CLIMATE ACTION AND ADAPTATION TASK FORCE

November 21, 2023 @ 6:30 PM
Pacifica Police Department, EOC, 2075 Coast Highway, Pacifica, CA 94044

AGENDA

I. Call to Order (10m)

1. Roll Call
2. Approval of Agenda
3. Approval of October 17, 2023 Meeting Minutes

II. Community Communications (TBD)

1. Public Comment - *This portion of the agenda is available to the public to address the Task Force on items not appearing on the agenda. Statements are limited to three (3) minutes.*

III. Task Force Communications (10m)

1. Announcements from Task Force Members and Updates from Delegates

IV. Staff Communications (15m)

1. Updates from City Staff

V. Discussion and Action (60m)

1. Approval of Scope for Pacifica's Climate Action and Adaptation Plan
2. Subcommittee Updates:
    a. Strategy and Actions Subcommittee
        1. Approval of ICLEI 5-Milestones Framework
        2. Receive Information on GHG Inventory and Roadmap (using ICLEI Framework)
        3. Provide Direction on Roadmap Tasks to All Subcommittees
    b. Community Engagement and Outreach Subcommittee
        1. Event Attendance Planning
    c. Policies and Regulations Research Subcommittee
3. Consideration of Any Changes or Additions to Subcommittee Assignments
4. Consideration of Applying for Membership to ICLEI

VI. Future Meetings (10m)

1. Determine potential future agenda items

VII. Adjournment

Next Regular Meeting: December 19, 2023, subject to change

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CLIMATE ACTION AND ADAPTATION TASK FORCE

October 17, 2023
6:30 PM
Pacifica Police Department, EOC
2075 Coast Highway, Pacifica, CA 94044

MEETING MINUTES

Call to Order:

6:48PM by *Fellow Trevino*

Roll Call:

Members Present:

Kimberly Finale, Kai Martin, Monica Meagher, Margo Meiman, Rick Nahass, Dave Plumb, Carl Schwab, Jake Scussel, Nancy Tierney

Members Absent:

Maria Barr, Cindy Yang

Staff Present:

Christian Murdock – Planning Director
Elizabeth Brooks – Management Analyst II
Gabriel Trevino – CivicSpark Fellow

Approval of Agenda:

Unanimously approved

Approval of September 21, 2023 Minutes:

Nahass requested the following modifications:

- Add that a question was asked about what the City Council direction was for the scope of the work of the CAAP Task Force. The answer from Analyst Brooks was that the City Council did not put any constraints on the operations and deliverables of the CAAP Task Force so that the Task Force could decide how narrow or wide the work and deliverables would be.
- Add that a question was asked, is there a budget? Director Murdock responded the Task Force does not have a dedicated line-item budget. There is council support and funding available to pay for some things within the scope of what council has asked you to do.
- Request that references to the Task Force work be changed from "project" to "program" or similar.

Meagher moved to approve the minutes as amended. *Martin* seconded. The motion passed unanimously.

Community Communications:

Gail Benton Shoemaker: Spoke as member of Tree City Pacifica advocating for nature-based solutions to be included in Pacifica's CAAP, specifically by including a tree canopy goal. The speaker notes that the International Union for Conservation of Nature is promoting a 30% canopy cover for every neighborhood. Tree City Pacifica solicited the assistance of Dr. Matt Ritter of Cal Poly San Luis Obispo, who arranged for a member of their Urban Forest Ecosystem Institute, Kenny Pollack, to assist Pacifica by creating a tool that will measure Pacifica's current tree canopy coverage for free. Once available, this tool can be used by the CAAP Force.

Paul Totah: Spoke as member of Tree City Pacifica advocating for nature-based solutions to be included in Pacifica's CAAP, specifically by including a tree canopy goal. As examples, he shared that the following jurisdictions have set the following goals:

- San Diego is aiming for15% urban tree canopy coverage by 2020, 35% by 2035
- Cleveland is aiming for 30% canopy by 2040.
- Bowie MD's is aiming for a 45% urban tree canopy goal.
- Portland, OR aims to expand urban forest canopy to cover 1/3 of the city.
- Milwaukee, Oregon aims to increase its tree canopy to 40% by 2040.

He noted that urban forest helps reduce the amount of CO2 in the atmosphere, conserve energy, provide shade, capture storm water runoff, and curb the impacts of flooding.

Jeff Moroso: Spoke as member of Tree City Pacifica advocating for nature-based solutions to be included in Pacifica's CAAP, specifically by including a tree canopy goal. He notes that planting trees is one of the easiest and most-long term things a citizen can do to help fight climate change. He shares that trees will capture carbon, help reduce the urban heat island effect, make walking and biking more pleasant on hot days, and improve local air quality, all of which improve public health and well-being. He states that studies have shown an association between urban forest canopy and better microclimates, physical and mental health, and reduction of noise levels by creating more leaves in neighborhoods. They can also encourage people to spend more time outdoors and to interact with their neighbors, which in turn promotes social health.

Task Force Communications:

Meagher: Attended Second Annual Climate Summit for San Mateo County and reported there were good resources shared for community engagement and working with community-based organizations.

Tierney: Also attended Second Annual Climate Summit for San Mateo County and reported there were good connections and, in addition to the substance dealing with climate change, a focus on community organizing.

Nahass: Reported he took part with the Pacifica Climate Committee at the Fog Fest, sharing alternative transportation information. They received 45 responses to a survey regarding public transportation. He also noted that the RICAPS CAP Template touches on green canopy being one of the cheapest carbon sequestration processes. This approach would support the concerns raised by the public comments.

Schwab: Attended the Electrification of Homes tour in Pacifica, and while the solutions were not new, it was interesting to see them being utilized in various settings.

Staff Communications:

Fellow Trevino: Reported he attended the September RICAPS meeting where representatives from other city governments, companies, local companies, consulting groups, and nonprofits gathered to share resources regarding the electrification of cities and personal homes. The meeting focused on the capital improvement planning process as a strategy for preparing for electrification city and country wide. He asked who the Task Force would like to identify as their liaison to RICAPS meetings going forward, as well as an alternate.

Nahass volunteered with *Tierney* and *Finale* as alternates.

Fellow Trevino continued to report that he had attended the October Local Energy Resources Network (LERN) meeting where the hosts shared information on potential grant opportunities that cities around San Mateo County can utilize, as well as the new Statewide Home Energy Score program, which looks to engage citizens in developing strategies for their own households for electrification and energy efficiency standards. He asked who the Task Force would like to identify as a point person to track LERN resource updates.

Meagher volunteered with *Schwab* as an alternate.

Fellow Trevino also reported he had attended the Climate Summit.

Analyst Brooks reminded Task Force members to share communication meant for the whole group with Staff first and Staff will then distribute it to the group as a whole to avoid any potential Brown Act violations.

She briefly shared that RICAPS and RINCON had completed an assessment of Pacifica's CIP and shared their results with the group. The assessment includes electrifiable opportunities identified in the CIP and suggested alternatives, how to prioritize them, a list of next steps, project descriptions, details for the projects themselves, and resources for how to implement.

Discussion:

Item 1: Scope of Pacifica's Climate Action and Adaptation Plan (CAAP)

Fellow Trevino began his report by clearly defining the meaning of scope as it pertains to Scope Emissions in comparison with the definition of scope as it pertains to the parameters of a particular project. He clarified that the Task Force is tasked with defining the scope of the CAAP as in defining its parameters.

Noting that in their previous meeting, the Task Force had asked for what GHG emissions data may be available for review, *Fellow Trevino* reported staff were able to obtain information from PG&E. He gave an overview of 2022 GHG emissions data as tabulated by PG&E, underscoring that the data warranted further staff review as some of the information was not fully defined.

Fellow Trevino then presented an analysis of the CAP scopes from multiple other jurisdictions concluding that a strong CAP scope is broadly defined and establishes timelines for its actions. He noted that scopes generally included some or all of the following "measures": the three obligatory CARB ones, adaptation, resiliency, nature-based solutions, net zero, and carbon neutral.

The Task Force then discussed how they would like to define the scope of Pacifica's CAAP.

It was asked if this should be the task of a Scoping Subcommittee and it was agreed that the discussion should be held by the group as a whole.

The various measures presented by *Fellow Trevino* were considered for suitability and feasibility. It was suggested that community engagement, food waste, and equity should also be considered. It was suggested that the scope include a target date and that current and upcoming legislation be kept in mind as it may impact the scope. It was also suggested that using CEQA guidelines could also be beneficial in defining the scope. A CEQA-certified CAP is not required but could potentially create processing efficiencies for the City.

The Task Force came to consensus that adaptation, mitigation, nature-based solutions, resiliency, community engagement, sustainability, and public health were important factors for consideration in the scope statement.

Martin shared the scope statement of the City of El Cerrito and Task Force members responded in favor of its language. *Fellow Trevino* then shared a rough draft statement he compiled based off the ongoing discussion and members responded in favor of that scope version as well.

The group agreed that the scope statement should be drafted as a "living document" that can be altered as their work goes on. It does not need to be officially documented until the Draft CAAP is presented to Council.

Staff offered to draft 3-4 scope statements, incorporating comments from this discussion, and bring those options back to the Task Force at the next meeting for their final consideration.

There was consensus for this approach.

Item 2: Rules of Order, Election of Officers, and Subcommittees for CAAP Task Force
Analyst Brooks presented a report outlining best practices for committee rules of order and made the following recommendations for practices/rules to be adopted by the Task Force:
Communications

- In the instance of the larger body, the Chair or Vice Chair will be the point of communication to staff, regional partners, and when presenting to City Council.

- In the case of subcommittees, a subcommittee member shall be appointed to be the communication lead for that group. They will be responsible to report out at Task Force meetings on behalf of the subcommittee and be the point of communication on behalf of the group.

Agenda

- The Chair or Vice Chair, in collaboration with staff, will create the agenda.
- All agenda item materials should be submitted to staff in final form no later than 7 calendar days prior to the related meeting.
- Staff will prepare the agenda packet and publish no later than the Friday before a regularly scheduled Tuesday meeting.

Subcommittees

- The Task Force may establish subcommittees for specific tasks or projects.
- Subcommittees are established by consensus, can be ongoing or ad-hoc, and must have a clear and specific directive.
- Subcommittees will report to the Task Force and will not have decision-making authority.
- Members are encouraged to serve on at least one subcommittee and may serve on more than one at a time or throughout their appointment, while ensuring compliance with the Brown Act.

The rules were approved without objection.

After hearing *Analyst Brooks* present further on the types and purposes of subcommittees for groups such as the CAAP Force, the Task Force members entered into discussion as to what subcommittees they found to be essential to form right away. Members agreed on the following subcommittees:

- Strategies and Actions Subcommittee
- Policies and Regulations Research Subcommittee
- Community Engagement and Outreach Subcommittee

Martin moved to approve the formation of these three groups. *Meiman* seconded. The motion passed without objection.

Members then volunteered for the newly formed subcommittees with the following membership:

- Strategies and Actions Subcommittee
    - Monica Meagher

    - Kai Martin
    - Carl Schwab
    - Nancy Tierney
- Policies and Regulations Research Subcommittee
    - Dave Plumb
    - Nancy Tierney
    - Margo Meiman
    - Carl Schwab
- Community Engagement and Outreach Subcommittee
    - Kim Finale
    - Rick Nahass
    - Jake Scussel

Meagher moved to approve this membership. *Meiman* seconded. The motion passed without objection.

Meiman nominated *Meagher* to be Chair of the Task Force. No other nominations were put forth.

Martin moved to appoint *Meagher* as Chair. *Nahass* seconded. The motion passed without objection.

Martin was nominated to be Vice Chair.

Meagher moved to appoint *Martin* as Vice Chair. *Tierney* seconded. The motion passed without objection.

Adjournment:

9:04PM by *Analyst Brooks*

Next Meeting:

November 21, 2023

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STAFF REPORT

IV. Updates from Fellow Trevino

Collecting San Mateo County Climate Summit Resources

The San Mateo County Climate Summit commenced on October 11 of 2023 from 8am to 6pm at the South San Francisco Conference Center. Featured speakers from the event included Congressman Kevin Mullin, and representatives from local organizations such as the Climate Resilient Communities, Nuestra Casa, Rise South City, and Thrive Alliance of Nonprofits for San Mateo County.

Topics Included community perspectives across San Mateo County coming from frontline community members, indigenous, faith-based, and farmworker communities all regarding climate resiliency. Breakout sessions provided information regarding funding for community resilience, strategic collaboration and mapping resources for resilience, and community research partnerships. Afternoon sessions provided information regarding nature based solutions, youth voice in the local climate movement, and how to build connections for community risk reduction.

