE

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## 1. Getting Started

Developing a Greenhouse Gas (GHG) emissions inventory is the first step to implementing sustainability into municipal planning and policy-making, and is the basis from which to develop a Climate Action Plan. This guide provides local governments with general information on conducting a GHG emissions inventory; it is intended to compliment already existing technical guides and resources. The guide outlines a management process along with noting effective strategies for inventory preparation, launch, and implementation.

This guide was designed to serve as a starting place for jurisdictions who want to develop an inventory program and are not sure what is involved. The guide provides information on each step of an inventory including comments on estimated staffing needs and time commitments. The guide can also be used as a resource for working with interns who are hired to conduct an inventory and need an understanding of how such an inventory can be completed in a local government setting. This guide should be used alongside technical resources such as ICLEI-Local Governments for Sustainability's Clean Air and Climate Protection Software, and in no way is intended as a substitute for the technical resources required to complete an inventory.

**YOU CAN'T MANAGE WHAT YOU CAN'T MEASURE.**

*This guide is based on the authors' experience in conducting GHG inventories, and from supporting material drawn from public resources; and assumes that you will use supplemental emissions software/spreadsheets to provide you with more detailed, technical guidance on the science of climate change and actual data collection and reporting. For each section of the inventory program possible resource costs are provided with explanation. For a complete table of Resource Cost Estimates, please refer to the appendix. Note this guide is a work-in-progress, and feedback is welcome on it's usefulness and scope.*

Conducting a GHG inventory requires an investment of resources, including staff time for data collection and analysis, and potentially a software purchase and/or membership with an organization that specializes in GHG emissions inventory (e.g. ICLEI and California Climate Action Registry). There are, however, invaluable benefits that result from completing an inventory. Specific benefits include:

- Identification of emission sources within your municipality and community
- Indication of the relative significance of each source
- A historical record of emissions that may prove valuable for future regulatory emission requirements
- Establishment of a solid foundation on which to base decisions on how to cost-effectively reduce and achieve emission reductions
- A framework to set goals and targets for future emission reductions

Identifying and tracking your community's energy use may also result in additional side benefits, such as discovery of inefficient energy use that can lead to efficiency improvements, costs savings, improved service delivery, and reduction in air pollution since in many cases, GHG and air pollution reductions go hand-in-hand.

## 1.1. Program design

Program design requires staff to research current practices, develop a plan for a GHG inventory program and outreach to elected officials and key department staff. Consider the time required for meetings among departmental staff to setup this program and obtain feedback / from key department heads.	
Duration	3-4
Project Manager (%FTE)	5-10%
Implementation Staff (%FTE)	0%
Additional Staff input	1-2 meetings
Possible Hard Costs	NA

This section of the guide describes an overall design of a GHG inventory program within a local government. There are three primary elements needed for a successful emission inventory program design: internal support, comprehensive data collection, and excellent record keeping.

### 1.1.1. Building Internal Support.

Invest the time and effort needed to build internal support across all relevant departments for your project. While the staff directly responsible for the inventory may be “on-board” for this project, it is highly likely that many staff members in your city are not aware of or interested in a GHG emission inventory. However, their input is critical to your success. Announce the initiative widely so that staff will be aware that you’ll be requesting data from them. Get high-level support for the initiative, so that parallel department staff understand this initiative has comprehensive support. Be sure to express your appreciation for participants’ time, effort and cooperation.

Spend time upfront on elected official and managerial level engagement. This can help to secure commitment and support as you move forward. Find out which elected officials are passionate and most supportive of this initiative and seek their guidance and advocacy so you can create as broad support as possible for the GHG inventory program. In addition, identify departmental stakeholders that are influential and whose support will help convince other people that this effort is a priority.

In most cases, the size of your municipality will determine how much data you’ll need to collect, and the availability of data determines how quickly you can complete an inventory. Based on these factors, working fulltime, a GHG inventory can take anywhere from one to three months. In addition, colleagues in other departments, primarily fleet and facilities, will need to allocate some time in collecting and providing you the necessary data. Finally, several staff may want to be involved in the analysis of the emission inventory results. A successful inventory is also one that is shared with key stakeholders and community members. An inventory is ultimately a starting place for defining local action steps to reduce carbon emissions, but the inventory alone cannot determine what those action steps are. As such it is critical to share results of the inventory with relevant stakeholders to move forward on reducing carbon emissions in the community. Staff will need to devote time to sharing results and responding to requests for further information.

### 1.1.2. Comprehensive Data Collection.

The data collection process requires information from a range of departments and offices. In some instances, it even requires a bit of detective work. Be prepared to be tenacious in securing all the

data you’ll need to collect. If you know someone from a neighboring community who has done this work, check-in with them on what steps they took to get the needed data. Often your utility will be key and your neighbors may have learned some tricks you can use to facilitate your data collection process. Work closely with your finance and accounting departments. In many cases, when all other resources have been exhausted, they will be your most reliable resource center for inventory data since most of municipal expenses and activities are recorded in financial files. In order to give your utility account representative sufficient time to collect the energy use data for all municipal and community accounts, talk to your utility account representative early on to find out the steps required to obtain historical energy use data. In addition, they are likely to be an important source of information about various upgrades made along the way.

GHG emissions inventory software, or at least, detailed spreadsheets, are a necessary and key component of conducting a GHG inventory. Software and data collection spreadsheets are used to convert inventory results into emissions through calculations based on emission factors for various sources (e.g. pounds of CO2 released in the production and use of natural gas). Please refer to Appendix A for a list of resources. Depending on where you are located, specific “inventory protocols” may need to be followed. For example, California, in partnership with other entities, has developed a “local government operations protocol.” Following this protocol is important, and you will need this protocol document. Any software or spreadsheet templates you use should conform to the protocols you are using.

1.1.3. Excellent Recordkeeping.

You must be meticulous about the data collection process, keeping detailed records on where you found the data and who provided it to you. Keep records in a spreadsheet or in a database. Note all your assumptions. It is rare for an inventory to ever be 100% complete and based on accurate records. In some instances where data is unavailable, you may need to make assumptions, and the credibility of your inventory depends on how well you document those assumptions. Record keeping is also critical in making sure the next inventory can be accomplished as efficiently as possible. It is also important to keep your records very well organized from the very start, as there are many components to conducting an inventory.

1.2. Program Identification

To identify the program appropriately, staff will need to spend time on outreach to department staff, utility representatives and community groups.	
Duration	1
Project Manager (%FTE)	2-5%
Implementation Staff (%FTE)	0%
Additional Staff input	2-3 meetings
Possible Hard Costs	NA

With a solid understanding of resources needed to carry out an emissions inventory – staff support, data, record keeping tools, look for opportunities to most efficiently and cost-effectively setup a GHG inventory program that will work in your jurisdiction. Knowing the historical level of energy efficiency and environmental activity internally and across the community can go a long way to streamlining this process, because that information can provide basic resources and contacts for organizing and collecting the information you need. In addition, as you think about the longer-term goals it can help identify additional stakeholders to work with down the road.

Keep in mind; the inventory is just a starting place for a longer-term project to develop a climate action plan. Along the way you will need to make the business case for this inventory and explain the benefits to your internal stakeholders. For example, the inventory can lead to savings (energy, water, etc.) in the long run, and the municipality will be recognized for its environmental leadership, which can be invaluable to environmental groups within your community. The more this inventory is seen as something that will add value to the city or the community, the more support it will gain. Increasingly, energy efficiency and GHG emissions management are being linked to economic development, job growth, public health and long-term community stability. Identifying your inventory program as the first leg of such a beneficial effort for the community can provide leverage and support that would not be present if it is seen as an outside independent or strictly “environmental” initiative.

Contact your facility and fleet managers to inform them about the municipality’s climate change initiative and data collection process. Use this opportunity to gauge the level of historical recordkeeping for utility bills. Some facility managers have been tracking electricity and natural gas consumption for years, and will be able to save you a lot of time in identifying and collecting those utility bills. Others simply have not. As mentioned above, contact your utility representative to see if they can provide you with historical utility bills in an electronic form. Experience has shown that obtaining utility records can be time consuming and challenging, so contacting your utility early on in the inventory process and being persistent can make a big difference. Again, this is a place to check-in with your neighbors for advice on working with the utility.

Another potential source of information is your County and/or State office to see if they have completed a GHG inventory of your region. This might identify some data sources for you and may provide you with a rough baseline to work from.

It can also be efficient to talk with local environmental non-profits, especially those who are involved with energy and climate related work. They may know of important data sources that you can use, have strategies for setting up the inventory and may even know about funding sources for your inventory program.

All of these program identification steps will help you to identify and catalog your major hurdles and gaps based on both the state of information resources and the structure of your local government.

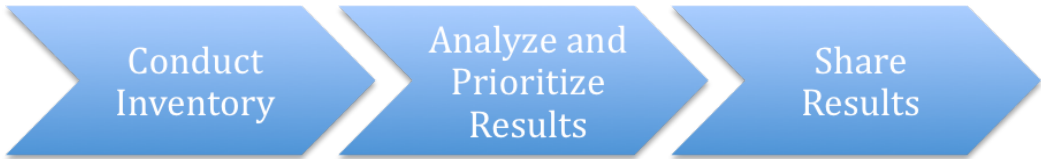
## 2. Taking Action

The six key steps involved in conducting a GHG emissions inventory program are outlined in this process flow diagram.

**Figure 1 – GHG Emissions Inventory Program Design Process Flow Diagram**

### *Program Implementation*





**2.1. Program Implementation**

Once the program has been designed and identified more focused effort on the part of a staff manager will need to be spent to formalize the inventory program and setup an infrastructure for its operations. Staff meetings will be required to launch the program and secure input.	
Duration	1-3
Project Manager (%FTE)	10-20%
Implementation Staff (%FTE)	5-10%
Additional Staff input	1-2 meetings
Possible Hard Costs	Costs may include software and training for implementation staff and possibly membership in local organizations.

The first three steps in the above diagram depict the requirements for implementing an inventory. The section below details each of these three steps.

**2.1.1. Assign a Project Manager**

Because of the complexity of an inventory, and the number of data sources and communications channels involved, it is ideal to assign a single project manager to manage the inventory. Determine who will be managing this project, and make sure they have the knowledge and skills to complete this inventory. If you don't have staff with appropriate training at the outset, consider investing in some training of the project manager so they are more informed about the technical aspects of an inventory (see appendix for some training resources). This also helps to develop your capacity for climate change related work moving forward. A GHG inventory takes time, and will not get done as a side project. The manager should have sufficient time allocated to complete this project. This does not mean the manager is necessarily the lead staff person. An intern can be hired, or other staff can conduct the bulk of the inventory work, but a project manager of sufficient seniority should be assigned to this project to ensure the staff working on this inventory has the authority needed to move forward.

**2.1.2. Assemble a Team**

Assemble a team of staff who is enthusiastic to be part of the jurisdiction's climate protection efforts. Good candidates are individuals that will actively support this process through their individual efforts and will take ownership of the initiative when it comes time to developing and implementing measures for reducing emission sources. Take some time to define the role of the team, it's authority (ideally backed up by your city manager, elected officials or other senior decision-makers), and objectives. Setup a timeline and key deliverables so that the project manager has support for moving the project forward.

The bulk of your data may come from the facilities, fleet and transportation department, therefore, ensure you have a representative mix on your team which correlates to the departments that you'll be working with to gather data.

A formal invitation from your mayor or city manager inviting staff to contribute to the launch of the process is a great first start. Given that everyone is volunteering for this process, be sure to regularly recognize people for their participation throughout the process. Have the mayor or city manager recognize team member's time and commitment to the process. A little recognition from city leadership goes a long way.

Think about using interns. Climate change is an increasingly interesting field to be in. There are many students, or adults looking to transition into a climate change related career who are interested enough in this work to come on board as an intern. Therefore, hiring interns is both an efficient and cost-effective way for conducting an inventory. Consider placing an advertisement at a local college. In return, you will be providing the intern with valuable job training in the environmental field. However, it is critical that you recognize that the intern cannot do this work alone. Because there is so much departmental input, an intern will need support from staff to be successful. If you do have an intern conducting the inventory you should consider the following aspects:

- Provide the intern with a desk at your City hall so that they can build relationships with co-workers, and become a climate protection advocate with their co-workers;
- Send around an announcement to the departments that they will be contacting so that your colleagues feel more prepared to response to the intern's requests
- Setup a process for the intern to report regularly to the project manager on progress.
- Try to build into the internship a presentation of findings to your electeds or department heads at the end, this gives the intern a chance to share their work, and get professional feedback.

#### 2.1.3. Organize Data Collection

Before starting your inventory, it is important to organize the focus and boundary. Many of these decisions will be embedded in the specific protocol or approach you are following; however it will be helpful to clarify the elements before setting out to collect data. Make sure to refer to that protocol before starting. Below are some of the most critical elements to consider from the Local Government Operations Protocol.

- Boundary of Analysis
- Scope of GHG Emissions
- Baseline Year

#### **Boundary of Analysis**

A GHG emission inventory can focus solely on municipal operations or it can include community sources. A municipal operations analysis creates an inventory of the GHGs produced by all government operations and facilities. A community inventory creates an inventory of the GHGs produced by a municipality plus all community sectors, including residential, commercial, industrial, and transportation emissions sources, within a given jurisdiction. Some municipalities decide to initially focus on municipal operations and then once that is completed, focus on completing an inventory of community GHG emissions. At this time, a standardized protocol is



available for only the local government operations<sup>1</sup>. A community wide protocol is in development, and should be available in the Fall of 2009. For more information on the boundary of analysis see the appendix.

### **Scope of GHG emissions**

Every jurisdiction and every community has multiple potential sources of GHG emissions each of which may emit a different type of GHG (refrigerants from coolants, Carbon Dioxide from Automobiles, etc.). You need to consider the scope of emissions for your inventory. Different protocols and approaches have different metrics for defining the scope of the inventory, but typically they are all addressing the questions

- What emission sources to measure
- What emissions to include; and
- What emissions to disregard.

No inventory is 100% accurate or complete, the boundaries of inventories are not clearly defined and are subject to continual debate, so defining a reasonable scope for your inventory lets you know what is included and what is not, and lets others know what may still need to be considered in the future. For more information on emissions scope see the appendix.