Staff has been requested by the CAAP Force members to provide any resources regarding the San Mateo County Climate Summit in regards to slides from presentation or possible recordings from the event. At this time, presentation slides and recordings from the Climate Summit are not available. CAAP Force members are advised to monitor the Thrive Alliance website regularly to know when those recordings and other resources are made available.

The full agenda and list of speakers can be found here: https://www.thrivealliance.org/agenda-climate-summit-2023

List of Resources Present at Climate Summit	
Plenary Sessions	Breakout Sessions
Thrive Alliance	Evergreen Collective
Association of Ramaytush Ohlone	San Mateo County District 2
Rise South City	Pacific Gas & Electric
Climate Resilient Communities	Strategic Growth Council
Nuestra Casa	Sand Hill Foundation
Saint Mark AME Zion	Office of Sustainability Santa Clara County
Ayudando Latinos a Soñar	Neighborhood Empowerment Network

Stanford Doerr School of Sustainability	Center for Policy and Behavior UC Davis
	North Fair Oaks Community Alliance
	Kearns and West
	San Mateo County District 1
	San Bruno Mountain Watch
	San Mateo Resource Conservation District
	Grassroots Ecology
	San Francisco Estuary Partnership
	Youth Conservation Corps
	Anamantangi Polynesian Voices
	Interfaith Power and Light
	El Concilio of San Mateo County

Strategies and Actions Subcommittee Communication Report

Strategies and Action Subcommittee Communication 10/30

In Staff's initial response to the queries below by the Strategies and Actions Subcommittees, we provided information about what the State employs through the California Air Resource Board resources. The initial response suggested the Air Quality and Meteorological Information System (AQMIS2). In regards to this, Staff would like to acknowledge that this resource should no longer be examined or referenced for emissions data, as the latest study year recorded is 2018.

Additionally in response to the Scope Emissions, Staff responded that Scope Emissions are not explicitly stated in environmental documents per se. Lastly, a calculation program such as OpenLCA for Life Cycle Analysis (LCA) could be useful for measuring Scope 3 Emissions.

Staff has taken some time to review the questions posed by the Strategies and Actions Subcommittee and has organized the following information. This is a living document, so more information will be added up until the deadline for public distribution of said information/resources for the upcoming CAAP meeting in November.

In regards to greenhouse gas emission inventories:

1) What tool is the county using?
2) What are other cities using? Scope 1 and 2 only, or are other cities doing Scope 3 and what tools make that easy?
3) Do cities require Verification of Inventories?
4) Can you recommend a tool for Pacifica to use? For calculation methodology, should it align to what the state has been proposing?

Question 1:

The tool employed by the county for GHG emissions assessment exercises such as inventories and other monitoring is completed via Rincon Consultants. The RICAPS GHG Inventory was distributed to CAAP Force members via email on 10/30, with an upload to the CAAP intranet soon following.

The excel data sheet covers how the county is provided this information by Rincon. The brief 'Purpose' statement on the first sheet of the excel document states "GHG emissions are quantified and reported in accordance with International Council for Local Environmental Initiatives (ICLEI) greenhouse gas accounting standards".

The tool uses ICLEI U.S. Community Protocol methodology, meaning that factors related to emissions are accounted for on a localized perspective. So for instance, if there was a

measurement related to gallons of gasoline used in the inventory, Rincon would refer to the Environmental Protection Agency (EPA) standard for how many kg CO2 were emitted per unit of gasoline used. The EPA Emission Factor Hub can be examined as a standard for computing said emissions.

Rincon Consultants developed the excel document specifically for the City/County Association of Governments' (C/CAG) RICAPS. The methodology behind the results of this report are derived from the aforementioned EPA Emissions Factor Hub, California Air Resources Board models of determining emissions by various sectors, and the California Climate Investments Quantification Methodology Emission Factor Database.

Question 2:

Other cities throughout San Mateo County are supported by Rincon Consultants providing computational power for detailed reports such as this. While there are many consulting firms that may provide similar services, it should be noted that not every city that is developing or has already published their CAAP GHG emission inventories used the same standards. The ICLEI has 38 members from communities within the State of California.

While it should not be assumed that all 38 of these communities use the exact same methodology, it likely can be assumed that the quality of data across these communities in the ICLEI is high. The ICLEI employs a U.S. Community Protocol where EPA standards are taken into account for calculating GHG emissions.

As explained in the previous CAAP Force meeting on 10/17, Scope 1/2/3 Emissions are not a topic that is typically explicitly stated in the research related to CAP/CAAPs and other relevant environmental documents. For example, in the San Francisco Climate Action Plan 2021 you can find through a function key word search (ctrl F or Command F on Mac) that emissions as related to the Scope Emissions are only mentioned a total of 4 times in the entire document, and very briefly.

However, action taken by communities to reduce GHG emissions, reduce solid waste generation, etc. may inherently address Scope 1/2/3 emissions dependent on the nature of the solution measure enacted.

Research has yielded mixed results as to whether or not accounting for and measuring Scope 3 emissions is easy, or completely doable in a way that yields accurate results. Organizations such as the Greenhouse Gas Protocol offer a calculation guidance for this sort of carbon accounting. Staff believes passing this question on to available personnel resources at Rincon would yield greater insight.

Question 3:

While not explicitly stated for the process of developing a CAAP, verification of inventories is typically incumbent upon the consulting agency or organization conducting the body of research to uphold. This is done in house by the agency/organization conducting the inventory, and then typically passed on to a third party carbon accounting resource for verification.

The EPA reports that the Center for Corporate Climate Leadership's GHG inventory guidance is aligned with The Greenhouse Gas Protocol. This organization serves as a corporate accounting and reporting standard that was developed by the World Resources Institute. This EPA page cites the process for conducting a GHG inventory, which has a chapter dedicated to verification of results.

Question 4:

Generally speaking, it may be in the best interest of the Pacifica CAAP Task Force to align with State goals, methodologies, and actions in any way feasible. This makes Pacifica more in line with the way research may be conducted, how we align with potential CEQA regulations, or even how marketable and competitive we are for receiving grants.

Strategies and Actions Subcommittee Communications 11/9: Rincon Meeting

As per the request of the Strategies and Actions Subcommittee, City Staff organized a meeting with resources from Rincon made available to the City of Pacifica via RICAPS. The representatives present from Rincon were Emily Saul and Ryan Gardner. This meeting took place on November 9 2023, and was attended by City Staff Elizabeth Brooks, AmeriCorps Fellow Gabriel Trevino, and subcommittee members Kai Martin, Nancy Tierney, and Carl Schwab.

The Rincon GHG Inventory provided to City Staff for dissemination to the Task Force covered the emissions generated by Pacifica for the 2021 year. Fellow Gabriel Trevino asked about when to expect the inventory for the 2022 year as we are now nearing the end of 2023. It was the recommendation of Ryan Gardner that it is typical for GHG inventories to be provided every other year, as the off years where an inventory is not provided are typically the years municipalities focus on enacting measures to reduce emissions based on that report.

When addressing the questions previously asked of Staff by the Task Force members regarding verification of GHG inventory reports, Ryan and Emily notified the attendees that while there are additional third party verification sources, they typically include in their process a subcontractor that verifies and double checks GHG emission calculations. Ryan additionally informed the attendees that the Capital Improvement Plan should be rereleased to our team hopefully by the end of the year.

Attendees were informed that the methodology of information gathering for GHG emission calculator was completed by monitoring activity. Specifically activity from metered sources or utilities such as PG&E and PCE. Once measurements are recorded, they then multiply that by

the emission factor. For instance, the process of calculating kilowatt hour usage into total GHG emissions. The verification in this process comes directly from the utility provider who is the recording body; in this case this oversight body would be the California Energy Commission.

It was reported by Emily and Ryan that of the many sectors included in the inventory, transportation is the lowest quality modeled data. This does not mean it is inaccurate or a misrepresentation of VMT in and through Pacifica; it is just not as exact as other measurements included in the study. Transportation is modeled roughly via data available to government agencies regarding the model types of vehicles in Pacifica, flow patterns in and through Pacifica, and studies of how many cars travel through certain corridors. Rincon is informed via the Metropolitan Transportation Commission, Plan Bay Area, DMV records, and CARB EMFAC.

When asked about what else Rincon can offer, Ryan elaborated that the services revolve around the budget provided for operating within RICAPS. This budget covers meeting time, guidance in processes related to the creation and drafting of various environmental documents, and measured quantification.

One such handy tool they offer for measured quantification for instance would be the SparQ Tool. This generates emissions forecasts and provides a space where a municipality can alter the input numbers to reflect certain actions, with the reflected emissions resulting. Fellow Gabriel Trevino has contacted Avana Andrade from RICAPS to further inquire about using the SparQ Tool.

Lastly, Emily and Ryan were kind enough to detail the 3 phases Rincon recommends municipalities use for community engagement and outreach in processes similar to the one Pacifica's Task Force is carrying out. The first initial phase revolves heavily around education and gathering a feel for what community priorities are. The second phase includes creating a suite of sample draft measures or strategies that would be included in an environmental document, and allow time for the community to react and provide feedback. The third phase is finalizing those measures or actions.

Key Takeaways from Monthly RICAPS meeting

October Meeting

- PCE ON-Bill Cost Data Share Out from Rincon Consultants yielded that the impacts of electrification in a single family home when switching to high efficiency appliances save $495 annually
    - Switching to high efficiency electric appliances such as heat pumps, etc. reduces overall energy usage by nearly 60%
- PG&E offers an Induction Loaner Cooktop Program for 2 weeks at no cost. This loaner program boasts energy efficiency rates better than gas or electric resistance cooktops while also heating food faster

November Meeting

- Capital Improvement Plan electrification: Municipal Electric First Policy
- Jurisdiction share out: Ori Paz, City of Menlo Park
    - Mix of Level 2 charging ports for lighter vehicle traveling
    - DC Fast chargers
- **GovEV Fleets Program from PCE**
    - Phillip Kobernick
    - What: Plan for fleet wide transition, installation, and maximize savings
    - Free service from PCE
    - Some funding available from PCE
    - Open now until 2025
    - **What will you receive**:
        1) EV Fleet Replacement Plan (Total Cost of Ownership, direction/recommendations on what to buy)
        2) Fleet EV Charging Needs Assessment
        3) Charging Installation Plans (for specific sites)
        4) Permit-Ready Plans (100% engineered plans)
        5) Funding Overview (which rebates apply to my project?)
        6) Energy Optimization Plan
        7) (Optional) Energy Management Services
            a) So, in summary, this can be split up into two elements: 1) Study/Research Element and 2) In the ground charging infrastructure
    - CARB'sAdvanced Clean Fleets Regulation
        - 50% EV new by 2024
        - 100% EV new by 2027

CLIMATE ACTION AND ADAPTATION TASK FORCE

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STAFF REPORT

V.1. Approval of Scope for Pacifica's Climate Action and Adaptation Plan

Alternative Scope Statements

During the October 17th CAAP Force meeting, a discussion concerning how to define the scope for the City of Pacifica was had. This conversation was led primarily by the CAAP Force community members, with some direction and occasional input from the Staff. Task Force members took Staff insight into careful consideration as they navigated how to define scope. After much discussion, the following statement was provided by Staff that combined the common themes:

Pacifica aims to achieve sustainability via an assortment of strategies and actions to reduce GHG emissions, target climate change adaptation and mitigation, all through measures to ensure the incorporation of community engagement, NBS, resiliency and Pacifica's health in regards to state timelines and city goals established in already existing documents/policies.

It was agreed upon by the Task Force that this preliminary statement would serve as a 'living' scope statement. This ensured that this could be edited for future iterations. The statement above was crafted by AmeriCorps Fellow Gabriel Trevino. With sustainability being a focus of the discussion, and CARB Local Government Actions as specified in Appendix D, the second half of the living scope statement was left intentionally vague. This was to ensure that required actions were taken, with more action to be specified in the future within those topics.

The following statement was later communicated to Staff via email by Vice Chair Kai Martin. This scope statement was the example he pulled from another city for the purpose of beginning discussion with the Task Force.

The CAAP is intended to specify strategies that will enable the City to achieve or exceed GHG reduction goals; identify climate adaptation and resilience strategies; and provide a means of reporting and monitoring the effectiveness of the plan. The CAAP will include a GHG inventory, including a consumption-based inventory, identify strategies, forecast GHG emission reductions, engage the community, identify climate adaptation and resilience measures, and prepare and develop a comprehensive plan.

Vice Chair Kai Martin informed Staff that per the Task Forces' request to craft additional alternative living scope statements for review, they should consider this example provided. Below is an example of both the living scope statement and the provided example consolidated.