### **Baseline Year**

Establishing a baseline year of GHG emissions is important because it is how your municipality will measure future successes in reducing emissions. Typically, GHG emission reduction goals are established as a certain percentage below a particular year (referred to as the baseline year). For example, 15% below baseline year 1990 emissions by target year 2010 or 20% reduction below baseline year 2000 emissions by 2015. Currently, California (the only state with a statewide target) aims to reduce community-wide emissions 15% below current levels by 2020. When deciding upon a baseline year for local government operations, you'll want data that most accurately and thoroughly reflects energy consumption and waste generation in your local government. In some cases, data may not be available for a given source. If all of the information is not available, or the resources needed to gather it are not available, gather complete data for as far back as possible. The most important factor here is completeness of data. If your most comprehensive data set is in 2005, use 2005 as your base year. It is better to select a more recent base year for which you can find a lot of information easily, than to spend weeks trying to track down data that may not exist or be incomplete.

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<sup>1</sup> <http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm>

## 2.2. Inventory

The actual inventory is the most resource intensive part of this program. The actual amount of time required for the inventory will vary depending on the size of the jurisdiction (e.g. population, number of facilities, etc.), and whether or not a community inventory is included. The actual costs will vary depending on what level of staff are involved (senior, junior, interns).	
Duration	2-4
Project Manager (%FTE)	10-15%
Implementation Staff (%FTE)	80-100%
Additional Staff input	response to information requests by implementation staff
Possible Hard Costs	NA

Once you have assigned a project manager, assembled a team, and made your inventory decisions, including boundary of analysis, scope of emissions, and baseline year, it is time to gather and enter the data. The full technical scope of an emissions inventory is outside the parameters of this guide, however there are key issues that relate to the practical implementation side, that make a discussion of some of these topics relevant here.

The bulk of your time will be spent identifying, gathering, organizing, and entering relevant data in your emission software or spreadsheet. Several emission inventory spreadsheets/software come with data sheets to assist you with data collection. The simplest form of data collection is collecting utility bills (if they are readily available) and it tends to get progressively more complicated for items such as transportation and solid waste. You can see a simple emission inventory sheet in the Small Town Carbon Calculator (STOCC)<sup>2</sup>.

The table below outlines emission inventory data you'll need to collect and where you'll likely find it. In all cases, your finance and accounting departments may be good resources because they pay the bills that these data relate to (energy, water, transportation, solid waste).

Table 1. Emission Inventory Data and Where to Find It

Sector	Data Needed	Where to Find?
<b>Residential</b>	electricity, natural gas, and fuel oil consumption	Utility bills; contact your local utility to see if they can aggregate the information by sector and send electronically.
<b>Commercial</b>		
<b>Industrial</b>		
<b>Institutional</b>		
<b>Transportation</b>	Gasoline, diesel fuel, diesel and electricity used in passenger cars, motorcycles, trucks, marine vehicles, school buses, and transit systems (buses, trams, trains).	Fleet managers and transit agencies.
<b>Waste</b>	Amount and composition of waste generated by municipal employees and facilities, residents, businesses, and by the construction and demolition sector	Solid waste agencies
<b>Streetlights</b>	Electricity use resulting from the operation of outdoor lighting such as streetlights, traffic signals, illuminated	Park and Recreation and Department of Public Works utility bills

<sup>2</sup> <http://www.carboncoalition.org/community/EnergyCommitteesResources.php>

	pedestrian signs, and parks and recreation lights	
<b>Water and Sewer</b>	electricity, natural gas, and fuel consumption from water pollution control plants, wastewater pumping stations, water pumping stations	Water and sewer agencies.

### 2.2.1. Units of energy usage

Most fuels have a unique unit of measurement. For example, natural gas is commonly measured in cubic feet and electricity in kilowatt-hours (kWh). Make sure to note units accurately so that you (or your software/spreadsheet) can normalize the units. Sometimes your utilities' unit of measurement is different than what you will need for your software. There are a number of free online unit conversion tools that can be used to translate units<sup>3</sup>. Some protocols/resources will already have these unit conversions available to you.

### 2.2.2. Keep Meticulous Records

It is essential to maintain a detailed record of every inquiry (telephone or email) and data source throughout the data collection process. At some point, you'll want to confirm data points, update data (and you'll want to know where you found it the first time), and pass along data collection to someone else who will need to know who and how you secured the data.

The excerpt below describes a real-world experience in tracking down data, illustrating why detailed journal keeping is such a critical component of the data collection process.

**Figure 2 Data Collection Diary**

#### **A true record of a search for University Fleet Fuel Consumption<sup>4</sup>**

12/14/00 - Contacted the Director of Transportation - was told the supervisor of garage maintenance would have the information. Contacted the supervisor of garage maintenance - was told that he forwards all of that information to the facilities business office.

12/20/00 - Contacted the facilities business office - was told that they could prepare the data in a few days.

1/11/01 - Was contacted by the facilities business office - was told they did not have that information and that the State Department of Transportation handles the fuel distribution and should have the data. Contacted the DOT - was told they keep no historical records but University Department of Transportation should.

1/18/01 - Contacted the University Controllers Office, was told they didn't have the information and forwarded my message to the Director of Facilities. Did not hear back.

1/25/01 - Contacted the Director of Facilities and was told he would get back to me. Did not hear back.

1/31/01 - Contacted the Director of Facilities and was told my message had been forwarded to the Director of Transportation.

<sup>3</sup> See for example, <http://www.unit-conversion.info>.

<sup>4</sup> Clean Air-Cool Planet. Campus Carbon Calculator, User's Guide, 2006. <http://www.cleanair-coolplanet.org/toolkit/inv-calculator.php>

2/7/01 - Received email from Director of Transportation suggesting I contact a specific person at the State DOT. Contacted the State DOT and was sent a file containing data from each vehicle fueling event (about 400 pages long) for the year 2000. Also learned that there used to be a University position that was charged with summarizing the vehicle data and reporting it to the state, but that this position had been eliminated in 1998.

2/21/01 - Contacted the supervisor of garage maintenance and was told he would look around for the old reports.

3/1/01 - Received a message from the supervisor of garage maintenance that he had found the reports in an old file cabinet.

### 2.2.3. Emission Factors

To ensure that your emissions are calculated accurately, you'll want to input the correct emission factors. The emission factor is based on your utility's energy mix. The emission factor specifies the emissions per kilowatt-hour of the annual average kilowatt-hour produced in the electricity region specified. Or, more easily said, it speaks to how many GHGs are emitted per unit of fuel used. For example, if your utility burns coal, your emission factor will be higher than if you are using hydropower, because more GHG emissions are emitted in the burning of coal versus the harnessing of hydropower.

The U.S. Environment Protection Agency's regional eGRID<sup>5</sup> emissions factors are commonly used by local governments throughout the country for calculating emissions from electricity usage. Other local governments try to obtain more accurate emissions figures by contacting their respective utilities, since all utilities use different energy mix to generate their electricity. If your utility can't provide you with an emission factor, you need to calculate an average of emissions generated per kilowatt-hour over an entire year (usually the baseline year), taking into account fuels used and emission control technologies in use in each plant. For example, you will need to identify the emissions factors per unit of energy from your utility's energy mix, which may include coal, natural gas, nuclear and hydropower, and calculate an average emission factor based on those uses. For local governments in California, emissions factors for California electric utilities as well as other fossil fuels are provided in the Local Government Operations Protocol.

### 2.2.4. Third Party Verification

If you are concerned about future reporting requirement due to anticipated governmental climate change regulations or thinking about registering your emissions reduction from a qualified reduction project with the California Climate Action Registry or The Climate Registry so that you can sell or trade your emissions, you might consider having a third party verifier assess your emission inventory.<sup>6</sup>

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<sup>5</sup> U.S.EPA eGRID. <http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html>.

<sup>6</sup> The California Climate Action Registry maintains a list of third party verifiers:  
<http://climateregistry.org/tools/verification/verifiers.html>

## 2.3. Evaluation

Once the inventory is complete, participants will need to dedicate some time to evaluating your results. This time will include data checking, emissions forecasting, writing up the results and sharing your results with key stakeholders. Additional meetings with departmental staff may be required for this phase.	
Duration	2-3
Project Manager (%FTE)	5-10%
Implementation Staff (%FTE)	20-30%
Additional Staff input	1-2 meetings
Possible Hard Costs	NA

Evaluation of the results is where information translates into action. However, before diving into the analysis of your results, it is important to spend the time proofing your outcomes. Review your assumptions, check your calculations, and if possible have an outside reviewer look at your data for consistency and accuracy.

### 2.3.1. Emissions Forecasting

After completing a baseline year GHG emissions inventory, the general next step is to assess how the emissions are going to change under business-as-usual conditions in the future. Completing an emissions forecast is important because you will need to understand what your emissions projections will be in order for you to efficiently determine your emissions reduction goal. Additionally, forecasting emissions will help you to identify and prioritize emissions measures as the estimated projections will provide insight into potentially the largest emissions sources.

There are numerous proxies that you can utilize to estimate your emissions forecast. For instance, within the community inventory, examples of some of those proxies include: population growth trends, residential, commercial and industrial development trends, energy use trends, and workforce expansion trends. For municipal emissions forecast, it is possible to use information on the expansion of municipal services or infrastructure, municipal budget forecast, community population growth trend, among others. The approach that is selected may depend on the unique circumstances of each jurisdiction. As such, it will be important to discuss among with your colleagues which approach will work best for your community.

It is important to keep in mind that the emissions forecasting should provide you *general* insight into your future emissions. As conditions evolve within both the municipal and community sectors, it will be necessary to revisit and update the forecast methods.

### 2.3.2. Organizing Results

Once the data collection and entry phase are behind you and fully proofed, you can proceed to interpreting the results. Your Inventory results will identify:

- GHG Sources
- Magnitude of the Sources
- Trends

This is a good time to look closely at existing emissions reports, as they can give a good idea of how to go about organizing and presenting your results. There are several ways previous

jurisdictions have evaluated their data to assist them in identifying opportunities for emission reduction. For example, your data can be sorted by;

- Sector (e.g. residential, commercial, and municipal)
- Fuels (electricity, natural gas, kerosene, steam)
- Operations (solid waste, fleet, agriculture)
- Sources within operations (e.g. streetlights, vehicles, traffic signals)
- Time trends (chart sector growth)

### 2.3.3. Visualizing Results

Inventory results are not straightforward or easy to understand for many people. Part of your evaluation will involve translating the dense quantitative results into a form your elected officials, staff members and community members can easily digest and respond to. Create graphical charts out of the emission data to enable readers to easily absorb the data and make sense of it. Again, look to existing reports for example of how to represent your data visually. Figure 5 illustrates New York City's emissions breakdown by sector and fuel source. These charts clearly show how important commercial emissions, and that surprisingly industrial emissions are less critical than one might imagine in a city of New York's size. Looking at the Fuel Source chart, one can quickly see that electricity is by far the largest source of emissions, as might be expected in such a large and dense urban environment.

**Figure 3 New York City Emissions Breakdown**

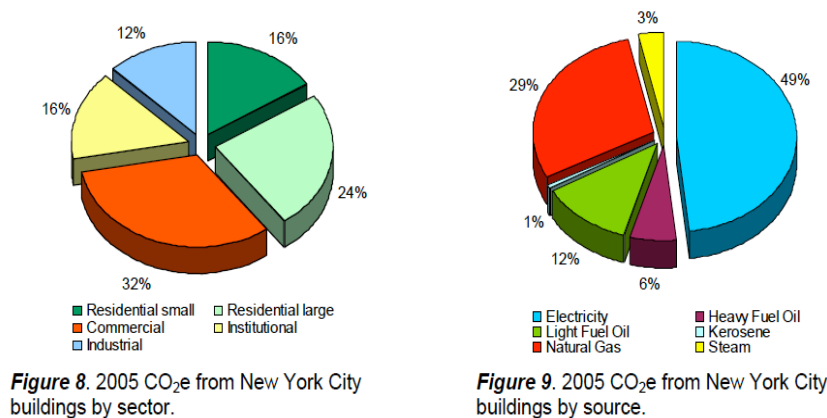
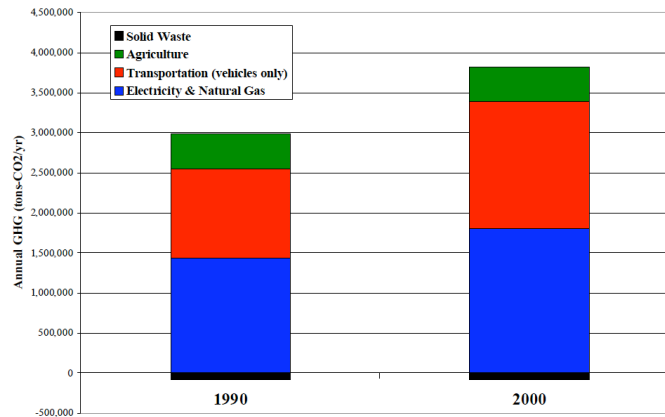


Figure 6 illustrates Sonoma County's emissions in 1990 and in 2000, and provides a quick way to identify what emissions are growing and by how much. For example, we can see solid waste has remained relatively even over that time period, electricity has grown, but transportation appears to be growing faster, a result perhaps of increased commuter traffic in the county.

**Figure 4 Sonoma County Emissions Breakdown**



Charts such as this provide for clear visual representation of the community’s emissions sources, and can be used to inform decision makers on which sectors and power sources to target for highest potential emissions reduction.

### 3. Moving Forward

A GHG inventory is only as good as the policies and programs that it is used to create. The inventory is the first step to emissions reductions—your emission inventory results inform you of the sources and magnitude of emissions from your local government so that you can move towards cost-effective reduction of those emission sources.

#### 3.1. Prioritization

Prioritizing the policies and programs to pursue through a climate action plan or other approach, can take a significant amount of time because defining priorities is not a technical issue as much as a political, social and cultural issue. As such, prioritization should involve significant input from community members, elected officials and other stakeholders. However, there may be a relatively low-level of effort spread out over a significant amount of time. Costs may be incurred through meetings and travel, report printing and distribution.	
Duration	2-3
Project Manager (%FTE)	5%
Implementation Staff (%FTE)	5-10%
Additional Staff input	some meetings
Possible Hard Costs	Costs may be incurred through meetings and travel, report printing and distribution.

The challenge in putting your GHG inventory to use is identifying which emission sources to focus on. This section details a few basic approaches to utilizing the inventory to determine emissions sources with greatest reduction potential, and associated actions and initiatives that can be implemented to achieve reductions. Identification of these priorities should be based on cost effectiveness, feasibility, and community support.