Pacifica is dedicated to achieving sustainability through a comprehensive array of strategies and actions aimed at reducing greenhouse gas (GHG) emissions, targeting climate change adaptation and mitigation. Our commitment extends to ensuring the active involvement of the community, harnessing the potential of Nature-Based Solutions (NBS), enhancing resiliency, and safeguarding the well-being of Pacifica in alignment

with predefined state timelines and established city goals, all as documented in existing policies and frameworks. The Climate Action and Adaptation Plan (CAAP) represents our roadmap to not only meet but exceed GHG reduction targets while simultaneously identifying resilient strategies for climate adaptation. It will serve as a robust framework for effective plan monitoring and reporting, encompassing a comprehensive GHG inventory, which includes a consumption-based analysis, and a forecast of GHG emission reductions. Our plan's success hinges on active community engagement, the identification of climate adaptation and resilience measures, and the meticulous development of an all-encompassing strategy designed to ensure a sustainable and climate-resilient future.

Below are alternative statements that aim to reciprocate the necessary elements and messages of the previously provided scopes.

Alternative 1:

Pacifica is embarking on a sustainability journey that encompasses a holistic approach to reduce greenhouse gas (GHG) emissions and enhance climate adaptation and mitigation. This mission revolves around ensuring active community engagement, leveraging Nature-Based Solutions (NBS), strengthening resiliency, and prioritizing the health and well-being of our city within the framework of established state timelines and city policies. Our Climate Action and Adaptation Plan (CAAP) encompasses a thorough GHG inventory, consumption-based analysis, and GHG reduction forecasts. We commit to robust community engagement, the identification of climate adaptation and resilience measures, and the comprehensive development of a sustainable and climate-resilient strategy.

Alternative 2:

In pursuit of sustainability, Pacifica is dedicated to implementing a diverse range of strategies to reduce greenhouse gas (GHG) emissions, drive climate change adaptation and mitigation, and prioritize community engagement, Nature-Based Solutions (NBS), resiliency, and the health of Pacifica, all while adhering to established state timelines and city policies. Our Climate Action and Adaptation Plan (CAAP) entails a comprehensive GHG inventory, including a consumption-based assessment, and forecasts for GHG emission reductions. It centers on active community involvement, the identification of climate adaptation and resilience measures, and the development of an all-encompassing, sustainable, and climate-resilient strategy.

Alternative 3:

Pacifica's commitment to sustainability is grounded in a multifaceted approach to reduce greenhouse gas (GHG) emissions, focus on climate change adaptation and mitigation, and prioritize community engagement, Nature-Based Solutions (NBS), resiliency, and the overall health of Pacifica, while adhering to established state timelines and city policies. The Climate Action and Adaptation Plan (CAAP) serves as our compass to not only meet but surpass GHG

reduction objectives and define a resilient path for climate adaptation. It encompasses a comprehensive GHG inventory, including consumption-based analysis, and forecasts for GHG emission reductions. Central to our strategy is active community involvement, the identification of climate adaptation and resilience measures, and the development of a comprehensive, sustainable, and climate-resilient plan.

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STAFF REPORT

V.2. Strategy and Actions Subcommittee

1. Approval of ICLEI 5-Milestones Framework
2. Receive Information on GHG Inventory and Roadmap (using ICLEI Framework)

CAAP TF
Strategies and Actions (S&A) Subcommittee Update

11/21/2023

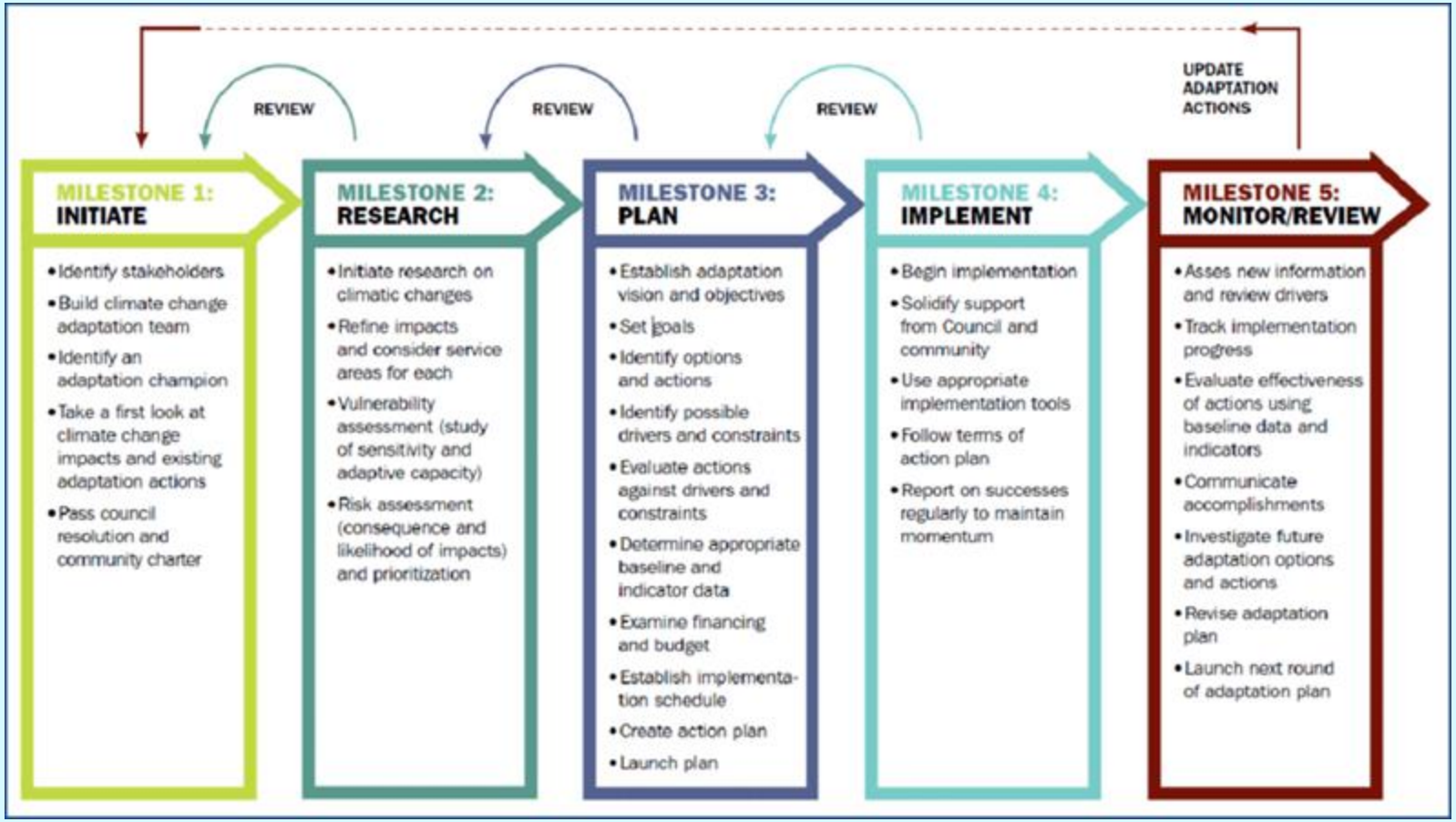
Strategies and Actions Subcommittee

Summary

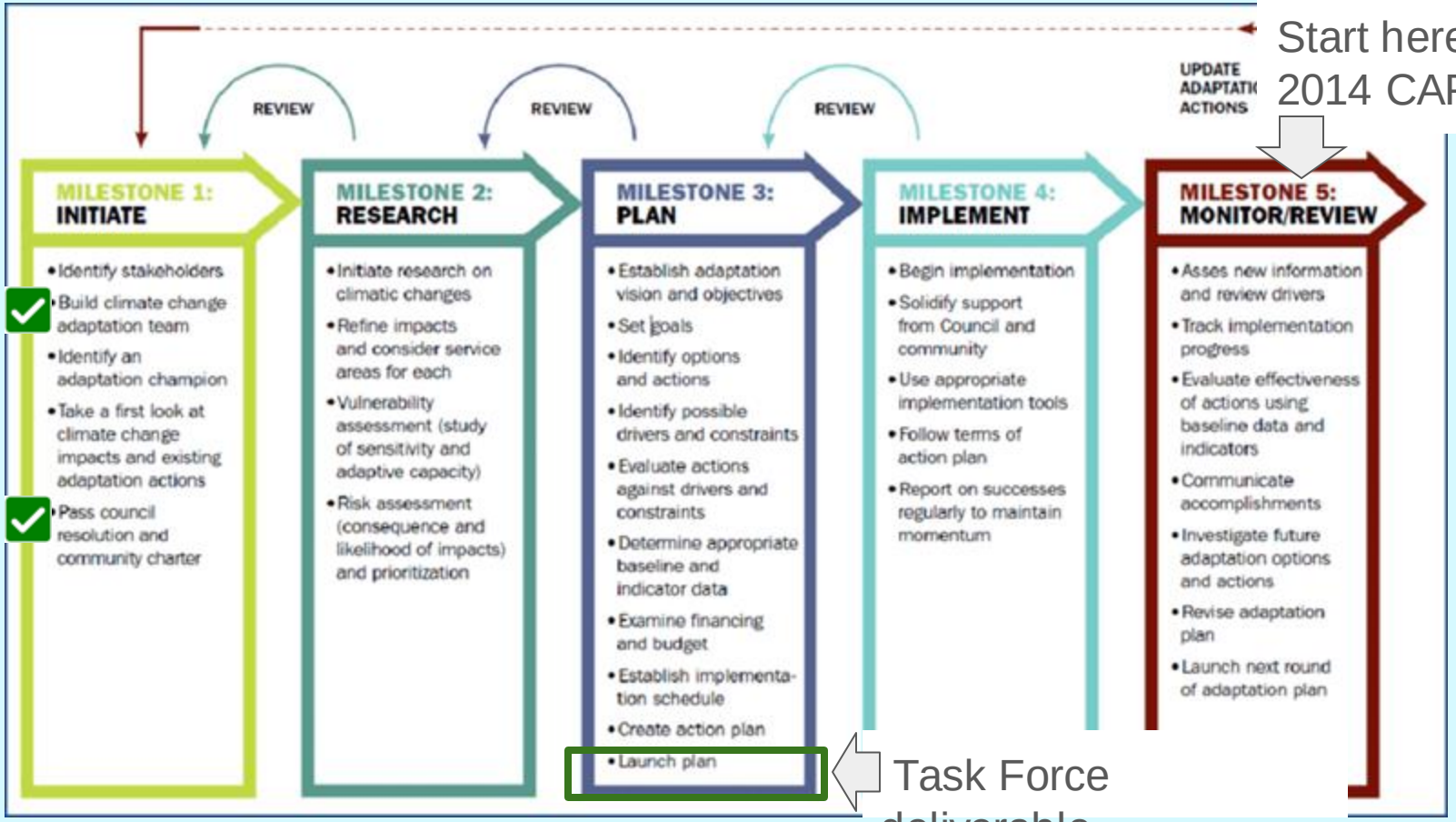
Framework: A way to organize our work to complete our goal
- This is different than a template, which can be a draft for our CAAP

- Researched and evaluated different frameworks for the task force
- ICLEI (International Council for Local Environmental Initiatives) helps towns, cities, and counties with climate change initiatives
  - Used for the 2014 Pacifica CAP
  - Many other Bay Area cities are members
  - Is the basis for the RICAP CAP Template

ICLEI 5-Milestones Framework



ICLEI Framework (modified for Pacifica CAAP)



Start here with 2014 CAP

Task Force deliverable

Strategies and Actions Subcommittee

Proposed Action

- The S&A Subcommittee recommends that the Task Force adopts the ICLEI 5-milestones framework to organize our work and uses the RICAPS template for our CAAP.

Sample Roadmap and Schedule

- Excel file display

Strategies and Actions Subcommittee

Next Steps

- The S&A Subcommittee will draft a proposed Roadmap and Schedule for approval using the ICLEI 5-milestones framework.
- Rincon will put together some standard practice options for community engagement based on previous experiences to share with CAAP TF

Greenhouse Gas (GHG) Inventory Status Update

- 2021 GHG Inventory completed for city by SMC contracted resource Rincon
- Distributed to CAAP TF by City Staff (Gabriel) 10/30
- Included multiple refinements and updates based upon community GHG reporting changes back cast to 2005. Updated 2010-2019.
  - Incorporation of methane leakage in the pipeline distribution of natural gas and at end-uses
  - Update of off-road transportation emissions using the newest OFFROAD2021 model (v1.0.3) from California Air Resources Board (CARB)
  - Use of origin-destination accounting methodology as default for vehicles miles traveled (VMT) accounting
  - Update of on-road transportation emissions using the newest EMFAC2021 model (v1.0.2) from CARB
  - Inclusion of electricity transmission and distribution (T&D) losses
  - Updated waste calculations reflecting the 2014 jurisdictional baseline from CalRecycle for SB 1383

Greenhouse Gas (GHG) Inventory Status Update

- RICAPS/Rincon will continue to provide ongoing most likely every other year

Next Actions

- 2023 GHG update will be performed by Rincon for Pacifica in Mid 2024
- Rincon will provide "menu of measures" to Gabriel and CAAP TF
- Gabriel and Rincon will discuss "smart tool predictions" and provide info to CAAP TF
- Rincon will provide additional Historic Emissions details from most recent
- Rincon will provide forecast data predictions for our analysis and consideration

Reference info for Rincon - https://www.rinconconsultants.com/environmental-consulting/sustainability-climate-action/

ICLEI
Local Governments for Sustainability

Cities for Climate Protection

Milestone Guide

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Introduction

Since 1993, ICLEI – Local Governments for Sustainability[1] has been assisting cities and counties around the world to reduce emissions of the gases and air pollutants that cause global warming and dirty our air. Your local government has joined over 600 other local governments from around the world, including over 230 in the United States alone, in ICLEI's Cities for Climate Protection® (CCP) campaign.

As a CCP participant, your local government has pledged to reduce global warming pollution by completing five Milestones:

1. Conducting a baseline emissions inventory and forecast
2. Setting an emissions reduction target
3. Developing an action plan to meet the target
4. Implementing actions in the plan; and
5. Monitoring and verifying emissions reduction progress

ICLEI provides software tools, technical assistance and other resources to CCP participants to help officials, staff, and their community partners pursue effective actions to reduce greenhouse gas emissions while creating various associated benefits for their communities. This Milestone Guide is just one tool that ICLEI provides to help your local government achieve its climate protection goals.

Inside you will find step-by-step guidance to help you complete the CCP 5 Milestone process, including concrete examples from cities and counties that have undertaken these same steps. Also included in this Milestone Guide are:

- Facts on the science of global warming and climate change;
- An overview of how local government decisions can affect global warming pollution;
- Step-by-step guidance on completing each Milestone, including how to use the CACP emissions analysis software; and
- Examples and testimonials from local government staff who have gone through this process.

Your local government is in good company. As a participant in ICLEI's Cities for Climate Protection campaign, you have joined a network of more than 230 cities and counties in the United States working to reduce the local causes of air and global warming pollution. Through effective and practical local action, local governments like yours are demonstrating to the world how strategies to solve global warming can help communities to thrive economically while achieving increased livability and sustainability.

[1] ICLEI – Local Governments for Sustainability was formerly known as the International Council for Local Environmental Initiatives

A Note to Elected Officials

This Guide was developed to directly advise staff on how to develop and implement your local climate protection program following the 5 Milestones of the CCP campaign. You may find the opening sections on climate change, how local governments affect emissions, and the overview of the CCP campaign most useful. You may also be interested in the example list of policies and programs that can be enacted to reduce emissions.

A Note to Staff

Use this Guide as you develop your local climate protection program and implement steps related to the 5 Milestones of the CCP campaign.

Data collection forms accompanying the Milestone 1 and Milestone 3 sections of this document provide guidance on what data to collect and where to find it, and contain space for recording the collected data for later entry into the Clean Air and Climate Protection software.

Global Climate Change: A Local Issue

Global Warming 101

The Greenhouse Effect

The climate we enjoy on Earth is made possible due to a delicate balance of naturally occurring gases that trap some of the sun's heat near the Earth's surface. This naturally-caused greenhouse effect is what keeps the Earth's temperature stable at an average of approximately 60°F—warm enough to support life as we know it. Without this natural greenhouse effect, our planet's average temperature would not be warm enough to sustain life.

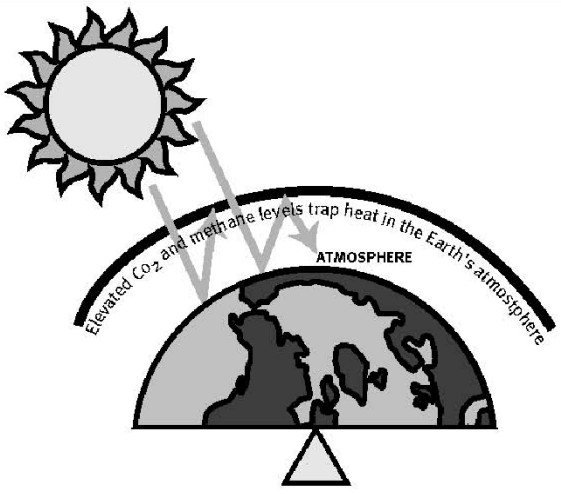
Global Warming:
The Enhanced Greenhouse Effect

The problem we now face is that human actions have disturbed this natural balance by producing additional large amounts of some of these greenhouse gases (GHGs) that are warming the climate. The two greenhouse gases of most concern to local governments are carbon dioxide, or CO_2, and methane.

Emissions of CO_2 are produced whenever fossil fuels—such as oil, natural gas, gasoline, diesel fuel, and coal—are burned to produce electricity, heat buildings or power vehicles. Through daily energy-using activities, we are increasing the amount of CO_2 in the atmosphere and magnifying the natural greenhouse effect. The net effect of this increased atmospheric concentration of CO_2 and other GHGs is to trap more of the sun's heat, causing the Earth's average temperature to rise—the phenomenon known as global warming.

Methane is the second most important greenhouse gas resulting from human activities. Methane, or CH_4, is a byproduct of organic waste and sewage decomposition. In

Global Warming



- Solar radiation passes through the Earth's atmosphere—some is reflected back into space, most is absorbed by the Earth and sent back out as thermal radiation or heat.
- "Greenhouse gases" like CO_2 and methane in our atmosphere trap this heat causing a natural "greenhouse effect", which keeps the Earth warm enough to support life as we know it.
- Human activities are increasing levels of CO_2 and methane and enhancing the greenhouse effect—too much heat is trapped, causing global warming.

urban areas, methane gas is produced as organic waste such as paper, yard trimmings, wood, and food waste decompose in landfills. Sewage treatment plants are also a significant urban source of methane. In terms of its greenhouse effect, methane is 21 times more powerful per unit of carbon than CO_2.

There is scientific consensus that global warming is occurring and that humans are the primary cause. Pre-industrial levels of carbon dioxide (CO_2) were 270 to 280 parts per million (ppm) in the atmosphere. Today, the level of CO_2 in the atmosphere is about 368 ppm – about 30% higher.[2] Scientists participating in the British Antarctic Survey have succeeded in charting the atmospheric concentration of carbon dioxide over the last 800,000 years. Their research has shown that temperature unfailingly rises and falls in response to carbon dioxide levels.

CO_2 levels are higher now than they have been in the past 650,000 years. According to NASA scientists, the 1990s were the warmest decade of the century, and the first decade of the 21st century is well on track to be another record-breaker. The years 2002, 2003, 2004 2005 and 2006 along with 1998, were the warmest six years since the 1890s, with 2006 being the warmest year in over a century. Over the last 100 years, temperatures at the Earth's surface increased by an estimated 1.4 degrees F.[3,4] This present concentration of CO_2 will double in 45 years if current patterns of fossil-fuel use continue, with drastic temperature increases predicted to occur as well.

Even the slightest increase in average global temperature can cause major changes in climate patterns, resulting in more frequent and extreme weather events. Globally, while some regions may experience warming, other regions may become colder. Precipitation may increase in some regions, causing floods and mudslides, while decreasing in other regions, causing droughts and water shortages.

Here in the U.S., we are already feeling climatic effects of more frequent and extreme weather events, mirroring the models developed by scientists. Over the last several years, the Midwest has endured one of the worst droughts on record. Higher temperatures are melting the snow-pack that provides much of the water supply for people in the western United States. Experts predict the region could lose nearly half its water supply by 2100.

Climate Change and Local Communities

Cities and Counties are Impacted

As the population centers of the world, urban and suburban areas will experience most of the negative impacts of climate change. Whether these climate changes affect

[2] Intergovernmental Panel on Climate Change (IPCC). "Climate Change 2001: Synthesis Report, Summary for Policymakers, 2001.
[3] National Aeronautics and Space Administration (NASA). "2005 Warmest Year in Over a Century," January 24, 2006
[4] National Oceanic and Atmospheric Administration (NOAA). "NOAA Reports 2006 Warmest Year on Record for U.S.," January 9, 2007

agricultural production and thus food supply, or an extreme weather event that hits a specific urban area, the impacts will be hardest felt by local communities.

Heat. Prolonged heatwaves, which scientists predict will occur with increasing frequency, hit urban areas hard. The impact of hot weather is intensified by certain features of the typical urban landscape. Dark surfaces of pavements and rooftops that cover the typical urban landscape worsen heatwaves, as they absorb and trap additional heat when struck by solar rays and increase already higher temperatures. The European heat wave of 2003 killed over 35,000 people, and raised even more concerns there about global warming. The heat wave that struck California in 2006 killed 140 people.

Another serious implication of hotter temperatures is the increase in incidences of diseases, such as malaria, dengue fever, and others spread by vectors that are temperature dependent. Malaria has been confined to tropical regions because the species of mosquito that carries the virus can only live within a small temperature range. As areas get hotter, the geographic range of the mosquito and the malaria it carries grows larger.

Air pollution. The issues of global warming and the dirty air that often plagues cities are closely linked. First, the primary activities that create the emissions that cause these two problems are essentially the same—the burning of fossil fuels for energy production, industrial processes or powering vehicles. As fossil fuel combustion increases, the emissions that cause global warming and air pollution also increase.

Second, hotter urban temperatures intensify air pollution. The chemical mix needed for ground-level ozone formation, which is one of the most damaging aspects of urban smog, requires not only air pollution emissions like nitrous oxide and VOCs, but also sunlight and heat. An average annual increase of only 0.5°F can turn an urban area that has worked hard to cut air pollution emissions into a non-attainment area due to an increase in the conditions that create smog.

A nationwide study of 95 urban areas jointly conducted by John Hopkins Bloomberg School of Public Health and the Yale University School of Forestry and Environmental Studies in 2004 showed that changes in ground-level ozone were significantly associated with an increase in deaths. The researchers calculated that a 10 ppb reduction in daily ozone, which is roughly 35 percent of the average daily ozone level, could save nearly 4,000 lives throughout the 95 urban communities included in the study.[5]

Children are particularly at risk, as their lung tissues are still developing and their air passages are smaller than those of adults. Incidences of asthma are also strongly associated with periods of high ozone pollution. Asthma studies in Los Angeles, CA and Houston, TX have found that chest discomfort increased by 17% with high ambient ozone levels.

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[5] Michelle L. Bell, PhD; Aidan McDermott, PhD; Scott L. Zeger, PhD; Jonathan M. Samet, MD; and Francesca Dominici, PhD. "Ozone and Short-Term Mortality in 95 U.S. Urban Communities, 1987-2000." *John Hopkins Bloomberg School of Public Health and the Yale University School of Forestry and Environmental Studies.* November, 2004

Damage to infrastructure and property. Hurricanes, blizzards, storms, and floods cause billions of dollars of damage each year. Most of that damage occurs in urban or suburban areas. With huge investments in private and public works infrastructure, cities and urbanized counties are especially vulnerable to the effects of climate change. Federal and state disaster relief programs cannot begin to cover the types of long-term economic, property, and infrastructure losses experienced due to these events.

Hurricane Katrina has provided perhaps the most compelling visual, emotional and financial impression of the damage a changing climate can inflict on communities. The National Academy of Sciences found that most of the increase in ocean temperature that feeds more intense hurricanes is a result of human-induced global warming. Considering the damage to both community and industrial infrastructure, and resultant flight, unemployment and decreased tax revenue, the total economic impact of Hurricane Katrina to Louisiana and Mississippi is estimated to exceed $150 billion.[6]

Realizing the powerful ways in which global warming could impact their communities, municipal leaders from across the country are making commitments to reduce GHG emissions from their jurisdictions.

Cities and Counties are Part of the Problem

As the population and economic centers of the world, urban areas are major consumers of energy and thus major emitters of GHGs. Urban areas are currently growing both in terms of population and geographic area. As they grow, energy demands for supporting daily activities and public and private infrastructure also increase. Land use and development decisions often cause cities and counties to spread outward, resulting in urban sprawl that encourages more driving, increasing fossil fuel consumption, and thus more GHG emissions.

Sprawling patterns of development in urban areas have increased transportation energy use, as well as the need for electricity to power lights and appliances and fossil fuels to heat buildings and fuel industry. Today, cities are such concentrations of energy use that they glow brightly on infrared photos taken from outer space.