### 3.1.1. Establish an Emissions Reduction Target

One of the more important decisions that will arise from the inventory is the establishment of an emissions reduction target. This target is central to your overall prioritization as it determines the amount of emissions you seek to reduce, which will inform the selection and importance of other steps you can take. The emissions target will take into account, current emissions and your emissions forecast and define a goal for reducing projected emissions in a given timeframe. The emissions reduction target is important in providing a tangible goal for your jurisdiction's reduction efforts. When setting a reduction target, keep in mind that the target should be aggressive but also practical in that it can be achievable given your jurisdiction's circumstances. It may be helpful to first research what reduction targets other local governments, especially those near you and/or those that have similar characteristics, have selected as a way for comparison. Additionally, if you are doing an inventory for both your municipal and community sectors, you may chose to set a more aggressive reduction target for your municipal sector. In so doing, you are setting an example for the rest of the community to follow.

### 3.1.2. Create a matrix that allows ranking of emissions sources

A matrix characterizing emissions sources provides for the comparison of savings potential and costs and benefits of target sub-sectors. The matrix should include criteria that are important to consider and be designed in such a way that stakeholders can compare the pros and cons of addressing specific emissions sources. Such a matrix could include;

- Potential Measures to address this source
- Co-benefits of reduction (health, jobs, criteria pollutant reductions, etc.)
- Staffing requirements for reducing this source
- Cost per ton reduction (cost of measure minus cost saving over time)
- Potential barriers to reductions
- Ease of integration into existing policy / Fit with existing codes and plans
- Short- / Middle-/ or Long-Term benefits
- Possible sources of funding (utility, state, federal, other)

Providing input to this matrix will require research, some guesswork, and will include many subjective judgments. Although it can be challenging, it is important for the purposes of comparison. However, to ensure that the process is clear and transparent, it is important to document all assumptions you make in this step, as tracking sources will enable verification of facts/estimates and allow for flexibility in updates as data increases and improves. Development of such a matrix will facilitate easier and more clear definition of reduction strategies and policy options in the future.

### 3.1.3. Involve the Community

Climate change is a complex, and far-reaching subject. It has the potential to affect the entire community. As such, defining priorities can be a challenging and political process. On the one hand, opening discussion of priorities to the public provides for an active civil society and engages people in their community. On the other hand, Local governments need to get community to buy-in or they will not be successful in achieving the reduction target. Priorities cannot be based solely on costs and savings, but rather should have broad community support so that they can be readily



approved and implemented. Additionally, community members often come up with creative ideas and innovative approaches to challenging problems.

Some communities establish committees for each emission sector (buildings, waste, transportation, etc.) Others hold community meetings to gather ideas across the board. Talk to other cities and counties to find out how they are involving their constituents in sustainability planning.

You can ask community members / stakeholders to provide input on criteria that might otherwise require intensive technical assessment, however where qualitative input may be sufficient to support prioritization of strategies. Criteria of this sort includes:

- Technical feasibility of reduction strategy
- Political feasibility of reduction strategy
- Visibility
- Perceived support

With the development of a an emissions reduction target, a priority matrix, and collection of community input on these priorities, you are in a position to define your priorities and begin to develop policies and programs that address those priorities. A significant level of effort and input in the prioritization process puts you in a position to make more informed choices about the kinds of policies and programs that can be used to realize your goals, and ensure that once those choices are made, as much of the community as possible supports the direction you choose to go in.

**3.2. Policy design**

The policy design process is inherently difficult to gauge, as it depends on many uncertain factors in the community and political environment. However, the process is likely to be drawn out over time. Effort will go into developing the policy itself and then further time must be devoted to building support and finalizing the design.	
Duration	1-12
Project Manager (%FTE)	5-10%
Implementation Staff (%FTE)	0%
Additional Staff input	depends on scope of policy
Possible Hard Costs	NA

Your emission inventory and prioritization process is really a long first step on your overall effort to establish sustainability planning activities in the community. Policies that arise from your inventory program will refer back to the inventory and will seek to address the priority areas identified. Policy’s can use standard incentives to encourage measure adoption or can set requirements for abidance. A well-designed greenhouse gas reducing policy has the potential to target upstream actors, functioning to proactively prevent emissions versus reducing them downstream. For example, if your municipality has an environmentally-responsible procurement policy, this will reduce the need to install energy efficiency appliances retroactively, as they will already be in use.

Increasingly, the policy design stage of this effort is bundled into the development of a comprehensive Climate Action Plan, which identifies measures to reduce the priority emission sources. Many of these measures are policy oriented, such as:

- Develop a green building policy (e.g. if you see a rise of emissions within the residential or commercial sector, this type of policy could effectively boost energy efficiency in new construction)
- Establish a full-time climate action coordinator position
- Develop a communications plan to educate employees of the principles of climate protection and effective reduction measures
- Require procurement of Energy Star or resource-efficient appliances
- Study the feasibility of adopting a self imposed carbon tax on ghg emissions from internal operations
- Establish a permanent cross-departmental climate team

To develop a viable climate change policy, significant research and development are likely to be required to ensure that the desired policy conforms to your local needs and regulatory environment. As an increasing number of local governments establish policies, and nongovernmental organizations seek to advance best practices in climate policymaking, the research burden is getting more streamlined. However, regulations vary from region to region and it is critically important to fully assess the implications of a particular policy choice at the local level.

The full scope of policy design activities and effort are beyond the reach of this guide. Many Cities and Counties have already implemented sustainability policies. Non Governmental Organizations are also increasingly coordinating the development of climate change related policies and policy resources. Capitalize on these resources to model general plan language, ordinances, and municipal codes from other local governments. Please refer to the Appendix for some resources on climate action planning and policy design in general.

### **3.3. Policy adoption**

As with policy design, the policy adoption process is inherently difficult to gauge, but it can often take several months to work with stakeholders, resolve issues, collect public input so that a final policy can be adopted.	
Duration	3-6
Project Manager (%FTE)	5%
Implementation Staff (%FTE)	0%
Additional Staff input	Depends on scope of policy and public engagement process
Possible Hard Costs	Costs may occur from public engagement activities, and through document preparation and distribution

There are a number of ways to adopt a particular policy; these are often specific to the jurisdiction, the state, and the scope of the particular policy. Local decision-makers are certainly the most qualified to determine the policy adoption process that is most suitable to their needs. However there are some general comments we can make on this topic.

### 3.3.1. Draw on Existing models

The number and diversity of existing GHG policies is growing rapidly every day. At this point, many jurisdictions have done the heavy lifting to define regulations, ordinances, and program structures that directly address their GHG emissions. As such, any jurisdiction looking to adopt a new policy does not have to reinvent the wheel. While it is clearly important to tailor policies to specific circumstances, the architecture, the basis and even the specific structure of another jurisdiction's policies may save significant amounts of time and effort. Further, looking at what neighbor jurisdictions are doing (or are talking about doing), may provide critical input on policy options. For example, if a neighboring community already has a defined green building policy, local contractors stand to benefit from a similar policy being adopted in subsequent jurisdictions. Climate Policies represent a particularly valuable opportunity to collaborate with neighboring jurisdictions. For consistency, and ease of implementation it can be valuable to consult with neighbors, regional bodies and other interested parties on what can and should be adopted for region-wide benefits.