In addition to energy use, another large source

Global Warming: Causes

Transportation
- Engines relying on fossil fuels
- Vehicle use increasing
- Vehicle miles traveled increasing

Waste
- Energy lost when materials become waste
- Methane released as waste decomposes

Energy Use
- Electricity generated by fossil fuels
- Fossil fuels used for heating and industrial processes
- Electricity use increasing

Loss of Vegetation
- Deforestation
- Increased urbanization
- Lack of green space, trees in existing urban areas

[6] Burton, Mark L.; Hicks, Michael J. "Hurricane Katrina: Preliminary Estimates of Commercial and Public Sector Damages." *Marshall University: Center for Business and Economic Research.* September, 2005.

of GHG emissions is the waste sector. Wasted materials represent greenhouse gas emissions from two sources—the emissions from the upstream processes needed to mine the raw material and manufacture it into a product, and methane released as the organic portions of the wasted materials decompose in landfills.

Local governments have a substantial impact on energy use and waste practices within their communities. The day-to-day decisions made by local governments, the facilities they operate, and the services and infrastructure they provide are significant determinants of the energy consumed, fuel used, and waste generated within their communities.

Energy use. The energy load of commercial and residential buildings is affected by building size and location along with the energy efficiency standards followed in building construction and operation. Local governments, through land use and development policies, building codes, and the like have a strong influence on these factors. In the case of municipally-owned utilities, the local government can determine whether the community's energy comes from fossil fuel or renewable energy sources.

Transportation and land use. Local government decisions that determine the type of infrastructure that is or isn't provided within a community—whether there are bike lanes, public transit, the type of roads, etc.—contribute to the level of a community's dependency on automobiles. In U.S. cities, energy use in the transportation sector is typically four times higher than in Western European cities—largely due to land use decisions that create sprawl and a lack of effective public transportation options.

Waste. Cities and counties usually have responsibility for waste management services, controlling source reduction and recycling programs, collecting waste or operating landfills.

Local government operations. Finally, local government operations themselves directly consume large quantities of energy and resources with the myriad facilities, vehicle fleets, parks, street and traffic lights, sewage and water treatment plants, landfills, and other public works that they own and operate.

Cities and Counties are Part of the Solution

Local governments can use their influence, decision-making and purchasing powers to increase energy efficiency and reduce greenhouse gas emissions. By doing so, cities and counties can also improve air quality, reduce pollution and waste,

Global Warming: Solutions

Local Governments Can:

- Encourage building and growth that reflect traditional, mixed use neighborhoods rather than sprawl
- Legislate energy-efficient building codes
- Construct public transit systems, pedestrian areas, and bicycle lanes
- Provide reuse, recycling, composting, and other waste reduction services
- Encourage combined or district heating, cooling and power systems
- Plant trees and expand green space
- Buy green, renewable power
- Provide energy saving measures for the community
- Lead by example by maximizing energy efficiency and waste reduction in local government buildings, facilities and operations

create jobs, save money and enhance the quality of life in their communities.

In most parts of the U.S., local governments possess regulatory and economic tools that can make communities greener and more energy and transportation efficient. These powers include land use and zoning decisions, control over building codes and licenses, infrastructure investments, municipal service delivery and jurisdiction over local schools, parks and recreation areas.

In sum, though climate change is a global problem, local authorities have plenty of tools to influence local energy use and greenhouse gas emissions. As the level of government that determines the physical form and spatial structures of a community, and that interacts most closely with people, local governments can affect community energy use in ways that national governments cannot.

Cities and Counties Benefit from Acting

Preventing climate change is not the only, or in some cases even the primary reason local governments are acting to reduce greenhouse gas emissions. Many are drawn to the issue because of local economic, environmental, and community needs. Local governments understand that they can benefit from reducing fossil fuel consumption and increasing energy efficiency—both economically, through lower energy bills, and socially, through improved air quality and more livable communities.

Saving Taxpayer Dollars Through Energy Efficiency

By investing in energy-efficient technologies—from high-mileage or alternative fuel fleet vehicles to energy-efficient public buildings, water and sewage treatment plants and streetlights—cities have dramatically reduced their energy expenses while cutting their contribution to global warming.

Investments in Mass Transit: A 6 to 1 return

Cities that invest in public transportation realize substantial economic benefits. These include increased real estate values, investments in neighborhood development and direct savings for city residents coping with today's high prices at the gas pump. Mass transit also helps improve mobility and opportunities for the elderly -- one of the highest priorities for older Americans. According to the American Public Transportation Association, investments in mass transit provide an economic stimulus far exceeding the original investment, through increased jobs, income profit and tax revenue – as much as six dollars gained for every dollar invested.

New Jobs and Businesses in the Clean Energy Industry

As demand for clean, renewable energy continues to grow, cities that tap into this demand will have a competitive economic advantage. Renewable energy technologies, such as wind and solar power, generate more jobs in construction, manufacturing and installation than fossil fuel-based energy technologies. They also create opportunities for public-private partnerships. As America's fossil fuel supply continues to decline, the importance of investing in clean energy technologies will continue to grow.

Protecting Health and Safety and Reducing Healthcare Costs

Over 140 million Americans, 25% of them children, live, work and play in areas where air quality does not meet national standards. Harmful motor vehicle emissions account for between 25 and 51% of the air pollutants in these unhealthy neighborhoods. From 2000 to 2002, the number of recorded high-ozone days in the U.S. increased 18.5%.

Pollution-related health ailments bring with them both a human toll and a staggering cost: $3.2 billion is spent each year treating children under the age of 18 for asthma alone. Unhealthy air is known to trigger asthma attacks. By investing in technologies that reduce pollution, cities and their partners in the business community can improve air quality and decrease and prevent negative health impacts like lung and heart disease, asthma and other respiratory ailments.

Clean Cities Are the 'Best Places to Live'

Cities that take action to reduce global warming pollution routinely receive local, regional and national acclaim as the best places to raise a family, do business and lead a healthy lifestyle. Popular magazines consistently give the highest marks to cities that have sound and sustainable urban planning, effective mass transit, clean air and energy-efficient buildings - the same measures that reduce global warming pollution.

> *"Being green (or clean) can have substantial benefits. Transportation, logistics and the supply chain are best practiced where they do not have to fight traffic jams, pollution and a tattered infrastructure. That goes for people's health as well."*
>
> -- "America's Greenest Cities," 2006 Forbes Magazine

An Overview of the Cities for Climate Protection Campaign

The work of the Cities for Climate Protection Campaign is focused on identifying sources and quantities of greenhouse gas (GHG) emissions and implementing actions to reduce those emissions.

At first glance, focusing on greenhouse gas emissions is neither a typical exercise for local governments, nor something that has traditionally been defined as a municipal priority. But as the impacts of global warming are becoming more apparent, communities also are beginning to understand that addressing the sources of greenhouse gas emissions also can improve air quality, cut traffic, save money, improve the efficiency of municipal operations and improve community quality of life. Why? Because the sources of GHG emissions are the same as those that make local air smoggy, streets congested, and energy bills high, as well as contribute to global warming pollution and climate change.

Cognizant of day-to-day local government realities, ICLEI has designed the CCP methodology to meet typical local government needs, while also meeting the goal of protecting the Earth's climate. The Clean Air and Climate Protection (CACP) Software for example, converts your community's energy, waste, and transportation data into the quantity of GHG emissions that result from electricity use, vehicle miles traveled, and waste landfilled. Since reducing criteria air pollutants and saving money are also priorities for local governments, businesses, and residents, the CACP Software can also calculate the amount by which air pollutants are being reduced, as well as project the cost savings that could accrue from implementing your chosen GHG reduction measures.

Although the CCP methodology is focused on achieving GHG reductions, most local governments start by determining their baseline emissions performance. When your local government completes the emissions analysis, you will have a profile of your community's energy, waste, and transportation habits along with the resulting GHG emissions. As your staff chooses GHG reduction measures for your jurisdiction's Climate Action Plan, the tools ICLEI provides can show the value of those measures with regard to cost savings, air quality improvement, and climate protection.

The CCP 5 Milestones

The CCP Campaign methodology follows a set of Milestones designed to assist your jurisdiction in reducing its contribution to global warming.

Milestone 1) Conduct a Greenhouse Gas Emissions Analysis: Baseline Inventory and Forecast

Similar to an energy audit before retrofitting a building, the emissions analysis lets you know what activities in your community are causing GHG emissions and the quantity each of these activities is contributing, both now and in the future. In performing the emissions baseline and forecast, you will gain some of the information you'll need for choosing strategic actions and designing an effective GHG reduction plan.

The baseline emissions inventory consists of two separate analyses – one evaluating activities in the residential, commercial, industrial, transportation, and waste sectors in your community, and the other focused on local government buildings, fleet vehicles, and operations. This baseline identifies how many tons of GHG emissions come from each of these sectors.

Don't worry, Expertise in climate science is not necessary. On the contrary, the inventory relies on relatively accessible data such as community-wide aggregate quantities of electricity and fuel use, garbage taken to landfill, and vehicle miles traveled.

The emissions forecast uses an estimation of how electricity, fuel use, and waste production are expected to grow in order to project growth in GHG emissions under business-as-usual conditions. The information needed for the forecast is similar to data on growth projections commonly made by local government planning, transportation and public works departments, and regional land use, growth management, or economic development.

Milestone 2) Establish a Reduction Target

The reduction target is the specific GHG emissions reduction goal that your local government aims to achieve by a designated year. It is usually expressed as a percentage reduction below the quantity of emissions released in the baseline year. For example, those countries that have signed on to the Kyoto Protocol and those cities who are signatories of the Mayor's Climate Protection Agreement, have committed to reducing emissions below 7 % below 1990 levels (the baseline year) achieved by 2012 (the target year). Almost all of the local governments participating in ICLEI's CCP Campaign establish GHG emissions reduction targets at 15 percent or higher to be met within a 10-15 year period.

Milestone 3) Develop a Climate Action Plan

The Climate Action Plan is a description of the actions – policies, programs, and projects – your local government will take to meet its GHG reduction target. The

Action Plan does not need to be a long document and it is ok if it is incorporated into another plan or document your local government is preparing such as an air quality improvement plan, master plan or general plan. In addition to listing actions to be implemented, the plan should also discuss how each action will be implemented via a timeline, financing, and assignment of responsibility to departments or staff. ICLEI has developed a number of document templates for Climate Action Plans that cities can use to guide their report development.

Milestone 4) Implement the Climate Action Plan

Of course, no plan is worth its salt unless it is implemented. Implementing the actions is an on-going process that will probably last through the target date—but the key point is to keep taking action until the GHG reduction goal is reached.

Learning From Experience

"Completing an Emission Analysis and Local Action Plan for your city can seem daunting, and it does require a lot of effort. However, with the CACP Software and assistance from ICLEI staff and contacts at other CCP cities, the job is not as difficult as it first seems. And the effort you put into creating the plan will pay off many times over by assisting future planning efforts, creating community partnerships and in promoting your successes."

Dean Kubani – Senior Environmental Analyst
Santa Monica, CA

Milestone 5) Monitor Progress and Report Results

Milestone 5 is an ongoing process that needs to be built into the implementation of the local Climate Action Plan. You will want to monitor the progress being made toward the target and the status of implementing the GHG reduction actions, so the community can feel proud of its accomplishments and adjustments can be made to keep on track.

How long will all of this take?

The process of completing the Milestones is not necessarily linear. The Milestones can be undertaken concurrently, and the specific emissions reduction target and contents of the Climate Action Plan are up to your jurisdiction to determine.

The amount of time needed to complete the Milestones depends on the size and complexity of a jurisdiction, the availability of data (e.g., fuel and electricity use), the amount of resources dedicated to the effort, and the creativity and dedication of all involved.

The GHG emissions analysis for example, can take anywhere from 2 weeks to 2 months, depending on the availability of data, who is doing the work, and how much time that person can dedicate to the job. In four Massachusetts cities—**Cambridge, Lynn, Medford, and Newton**—college interns were able to complete the baseline inventory in 6 to 8 weeks. In other instances, city or county staff spending four hours to one day per week on the inventory have completed it in 3 to 4 months.

Choosing measures for the action plan and incorporating public input will most likely be a longer process. Some local governments have completed all the Milestones within eighteen months, others have taken longer. ICLEI recommends that CCP jurisdictions complete the Action Plan and begin implementation within three years.

The Clean Air and Climate Protection Software

ICLEI commissioned Torrie Smith Associates to develop a software product to help local governments accomplish the five Milestones of the CCP campaign. The Clean Air and Climate Protection (CACP) Software is a user-friendly, Windows-based application that translates data on community-wide and municipal operations energy use and solid waste into greenhouse gas and criteria air pollutant emissions. It greatly simplifies the process of performing the emissions analysis, and it is a great planning tool to calculate the energy, financial, greenhouse gas and air pollutant savings resulting from measures you are considering for your action plan.

The CACP Software:

- Translates energy, fuel use and other data into GHG emissions for the emissions analysis
- Calculates target year projections
- Quantifies the GHG emissions reductions of existing programs and actions
- Projects the GHG emissions reductions of potential programs and actions
- Can be used as a planning tool in choosing measures for the Climate Action Plan
- Can be used to monitor and track the results of actions as they are implemented
- Calculates co-benefits of GHG reductions such as energy savings, money savings, and criteria air pollutant reductions

The instructions in this guidebook on how to conduct the emissions analysis, quantify measures, and develop the climate action plan, are based on using the Clean Air and Climate Protection Software. Data collection forms are included in this Guide to make it easy for you to gather the data needed for inventorying emissions from your community and quantifying climate, air quality, and money savings from GHG-reducing measures. A Software User's Guide is also included, providing step-by-step instructions on using the Software to assist your local government throughout the CCP Milestone process.

Learning From Experience

"The CACP Software program was invaluable to me in organizing, tracking and evaluating all the data I collected, in a user-friendly, understandable way."

Albert Nunez – Public Works
Takoma Park, MD

Getting Started

Step 1. Designate Elected and Staff Liaisons

Local government is a combination of policy and practice. The CCP reflects this through involving both elected officials and staff liaisons as primary contact people to the Campaign. Elected officials secure the political commitment necessary to carry out the work of climate protection. Staff primarily carry out and oversee the actual tasks involved with achieving the five Milestones.

Designating a staff person as the overall project coordinator is essential, even if your local government chooses to hire a consultant to do the bulk of the work. Typically the staff person assigned to be the CCP staff liaison works in the planning, public works, buildings or energy offices. The most important thing to consider in being or designating a CCP staff liaison is the person's commitment to the issue and the project.

CCP Staff Liaisons:

- Are generally the lead CCP contact person;
- Take primary responsibility for developing the local climate protection program;
- Determine the best way to get work done—choosing to hire interns, consultants, or to do it in-house
- Assemble the jurisdiction's "climate task team" or advisory committees
- Develop and oversee workplan and timeline
- Coordinate the writing and implementation of the Climate Action Plan
- Participate in CCP Training Workshops

> *Learning From Experience*
>
> *"Assign oversight to one person. But with that in mind, no one person should try to do it alone. Input from representatives of various departments, as well as support from the city manager and governing body were critical to our success."*
>
> George Moody – Environmental Compliance Manager
> Overland Park, KS

CCP Elected Official Liaisons:

- Keep the elected body apprised of the jurisdiction's progress in GHG reduction efforts
- Keep the elected body informed of opportunities (e.g., grants and other available assistance)
- Help keep the local government and community motivated to accomplish climate protection goals
- Participate in CCP Training Workshops
- Use public visibility as a means to educate the community about the issue of global warming

Both liaisons can expect to receive the following from ICLEI:

- Correspondence from ICLEI
- Notification of grant opportunities
- Updates on climate science
- Invitations to CCP training workshops
- Assistance in publicizing local successes
- Access to network of U.S. and international local governments
- On-demand technical assistance
- Access to tools and resources for advancing climate protection strategies

Step 2. Get CACP Software, Training and Assistance from ICLEI

ICLEI offers a variety of ways to assist you in undertaking your climate protection activities. Resources such as the CACP software, this Guidebook, copies of other local governments' action plans, the ICLEI website, printed case studies and other materials, and training workshops are all available. In addition, as time and resources allow, ICLEI staff are prepared to help in person or over the phone.

As mentioned previously, the CACP Software will greatly assist the work of the emissions analysis and other tasks associated with completing the Milestones. It is also a great tool for identifying and reporting the results of your local government actions. While many staff and community residents may not understand the importance or benefit of GHG reductions, all appreciate cutting air pollution, saving money, and other co-benefits which the Software calculates. The CACP software is available for free download by ICLEI members from www.cacpsoftware.org.

> Call the ICLEI office at 510.844.0699 when you need help and we'll be happy to match available resources with your needs.

Step 3. Establish a Climate Action Team

Forming a climate action team or advisory committee can provide an effective vehicle for defining and delegating tasks as you develop and implement your jurisdiction's Climate Action Plan. A collaborative team can also be an effective means for involving stakeholders such as residents, businesses, community groups, and other local government staff in the process. Including key stakeholders early on will most likely yield a smoother and more efficient process and successful results.

Deciding who to include on the climate action team and how many such teams to establish will depend on whether you want a forum for interdepartmental staff to help coordinate the work, a vehicle for community input, a policy advisory body or all of the above.

Will the Climate Action Plan be developed in-house? If so, which departments will be involved and which department will take the lead? Will an outside contractor be hired to do the work? Or will an interdepartmental advisory group be established to lay out the workplan and oversee staff development of the Climate Action Plan? Any of these approaches can work, and all have been used by jurisdictions in the CCP.

Austin, TX created an interdepartmental task force with city staff from the Planning, Environmental and Conservation Services Department, including a planner, an economist, an air quality manager, a demand side management program manager, and an editor.

Fort Collins, CO hired a private consultant to assist city staff in developing the technical and logistical aspects of their Climate Action Plan and to work with a Project Advisory Committee that oversaw development of the Plan. Fort Collins' Project Advisory Committee was formed to build consensus and ensure that programs were coordinated. It was comprised of council members, interested citizens, and key staff from Facilities, Fleets, Light and Power, Natural Resources, Parks and Recreation, Transportation Planning, and Traffic Operations departments.

Minneapolis and Saint Paul, MN combined efforts to produce the Minneapolis—Saint Paul Urban CO_2 Reduction Plan. An Executive Steering Committee made up of key decision makers was created to direct the development of the Plan. The committee included mayors and other elected officials from both cities, representatives from Hennepin and Ramsey County Boards of Supervisors, executives from Northern States Power utility and other local businesses, and representatives from community and environmental organizations. Because of this inclusive committee process, stakeholders derived a feeling of ownership over the project. As a result, Northern States Power entered into an agreement with the City of Saint Paul to provide capital for a comprehensive municipal energy efficiency retrofit project at zero percent financing.

Portland, OR set up a Technical Team—comprised of city, utility and state energy office staff—to assist with the technical aspects of the work. Portland also set up a Policy Committee with representatives from utilities, the transit agency, METRO, the State Energy Office, the Mayor's Office and local businesses. Members of both committees accompanied the lead staff in presenting the final plan to the planning commission and at council hearings.

Step 4. Engage Key Stakeholders and the Community

Whatever route your local government chooses to take, remember to involve relevant players and work to secure the cooperation and buy-in of appropriate departments and other entities. Key players include elected officials and department heads who will be involved in plan preparation and be responsible for plan approval and implementation.

Including key players spreads the ownership widely, providing the necessary support for the development and implementation of the local Climate Action Plan.

Learning From Experience

"Political leadership is a critical component of this effort. We could not have done what we did in the absence of direct and continuing participation of a respected local elected official. This opened the doors of the many agencies which ultimately participated actively in the development of our Local Action Plan."

Dr. Doug Yoder – Assistant Director
Dept of Environmental Resource Mgmt
Miami-Dade County, FL

The success of your Climate Action Plan will in most cases depend on strong community support. This means that residents, businesses, and other entities need to be brought into the process of formulating the Plan that they will eventually be asked to help implement. Public participation processes—such as public hearings and workshops—traditionally held in your community can be used to build support. One way to ensure support is to integrate the development of the Climate Action Plan into existing processes and initiatives.

Berkeley, CA used its existing structure of Citizen Boards and Commissions to review the action plan and give input before it was presented to City Council. Staff from the Energy Office along with a consultant did the initial work to draft the plan, drawing strongly from existing city priorities and existing policy that complemented Berkeley's GHG reduction efforts. Policies that were in the midst of implementation or that were lagging behind, such as Berkeley's recycling and waste reduction program and its bicycle plan, were included as measures to reduce GHG emissions. This helped reinforce these existing goals as well as the new objective of climate protection. When circulated among the Boards and Commissions for their review, the members were able to embrace the plan and see it as integrating many city goals.

Several strategies can be used to encourage effective citizen involvement:

- Identify key businesses, institutions, community organizations, individuals, and decision makers to engage (e.g., public officials, major employers, utilities, environmental and neighborhood organizations, chamber of commerce).
- Establish a community task force or advisory team to work with municipal staff and elected officials.
- Utilize volunteers from the community to consult in formulating the plan and in presenting it to the public.

Integrate the process of identifying measures to reduce GHG emissions to the extent possible into existing processes and programs such as your local government's master plan, air quality improvement plan, transportation plan, community development policies or other on-going plans and procedures.

Step 5. Get the Word Out

While listed as Step 5, spreading the word about your climate protection efforts is really an ongoing process. Publicizing your local government's commitment to climate protection can help gain public support at an early stage, and might also help identify people willing to volunteer their services to add value to your efforts. **Cambridge, Lynn, and Medford, MA** sent out press releases to local newspapers informing their communities of each city's interest in climate protection. Concerned citizens responded by calling city staff liaisons to volunteer support. Below are some other suggestions on how to get the word out in your community.

Public Forums and Town Meetings

Public forums and town meetings can not only be used to inform the community about your local government's climate protection initiatives, they can also provide a forum for educating the public about the causes, impacts and possible solutions associated with climate change. CCP participants have utilized a variety of public meeting approaches to incorporate public input into the development of their greenhouse gas reduction strategies. Examples include:

Takoma Park and Mount Rainier, MD held a joint public forum, where several dozen residents met with staff and elected officials to discuss ways in which both communities could reduce their GHG emissions. During the forum, attendees broke up into groups to brainstorm specific suggestions for conservation in areas such as transportation and recycling. Suggestions were distilled into workable measures for inclusion in their local Climate Action Plans.

Fort Collins, CO hosted two public meetings to build awareness of the issue of global warming and support for its local Climate Action Plan. At one of the meetings, a U.S. Department of Energy representative spoke about sustainability efforts at the local level and relationships to climate protection. City staff then gave a presentation on the city's own climate protection efforts and development of the local Climate Action Plan.

Learning From Experience

"It just makes sense for our communities to work together. We can leverage our interests in the counties, in the state and beyond."

Bruce Williams – Councilman
Takoma Park, MD

Media Coverage

Encourage your local government officials to write op-ed articles or letters to the editor about local climate protection commitment and the benefits it will bring to the community. Publicize any events—adoption of your local target or action plan, public meetings, speakers, etc.—to the press. Encourage local weather reporters involved so that they make connections to climate change part of their nightly broadcasts. ICLEI provides sample press releases, an Outreach Toolkit and communications support to local governments interested in improving local media coverage of their efforts.

Schools
Build awareness of the science and issues of global warming in your schools. The City of **Chula Vista, CA** has developed a week-long curriculum for 6th graders on global warming. The curriculum includes a teacher's guide and student activity sheets, and was produced in both English and Spanish. The City of **Missoula, MT** challenged its high school students to come up with a VMT reduction plan for the entire city. In addition to receiving press coverage, the winner received a brand new mountain bike.

Businesses
Austin, TX; Portland, OR; Cambridge, MA; and other local governments are recruiting local businesses to become more energy and resource efficient as part of their local climate protection plans. Businesses that reduce the most waste, energy, and water use receive awards that are widely promoted and covered in the press.

Earth Day Activities
Brochures and booths, displays at libraries and schools, panels and speakers on the topic of global warming all offer opportunities to highlight your local government's commitment and to educate the public in association with Earth Day.

Public Education
Encourage your local television station to show videos and media clips on climate change and associated solutions. Libraries, schools, and city buildings are good places for public education displays on climate change and what your community is doing to protect the climate. Send brochures on climate change to residences and businesses or put them out in libraries and other public buildings. ICLEI offers a public outreach toolkit providing advice on the use of display materials, lists of videos, and a brochure template that can be tailored to show your community's GHG emissions and the highlights of your local government's action plan. This brochure template is free for CCP local governments and can be obtained by contacting the ICLEI office at 510.844.0699.

Step 6. Complete the 5 Milestones and Achieve Your Climate Protection Goals

The steps above will help to ensure the success of your climate protection efforts as you proceed through each of the five milestones of the CCP campaign. Consider them carefully before you dive in and revisit them throughout the process.

All of these steps lead up to the development and ongoing implementation of the Climate Action Plan. But implementing measures to reduce emissions can be happening throughout the process— your local government doesn't have to wait until completing the Action Plan to begin implementing GHG-reducing measures! So look for opportunities as they arise and make sure existing policies and programs that are reducing GHG emissions don't get put on the budgetary or implementation chopping block.