### 3.3.2. Make the business case:

*Solving the climate crisis is urgent, but perhaps more importantly, doing it in a smart way will unleash enormous economic opportunity. Mitigating greenhouse gas emissions worldwide will require a crash program to use energy more efficiently, and to use renewable energy sources. Doing this can cut costs and drive competitiveness, spread the use of clean energy technologies that already are cost-competitive and available and develop next-generation technologies in virtually every sector of the economy.<sup>7</sup>*

L. Hunter Lovins, President, Natural Capitalism Solutions

If you can demonstrate both long-term and short-term savings potential from emission reductions, you are going to be in a much stronger position to engage stakeholders in the policy adoption process (see the referenced article above). However, don't be held prisoner to short-term return on investment. Some actions (e.g. environmental education) have no or only limited direct payback, but are critical for building capacity internally or throughout the community.

### 3.3.3. Focus on Co-benefits

Because of the breadth of GHG producing activities, policies to reduce these gases can be far-reaching and require significant community support, however the same breadth means that there are often significant co-benefits from GHG reducing policies that become leverage points for building support, or even identifying funding sources for implementation measures. For example, transportation produces significant carbon emissions, but also creates air quality hazards. Addressing transportation impacts through the use of low-emission vehicles can also help create cleaner air a vital public health benefit. By framing the issue from various perspectives (e.g. health, education, economic development). you will appeal to a broader base of support. The benefits are multifold, including energy independence, clean energy development, and green collar jobs. If you reach out to the likely as well as the the unlikely advocates, you may move forward more easily. While environmental groups and certain trade associations may easily support your efforts and

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<sup>7</sup> The Economic Case for Climate Action by L. Hunter Lovins, a well referenced source of economic evidence for the importance of climate policy adoption available at [www.natcapsolutions.org/publications\\_files/PCAP/PCAP\\_EconomicCaseForClimateProtection\\_04xii07.pdf](http://www.natcapsolutions.org/publications_files/PCAP/PCAP_EconomicCaseForClimateProtection_04xii07.pdf)

advocate on your behalf at public meetings and through marketing, you may also be able to engage new advocates (e.g. advocates for seniors may respond to increased density policies because it can increase access to services for the elderly). Identifying and highlighting the co-benefits of GHG reduction policies can greatly facilitate support and adoption.

### **3.4. Conclusions**

This guide is intended as a starting place and a resource to compliment efforts to setup, manage and implement a successful GHG inventory program. However, the landscape for this work is changing rapidly and what may be suitable today is likely to be very different tomorrow. In addition, it is critical to stress that an inventory is just the first step in an ongoing process of addressing GHG emissions at the local level, and so efforts should be made to build a program that will have durability and longevity in the community. With those factors in mind, the authors hope you find this guide useful, that it helps you navigate this new and challenging world of GHG emissions and climate change management, and most importantly that it is an aid in moving your community towards a reduced carbon impact and a more sustainable future.

## 4. APPENDICES

### 4.1. Resource Cost Estimates

The table below provides a summary of the resource cost estimates described throughout this guide.

Phase	Duration (months)*	Estimated Time (%FTE)			Possible Hard Costs**
		Project Manager	Implementation Staff (1 or more)	Additional Staff (Dept. Heads, stakeholders, etc.)	
<b>Program Design:</b> Program design requires staff to research current practices, develop a plan for a GHG inventory program and outreach to elected officials and key department staff. Consider the time required for meetings among departmental staff to setup this program and obtain feedback / commitment from key department heads.	3-4	5-10%		1-2 meetings	
<b>Program Identification:</b> Timewill need to be spent on outreach to department staff, utility representatives and community groups.	1	2-5%		2-3 meetings	
<b>Program Implementation:</b> Once the program has been designed and identified more focused effort on the part of a staff manager will need to be spent to formalize the inventory program and setup an infrastructure for its operations. Staff meetings will be required to launch the program and secure input.	1-3	10-20%	5-10%	1-2 meetings	Costs may include software and training for implementation staff and possibly membership in local organizations.
<b>Inventory:</b> The actual inventory is the most resource intensive part of this program. The actual amount of time required for the inventory will vary depending on the size of the jurisdiction (e.g. population, number of facilities, etc.), and whether or not a community inventory is included. The actual costs will vary depending on what level of staff are involved (senior, junior, interns).	2-4	10-15%	80-100%	response to information requests by implementation staff	
<b>Evaluation:</b> Once the inventory is complete, participants will need to dedicate some time to evaluating your results. This time will include data checking, emissions forecasting, writing up the results and sharing your results with key stakeholders. Additional meetings with departmental staff may be required for this phase.	2-3	5-10%	20-30%	1-2 meetings	
<b>Prioritization:</b> Prioritizing the policies and programs to pursue through a climate action plan or other approach, can take a significant amount of time because defining priorities is not a technical issue as much as a political, social and cultural issue. As such, prioritization should involve significant input from community members, elected officials and other stakeholders. However, there may be a relatively low-level of effort spread out over a significant amount of time. Costs may be incurred through meetings and travel, report printing and distribution.	2-3	5%	5-10%	some meetings	Costs may be incurred through meetings and travel, report printing and distribution.
<b>Policy Design:</b> The policy design process is inherently difficult to gauge, as it depends on many uncertain factors in the community and political environment. However, the process is likely to be drawn out over time. Effort will go into developing the policy itself and then further time must be devoted to building support and finalizing the design.	1-12	5-10%		depends on scope of policy	
<b>Policy Adoption:</b> As with policy design, the policy adoption process is inherently difficult to gauge, but it can often take several months to work with stakeholders, resolve issues, collect public input so that a final policy can be adopted.	3-6	5%		depends on scope of policy and public engagement process	Costs may occur from public engagement activities, and through document preparation and distribution

\*The durations of specific phases are not mutually exclusive, and are likely to overlap somewhat depending on the jurisdiction, time commitment and other factors.

\*\* Hard Costs are extremely variable due to size of jurisdiction, scope of activities and other factors. The information provided here is a reference to the types of costs that can be associated with each phase.

### 4.2. GHG Emission Inventory Tools

#### 4.2.1. Public Sector Tools

- Clean Air and Climate Protection (CACP), by ICLEI–Local Governments for Sustainability**  
 A GHG emission inventory software designed specifically for local governments.  
<http://www.icleiusa.org/action-center/tools/cacp-software>
- Climate and Air Pollution Planning Assistant (CAPPA), by ICLEI – Local Governments for Sustainability**  
 A comprehensive spreadsheet calculator tool for identification and quantification of over 100 distinct emissions reduction strategies.  
<http://www.icleiusa.org/action-center/tools/decision-support-tool>
- Climate Action Registry Reporting Online Tool (CARROT), by the California Climate Action Registry (CCAR)**

An online emissions calculation, reporting, and verification software.