Issues to consider as you proceed through the Milestone process:

- *Which Milestones or other steps can be finished in the next six months?*
- *What do I need to achieve that goal?*
- *What barriers might arise in completing our action plan?*
- *What barriers will we face in implementing emissions reduction measures?*
- *What could help us get past these barriers?*
- *How do I create political and staff buy-in and obtain concrete assistance for this work?*
- *What existing planning processes, initiatives, etc., can we integrate this work into?*
- *How do I get the community involved in our climate protection efforts?*
- *How can I build public awareness for the need for climate protection?*
- *How might recognition and celebration of successes be built into the process?*

Important Terms

Throughout this Guide, you will come across terms and concepts that might be new to you. Below are descriptions of several frequently used terms you will encounter.

Coefficients

Standard formulas exist for determining GHG emissions from combustion of each type of fossil fuel and decomposition of organic waste. These formulas result in a number that reflects the quantity of CO_2 emissions produced per unit of a particular fuel burned or per unit of decomposed waste—this number is a coefficient. Coefficients vary by fuel type, so for example, an equal quantity of natural gas burned will produce less or have a lower co-efficient for CO_2 than the same quantity of coal burned.

Coefficients for coal, natural gas, and other fossil fuels used to generate electricity in your region; diesel, gasoline, and other transportation fuels; and methane from waste decomposition are already embedded in the CACP Software. In conducting the emissions inventory and forecast, you don't have to worry about doing these calculations. While these average coefficients are not perfect expressions of the absolute quantity of GHG emissions, they are accepted standards.

CO_2e

The emissions designation "CO_2e" represents the total GHG emissions resulting from energy consumed, fuel used, and landfilled waste generated by your community. Equivalent CO_2 (CO_2e) allows emissions of greenhouse gases of different strengths to be added together, in a sense allowing you to compare apples and oranges. For carbon dioxide itself, emissions in tons of CO_2 and tons of CO_2e are the same thing, whereas for methane, a stronger greenhouse gas, one ton of emissions is equal to 21 tons of CO_2e.

Electricity Related Emissions

Unlike vehicles where emissions come straight out of the tailpipe as the vehicle is driven, electricity does not emit GHGs or air pollution at its point of end-use (e.g. from light-bulbs). The GHG and air pollution emissions from electricity occur at the power plant where the electricity is generated. In some cases this is nearby your community, while in other cases it occurs far away. The CCP methodology of quantifying GHG emissions associated with end-use electricity consumption takes into account these power plant emissions through GHG coefficients for electricity generation based on the fuel mix consumed in your grid region. These default coefficients are provided in the CACP software and GHG emissions are automatically calculated after inputting basic end-use electricity data. While local governments may not be able to regulate the emissions at the point of electricity generation, they can influence how much electricity is used by their operations and within their communities, and can often influence the types of fuel electricity is generated from.

Criteria Air Pollutants

The term criteria air pollutants (CAPs) refers to pollutants that are regulated under the U.S. Clean Air Act. Many sources of GHG emissions also produce CAPs. As in the case of coefficients for GHG emissions, there are coefficients or standards for determining the quantity of the different criteria air pollutants (SO_X, NO_X, PM_{10}, VOCs and CO) per unit of fossil fuel consumed. The coefficients, based on aggregated nation-wide data, for these air pollutants are also embedded in the CACP software, which can produce reports on GHG or CAP emissions.

ICLEI staff are always available to help your local government get started on these steps and to connect you to staff or elected officials in other CCP jurisdictions that have gone through this process. We're here to help!

ICLEI— Local Governments for Sustainability
Cities for Climate Protection Campaign
436 14th Street, Suite 1520
Oakland, CA 94612
Phone: 510.844.0699
Fax: 510.844.0698
Email: iclei_usa@iclei.org
Web: www.iclei.org/usa

Milestone 1: Conducting the Emissions Analysis

The Greenhouse Gas Emissions Analysis

Think of the greenhouse gas (GHG) emissions analysis as an audit of the activities causing or releasing GHGs and a projection of how much these activities are likely to grow in the future. The full analysis consists of a baseline inventory and a target year forecast of GHG emissions from community-wide sources (i.e., the full geographic area of your local government's jurisdiction) and a baseline inventory and forecast completed highlighting emissions resulting from local government facilities and operations.

Typically, greenhouse gas emissions are produced by the following sources: combustion of fossil fuels to produce the electricity that lights, heats, cools, and ventilates homes, offices, parks, and streets; combustion of fossil fuels for heating and operating vehicles; and decomposition of waste occurring in landfills and sewage treatment plants.

The Baseline Emissions Inventory

The first step in conducting an emissions analysis is to develop a baseline inventory of emissions. This process involves gathering data such as:

- Electricity and other fossil fuel energy use
- Transportation data such as vehicle miles traveled and/or fuel consumed
- Quantities of waste generated and landfilled
- And other data relating to sources of greenhouse gas emissions

Why Count Beans?

A GHG baseline inventory isn't an exercise in bean counting. First, knowing where the bulk of emissions are coming from (e.g., vehicles, streetlights, commercial electricity use, residential heating or landfilled waste) will help you to target projects and programs to reduce emissions effectively.

Knowing where energy use is highest does not necessarily tell you where GHG emissions are great-

Learning From Experience

"I would tell someone who is just beginning their emissions analysis that it is important to remember that there is no ultimate 'right answer'. No one in your community has ever undertaken this exact task before, so you are charting new territory. You can only use the best data that is currently available, and it probably won't be perfect. Don't waste time grappling with minute details that keep you from moving ahead."

John Bolduc – Environmental Planner
Cambridge, MA

est. For instance, communities in Washington State could use a lot of electricity for heating and cooling, which might point to improving building insulation as a measure to decrease GHG emissions. But because the electricity used in Washington State comes mainly from hydro-power rather than a fossil fuel, the GHG emissions from electricity use in Washington are relatively low. Communities in states such as Arizona, where coal is the main fuel source used to generate electricity, will find that a substantial portion of their GHG emissions comes from electricity use.

Second, the baseline inventory serves as a reference against which to measure your jurisdiction's GHG reduction achievements. In this way, the baseline is essential for setting the GHG reduction target. The target is typically set at a certain percentage below the baseline emissions level—examples would be 15% below baseline 1990 emissions by target year 2012 or 20% below baseline 2000 emissions by target year 2020. Guidance on establishing a reduction target will be discussed in detail in the next section.

Which Beans are Counted?

The emissions analysis focuses primarily on two major GHGs—carbon dioxide (CO_2) and methane (CH_4). CO_2 is released through the burning of fossil fuels, while the main source of methane in urban areas comes from the decomposition of organic waste (such as paper, wood, and vegetation) in landfills and sewage in sewage treatment plants. These two GHGs are by far the most significant contributors to urban emissions.

Community-Scale Inventory

The community-scale inventory estimates the quantity of GHG emissions for which the community as a whole is responsible for a specific baseline year. The community inventory is organized by sector—residential, commercial, industrial, transportation, and waste. When completed, the community inventory will show how much electricity and fuel were used in residential, commercial, industrial, and transportation sectors, and how much waste was produced and landfilled in a chosen base year, as well as the quantity of GHG emissions produced by each of these sectors. The data needed is typically available from **electric and gas utilities, planning and transportation agencies and solid waste management departments.**

Each local community has unique characteristics (e.g., population, housing types, transportation networks, industries, electricity fuel mix) that make its baseline different from other cities or counties. The primary value of an emissions inventory is to enable the demonstration of progress over time.

Local Government Operations Inventory

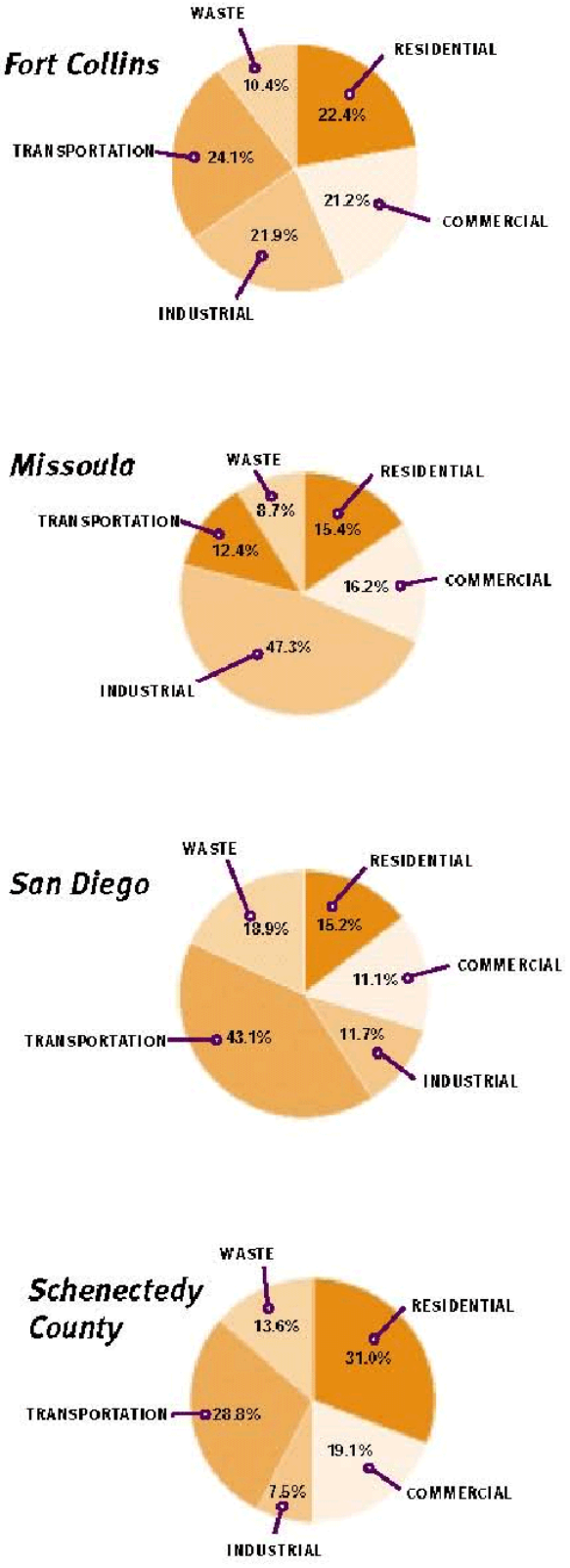
The local government operations inventory identifies the amounts of electricity and fuel used in municipal buildings, traffic signals and streetlights, fleets and other local government operations, and how much municipal waste was produced and landfilled for a designated base year. The data needed typically comes from utility bills and fuel records.

When completed, the local government operations inventory pinpoints the quantity of GHG emissions from each municipal building and facility, from streetlights, fleet vehicles, sewage treatment, and other local government owned or operated facilities and operations.

Note that the community-scale inventory is designed to represent the total quantity of GHG emissions produced by your community as defined by its geographic borders during a chosen year. **Do not add the results of your local government operations inventory to the total GHG emissions calculated in your community-scale inventory.** Emissions from your local government operations are already embedded in the community inventory. For example, aggregate commercial energy use data includes energy used for municipal buildings and facilities; community VMT estimates include miles driven by municipal fleet vehicles; total tons of community landfilled solid waste includes municipal waste, etc. The government operations inventory is in this way a subset of the community-scale inventory.

Developing a separate government operations inventory is valuable because it enables a deeper level of analysis and identification of opportunities than the community-scale inventory, attributing specific amounts of GHG emissions to each facility and operational emissions source. This information can be used to identify and target main GHG emitters within local government-owned and operated facilities, improve the efficiency of these buildings and operations, save money, and set an example for the rest of the community.

Community Baseline Emissions Results



The Emissions Forecast

The emissions forecast represents an estimate of how GHG emissions are likely to change under business-as-usual conditions over time. In most cases the forecast projects growth in GHG emissions that will occur 10–20 years into the future, correlated with your chosen emissions reduction target year (see Milestone 2). When completed, the emissions forecast shows how much GHG emissions are likely to grow and from which sectors this growth is likely to occur.

> *Learning From Experience*
>
> *"We soon found out that it was fare more useful for planning purposes to develop good ballpark figures for emissions levels rather than laboring over minute details. This enabled us to keep the work moving along. Later, when more data was available, we went back and adjusted numbers as needed."*
>
> Maria Sanders – City Planner
> Oakland, CA

Community Forecasting— Estimating Future Emissions

The same data sources used for the community baseline inventory can often provide estimates for the forecast. For business planning purposes, utilities often make future estimates on expected electricity use by sector, so they are a good source for forecast numbers. Transportation planning agencies often make estimates of expected VMT growth or road capacity expansion which can provide the data needed for the transportation sector forecast. Solid waste departments are the likely source for estimates in growth or change in amounts of future landfilled waste.