<http://www.climateregistry.org/tools/carrot.html>

- **Local Government Toolkit, by the California Air Resources Board**  
A "one-stop-shop" to assist local governments to reduce GHG emissions.  
<http://www.arb.ca.gov/cc/localaction/localgovstrat.htm>
- **Small Town Carbon Calculator (STOCC), by the Carbon Coalition of New Hampshire**  
An Emissions Inventory calculator specifically for small to medium sized municipalities, developed.  
<http://www.carboncoalition.org/community/EnergyCommitteesResources.php>
- **Technical Resources/ Modeling Tools to Estimate GHG Emissions**  
As part of a technical advisory on CEQA and Climate Change, the California Office of Planning and Research prepared a comparison table of "Technical Resources/ Modeling Tools to Estimate GHG Emissions" This table provides a quick means to compare different approaches to modeling and their respective data needs and outputs. Each tool is described in more detail in the technical advisory document.  
<http://www.opr.ca.gov/index.php?a=ceqa/index.html>

#### 4.2.2. Private Sector Tools

- **Calculation Tools, by Greenhouse Gas Protocol Initiative (GGPI)**  
A suite of tools to assist users to calculate emissions from specific sources and industries.  
<http://www.ghgprotocol.org/calculation-tools>
- **Emissions Calculations Spreadsheets, by The Greenhouse Gas Protocol Initiative**  
<http://www.ghgprotocol.org/calculation-tools>
- **Energy Management Calculators, by EnergySTAR**  
A suite of tools and resources to help companies implement successful energy management strategy.  
[http://www.energystar.gov/index.cfm?c=tools\\_resources.bus\\_energy\\_management\\_tools\\_resources](http://www.energystar.gov/index.cfm?c=tools_resources.bus_energy_management_tools_resources)
- **GHG Emissions Standard, by International Standards Organization (ISO)**  
A standard that specifies principles and requirements at the organization level for quantifying and reporting GHG emissions and reductions.  
[http://www.iso.org/iso/iso\\_catalogue/catalogue\\_tc/catalogue\\_detail.htm?csnumber=38381](http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=38381)
- **GHG Protocol Corporate Standard, by Greenhouse Gas Protocol Initiative (GGPI)**  
A GHG emissions inventory protocol for companies and organizations.  
<http://www.ghgprotocol.org/standards/corporate-standard>

#### 4.2.3. Education Sector Tools

- **Campus Climate Action Toolkit (CCAT), by Clean Air-Cool Planet**  
A stand-alone GHG emissions inventory calculator specifically designed for university campuses.  
[http://www.cleanair-coolplanet.org/toolkit/component/option,com\\_frontpage/Itemid,125/](http://www.cleanair-coolplanet.org/toolkit/component/option,com_frontpage/Itemid,125/)

#### 4.2.4. Residential Sector Tools

- **California Carbon Calculator, by CoolCalifornia.org**  
A statewide carbon footprint calculator for households, individuals, and communities; including links to useful solutions for improving energy efficiency, and for reduction the overall carbon footprint.  
<http://www.coolcalifornia.org/>
- **Impact Calculator, by Low Impact Living, Inc.**  
A residential calculating tool carbon, energy, water, wastewater, trash and stormwater runoff footprints of homes and lifestyle.  
<http://www.lowimpactliving.com/pages/impact-calculator/impact-calculator>

#### 4.3. GHG Emissions Inventory Training resources

- **Greenhouse Gas Management Institute (GGMI)**  
Founded as a nonprofit organization in 2007, the GGMI trains and supports a global community of qualified professionals to work on GHG measurement, accounting, auditing and management.  
<http://www.ghginstitute.org/index.php?menu=20>
- **ICLEI – Local Governments for Sustainability**
  - **Greenhouse Gas Emissions Analysis Protocol Training Series**  
A series of webinars designed to teach officials how to aggregate data for climate analysis.  
<http://www.icleiusa.org/action-center/skills-training/iclei-greenhouse-gas-emissions-analysis-protocol-training-series>
  - **CACP Software 2009 Trainings**  
Interactive webinars offering an introduction to using CACP to complete GHG inventories, forecasting, and reporting.  
<http://www.icleiusa.org/action-center/skills-training/clean-air-climate-protection-cacp-software-trainings>
- **California Air Resources Board (CARB)**  
An assortment of courses providing usable and cost-effective information for both new and experienced environmental professionals, in California and nationally.  
<http://www.arb.ca.gov/Training/2009/courses.htm>
- **U.S. EPA Air Pollution Training Institute, Introduction to Emissions Inventories**  
An interactive computer-based training course to assist air pollution professionals and others in understanding the process of developing an air emissions inventory.  
<http://www.epa.gov/air/oaqps/eog/course419a/index.html>

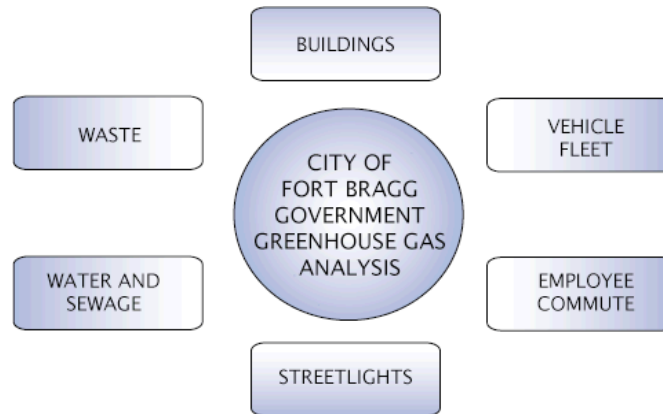
#### 4.4. Additional Information on Boundary and Scope

##### 4.4.1. Boundary

There are certain advantages to the local government operations inventory by itself. In general, a local government can conduct a more thorough inventory of it's own operations than it could of the whole community. As a result, the likelihood of indentifying opportunities for emission reductions, cost savings and efficiency improvements are more significant. In addition, while a community inventory may reveal significant opportunities for reductions, a local government is in

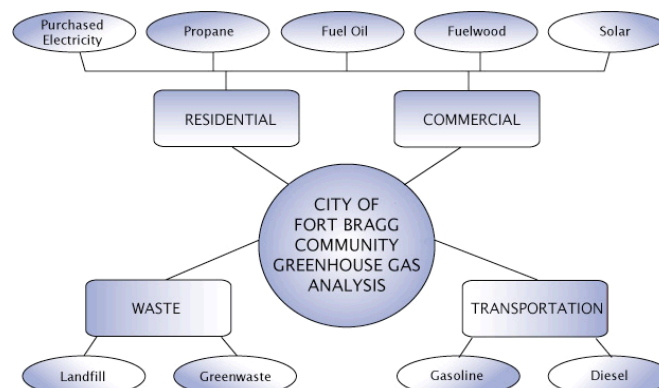
the best position to modify it's own emissions. Finally, a local government operations inventory (and the resulting climate action plan) sets a great example for the rest of the community to try to meet or beat. Figure 5 illustrates the boundaries of the Local Government Inventory for the City of Fort Bragg, CA<sup>8</sup>.

**Figure 5 Sample Local Government GHG Inventory Boundaries**



While critical, local government emissions are typically 1% of total community emissions, so on the basis of scale, it is ultimately important to obtain the community inventory. Some local governments start with their own inventory and build a community inventory in later while others conduct both simultaneously. Figure 6 illustrates the boundaries of the community Inventory for Fort Bragg, CA. As can be seen from this figure, community-wide analysis is more complex than a local government boundary. In part this is because of the broader set of organizations and variety of fuels that the community GHG analysis entails. Determination of which type of boundary your local government conducts should be based on how much staffing you have for the project, and what you intend to do with the inventory in the short and long-term.

**Figure 6 Sample Community GHG Analysis**



#### 4.4.2. Scope

There are five greenhouses gases that are typically measured in GHG inventories:

<sup>8</sup> City of Fort Bragg Greenhouse Gas Emission Inventory (August 15, 2007), <http://city.fortbragg.com/pdf/GreenhouseGasInventory8-15-2007.pdf>



- carbon dioxide (CO<sub>2</sub>)
- nitrous oxide (N<sub>2</sub>O),
- methane (CH<sub>4</sub>),
- sulfur hexafluoride (SF<sub>6</sub>); and
- hydrofluorocarbons (HFCs).

Each of these gases has a different global warming potential, which means their potential impact on global warming varies. For example, a molecule of methane is twenty-one more times powerful in capturing heat in the atmosphere than a molecule of carbon dioxide. Many software programs and emission calculation spreadsheets already have the global warming potential of each GHG programmed into the software, and will convert it into a CO<sub>2</sub> equivalency (CO<sub>2</sub>E). This is a convenient way to compare separate gases with distinct global warming properties in an equal manner.

The World Business Council for Sustainable Development and the World Resource Institute (WBCSD/WRI) jointly established a set of accounting standards<sup>9</sup> that address this question, by which entities are to be guided in their emission reporting endeavors. These standards identify operational boundaries for institutions to ‘scope’ their sources of emissions in order to provide accountability for prevention of “double counting” or conversely, “double credits”. There are three scopes.

- Scope 1 - includes all direct sources of GHG emissions from sources that are owned or controlled by your institution, including (but not limited to): production of electricity, heat, or steam; transportation of materials, products, waste, and fugitive emissions (unintentional leaks).
- Scope 2 - includes GHG emissions from imports of electricity, heat or steam, generally those associated with the generation of imported sources of energy (such as electricity used to heat, cool and power buildings).
- Scope 3 - includes all other indirect sources of GHG emissions that may result from the activities of the institution but occur from sources owned or controlled by another company, such as: business travel, outsourced activities and contracts, and all purchased goods which are manufactured in other areas.

Generally speaking, Scope 1 and 2 emissions are mandatory in reporting schemes and Scope 3 is voluntary. However, keep in mind that these are reporting guidelines, not accountability guidelines. By including Scope 3 emissions, you will be more accurately accounting for the generation of your community’s emissions and new opportunities for reducing your GHGs will present themselves. For example, environmentally responsible purchases of products and food, and commuting modes may arise as reduction measures, but will have not been accounted for if only Scope 1-2 emissions are tracked.

## **4.5. Climate Policy Resources**

### **4.5.1. Publications to review to get up to speed on climate change policy**

Knowledge about climate change is evolving rapidly. New publications are coming out all the time, so it can be hard for local governments to keep up to speed on the status of climate change science and policy options. However there are many credible and valuable resources available. Below are a few that represent a starting place.

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9 WBCSD/WRI, <http://www.wbcsd.org/web/publications/ghg-protocol.pdf>

- **The U.S. Mayors Climate Protection Handbook**  
<http://www.seattle.gov/climate/docs/ClimateActionHandbook.pdf>
- **The California Climate Action Network's Best Practices Framework**  
[http://www.cacities.org/resource\\_files/26286.BestPracticesFramework%20v5.0.pdf](http://www.cacities.org/resource_files/26286.BestPracticesFramework%20v5.0.pdf)
- **The U.S. Conference of Mayor's Energy and Environment Practices**  
[http://www.usmayors.org/uscm/best\\_practices/EnergySummitBP06.pdf](http://www.usmayors.org/uscm/best_practices/EnergySummitBP06.pdf)
- **The Presidential Climate Action Project's Economic Case for Climate Action**  
[http://www.natcapsolutions.org/publications\\_files/PCAP/PCAP\\_EconomicCaseForClimateProtection\\_04xii07.pdf](http://www.natcapsolutions.org/publications_files/PCAP/PCAP_EconomicCaseForClimateProtection_04xii07.pdf)
- **American Institute of Architects' Local Leaders in Sustainability: A study of Green Building Programs in our Nation's Communities**  
[http://www.aia.org/adv\\_localleaders](http://www.aia.org/adv_localleaders)
- **Environment America' report on U.S. GHG reduction policies and practices at the local Government Level**  
[http://www.environmentamerica.org/uploads/II/D0/IID0AFiN\\_CyeSLESFdDg4Q/Global-Warming-Solutions-that-Work.pdf](http://www.environmentamerica.org/uploads/II/D0/IID0AFiN_CyeSLESFdDg4Q/Global-Warming-Solutions-that-Work.pdf)
- **NOAA Study synthesizing more than 100 academic papers. Part of the US Climate Change Science Program.**  
<http://www.climate-science.gov/Library/sap/sap3-3/final-report/default.htm>

#### 4.5.2. Resources for information about climate change policy

There is no need to reinvent the wheel when it comes to climate change policy making. Many organizations are aggressively working to resolve the very problems local governments are struggling with now. Below are some of the well-known organizations and datasources that you can turn to for answers and help.

- **The Pew Center for Climate Change**  
<http://www.pewclimate.org/>
- **The California Climate Action Registry**  
<http://www.climateregistry.org/>
- **ICLEI, Local Governments for Sustainability (Star Community Index)**  
<http://www.iclei.org/index.php?id=7250>
- **The Alliance for Climate Protection**  
<http://www.wecansolveit.org/content/about>
- **The Center for Climate Strategies**  
[http://www.climatestrategies.us/Climate\\_Policies\\_Work.cfm](http://www.climatestrategies.us/Climate_Policies_Work.cfm)
- **The Association of Bay Area Governments**  
<http://www.abag.ca.gov/>
- **EPA State and Local Government Climate Change Web Site**  
<http://www.epa.gov/climatechange/wycd/stateandlocalgov/index.html>
- **EPA state and regional maps of clean energy initiatives and programs**  
<http://www.epa.gov/cleanenergy/energy-programs/state-and-local/policy-maps.html>
- **EPA state and regional maps of Climate Policies**  
[http://www.epa.gov/climatechange/wycd/stateandlocalgov/state\\_actionslist.html](http://www.epa.gov/climatechange/wycd/stateandlocalgov/state_actionslist.html)
- **Architecture 2030 "code equivalents"**  
[http://www.architecture2030.org/pdfs/2030Challenge\\_Codes\\_WP.pdf](http://www.architecture2030.org/pdfs/2030Challenge_Codes_WP.pdf)

- **StopWaste.Org Model Policies**  
<http://www.stopwaste.org/home/index.asp?page=518>
- **The Association of Bay Area Governments housing element toolkit.**  
<http://www.abag.ca.gov/planning/toolkit/>
- **International Energy Agency (IEA) Climate Policies and Measures Database**  
[http://www.iea.org/textbase/pm/index\\_clim.html](http://www.iea.org/textbase/pm/index_clim.html)
- **Center for Energy & Environment Security (CEES) Climate Action Database**  
<http://cees.colorado.edu/pcap/>
- **SustainLane's Climate Change Policy listings**  
<http://www.sustainlane.us/category/c2>
- **US EPA Air/Climate Change Portal**  
<http://www.epa.gov/ncei/international/airclimate.htm>
- **US Conference of Mayors Mayors' ClimateProtectionCenter**  
<http://www.usmayors.org/climateprotection/bestpractices.htm>
- **Institute for Local Governments Climate Plans**  
<http://www.ca-ilg.org/climateplans>