If your sources of community baseline data cannot provide you with growth projections, think about what new roadways, residential housing, commercial and industrial development your jurisdiction has planned to help forecast emissions growth. Anticipated changes in population and commercial activity are often used as proxies.

Local Government Forecasting— Taking into Account Planned Actions

To forecast future emissions from local government operations, consider each facility and operation inventoried in the base year and take note of any changes in electricity or fuel use that are likely to occur in each of these facilities by the target year under business-as-usual conditions (e.g., from potential expansion projects). What new buildings are being planned or expanded? A new park, library, school or basketball stadium? What new programs are in the works—new services can increase future emissions. In addition to your local government's planning scheme and transportation plan, look also to regional agencies such as your state planning department, county solid waste management plan or regional transportation authority for future activities that would affect your own local government's operations. **Do not account for planned emissions reduction activities here.** Rather, your forecast should reflect business-as-usual trends in the absence of new energy-conserving or emissions-reducing efforts.

Benefits of a Forecast

The emissions forecast can help you to set emissions reduction targets wisely, identify

priority areas for implementation of GHG-reducing measures, and spend local government resources efficiently. If the emissions forecast shows that personal cars and residential buildings will be the main sources of GHG emissions in 10 years, actions in the GHG reduction plan should focus on transportation and residential measures.

Completing the Emissions Analysis

Step 1. Choose a Base Year

Community Base Year

Get started by choosing a base year and collecting data. Many of the first communities to develop emissions inventories were able to gather baseline data from 1990, the year referenced in the Framework Convention on Climate Change. This is also the reference year for commitments made under the 1997 Kyoto Protocol agreement will be measured and the US Mayors' Climate Protection Agreement. This may also be the year from which emissions trading will be based or "Early Action Credit" given, if such policies are enacted.

However, for many communities, it is now difficult if not impossible to find accurate data on energy consumption going back as far as 1990. CCP participants are encouraged to select a base year by finding the earliest year for which they can get comprehensive and reliable data (e.g. many communities choose a year between 2000 and 2005 as a 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. Try to assess data availability as early as possible. If you have chosen an early base year, but later find better data availability for a later year, you can easily change the base year referenced in the CACP software.

Learning From Experience

"From the beginning we knew that the hardest task would be to get information from our local utility. By including a representative from Duke Power on our Greenhouse Gas Emissions Reduction Task Force, the utility had buy-in for the project and was forthcoming with the data we needed."

William Sun – Superintendent
Environmental Resources
Durham, NC

Community Interim Year (optional)

Cities and counties are encouraged to collect data for an interim year for their community analysis. Your community's energy use might have changed dramatically since your chosen base year. Gathering data for an interim year provides a sense of how far you've come and doesn't take much more time to complete, as you will be asking for data for both base and interim years at the same time and from the same data sources.

Local Government Base Year

The base year for the local government operations emissions analysis does not have to be the same as the base year for the community analysis. When conducting the emissions analysis for local government operations, you'll want data that most accurately reflects energy consumption and waste generation in your local government.

Step 2. Choose a Forecast Year

Community Forecast Year

The year chosen for the forecast is the same as the target year in the Climate Action Plan. When the target should be set and what it should be are discussed in detail in the next section of this Guide. Most jurisdictions have chosen a 15-20 year time frame between their community base and target years to provide ample time to reach their goal.

Local Government Forecast Year

You may wish to have a different target year for your local government analysis, e.g. you may find that setting an earlier government target year than that chosen for the community will allow your local government to showcase its achievements and encourage its community to reduce GHG emissions by example.

Step 3. Collect Baseline Data, Make Forecasts

Data collection forms for both community and local government inventories and forecasts are provided the end of this section. These forms walk you through all the steps necessary for obtaining data for your emissions inventories and forecasts. They also provide suggestions on where to look for data.

Paving the Way

A good way to facilitate the inventory process is to send out a notice informing relevant staff and departments that you will be calling on them for help in collecting the data you need. The cities of **Lynn, Medford, and Newton, MA** sent a letter, signed by their respective Mayors, to all appropriate city departments prior to conducting their emissions analyses paving the way for the interns who were assisting the cities and giving them official recognition for their work.

The Value of End-Use Information

The **City of Chula Vista, CA** is a good example of why specific, local information about end-use energy consumption is important. In conducting its emissions analysis, Chula Vista staff found that natural gas represented 67% of energy used in the residential sector. In most areas of the country, you would suspect that the primary end-use for natural gas would be space and water heating and that GHG-reducing measures should focus on increasing energy efficiency of residential space and water heaters and upgrading insulation. In looking at its specific end-use breakdown however, Chula Vista found that the biggest share of natural gas use came from heating swimming pools, spas and hot tubs. Only in

California! The lesson: obtain as much information about the specific ways energy is being used in different sectors as possible so that your local government can target its Climate Action Plan measures effectively.

Step 4. Enter Data into the CACP Software

When using the Clean Air and Climate Protection Software, enter your community-wide emissions source data into the Community Analysis module, and data from your local government operations into the Government Analysis module.

Step-by-step instructions on using the CACP software are provided in the Software User's Guide available when you download the software. These instructions will walk you through using the CACP software for your emissions inventory and forecast, as well as the Software's other features such as quantifying the benefits of emissions reduction measures and other tools to help you through the Milestones.

Step 5. Print Reports from the Software; Send Printouts to ICLEI

As you input data into the CACP software, the results of your emissions inventory and forecast will be automatically summarized in reports. These reports express GHG emissions in terms of tons of CO_2e and pounds of CAPs emitted annually. The completed reports constitute your emissions inventory and forecast.

Once you have completed the emissions inventory and forecast, feel free to send your data and/or printed reports to ICLEI. We will be glad to review your emissions analysis.

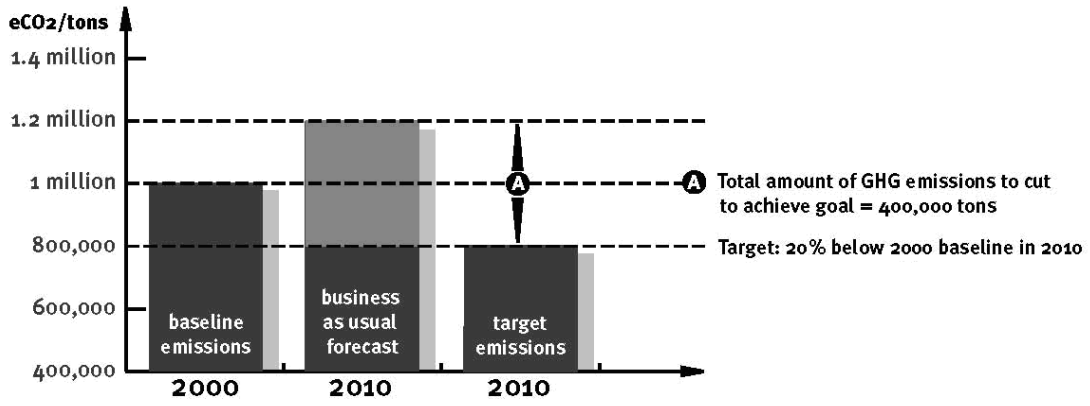
ICLEI— Local Governments for Sustainability
Cities for Climate Protection Campaign
436 14th Street, Suite 1520
Oakland, CA 94612
Phone: 510.844.0699
Fax: 510.844.0698
Email: iclei_usa@iclei.org
Web: www.iclei.org/usa

Milestone 2: Setting the Target

The GHG Emissions Reduction Target

The greenhouse gas (GHG) emissions reduction target represents a specific quantified emissions reduction goal. Most often, this is the percentage by which a local government plans to reduce GHG emissions in its community and/or government operations below base year levels by a chosen future target year. An example of a reduction target might be a 20% reduction in GHG emissions below 2000 base year levels by the target year 2010. Thus, if your jurisdiction's 2000 emissions were 1 million tons of CO_2e, its aim would be to reduce total emissions from your community to 800,000 tons in 2010, regardless of any projected growth in emissions between the base and target years (see graph below).

Setting an Emissions Reduction Target Relative to Baseline Performance



Why Set a Target?

A target gives the Climate Action Plan a tangible, specific goal without which the Plan would merely be a collection of nice ideas and strategies. A target provides an objective toward which to strive and against which to measure progress. It allows a jurisdiction to quantify its commitment to fighting global warming—is the jurisdiction serious enough about this commitment to adopt a significant target, or is this just a nebulous commitment with good intentions?

When and How Should We Adopt the Target?

Some communities adopt an emissions reduction target at the outset. Others conduct their emissions inventory and forecasts and evaluate existing and potential measures

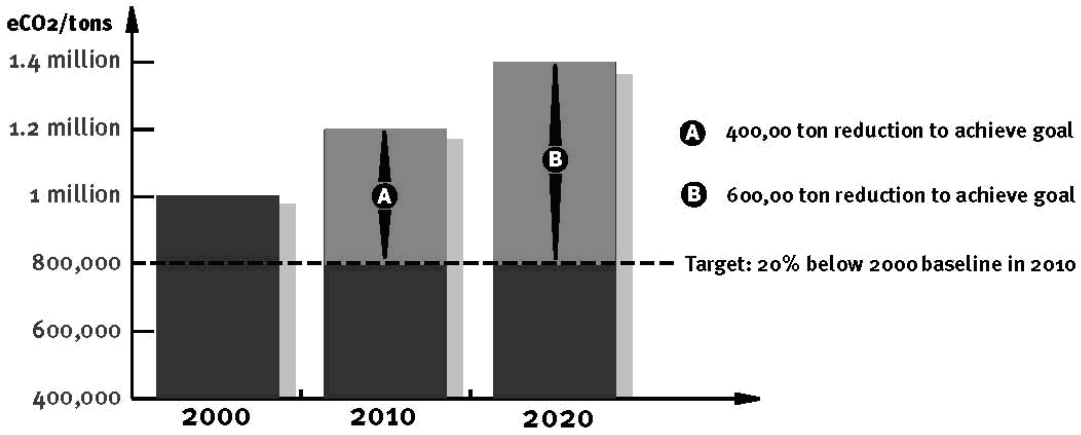
before officially adopting their target. Choose the path that best fits your local circumstances.

In many communities it will be necessary for the governing body—the City Council, the Board of Supervisors or Alders, the Mayor in a strong mayoral jurisdiction, etc.—to officially adopt the target. How this is done and what level of public input should be included in the adoption process will depend on local practice.

What Should It Be?

Should the target be low and easy to achieve? Should it be high and stimulate creativity and innovation? It would be simple for jurisdictions to opt for the easy way out and choose a target of minimal significance that would be easy to achieve. It is tempting to compile a list of existing actions the city or county is already implementing that reduce emissions and adopt a target that does not require further effort. But that would defeat the purpose of a Climate Action Plan, which is to have a meaningful impact on global warming.

Long Term Targets Can Require More Significant Reductions



There are several issues involved in setting a reduction target. Your local government will want to give itself enough time to implement the measures in its Climate Action Plan and achieve its reduction goal—but note that the farther out the target year is, the more your local government might be pledging to reduce (see graph above). You might also want to quantify existing measures to determine how far your jurisdiction has already come in reducing emissions, before deciding what the target should be.

ICLEI recommends that regardless of your chosen long-term (e.g., 15-20 year) emissions reduction target, it is advisable to establish interim targets for every 2-3 year period. Near-term targets facilitate additional support and accountability, and help to ensure continued momentum around your local climate protection efforts.

Most local governments participating in ICLEI's CCP Campaign choose to establish long-term GHG emissions reduction targets of approximately 15% below baseline emissions to be met within a 15 to 20 year period. ICLEI recommends considering a long-term emissions reduction target of at least this level.

Adopting a significant reduction target is an important beginning. Because the CCP is a voluntary program, a local government can refine and increase its goal as it develops the Climate Action Plan and gets a better idea of what targets are feasible.

Ecological necessity presents a compelling argument to go further and adopt a more aggressive goal, even if it means a jurisdiction must work harder. In order to slow global warming, the human community must achieve significant reductions in greenhouse gas emissions and must achieve the reductions soon. The preponderance of scientific opinion is in agreement that we must reduce greenhouse gas emissions a minimum of 20% below 1990 levels in order to stabilize the climate.

Today, the human community is producing about twice as much CO_2 as the earth's various natural carbon sinks (oceans, forests, etc.) can absorb. That means that even if we were to stabilize emissions at current levels, greenhouse gas concentrations in the atmosphere would continue to increase markedly. IPCC research implies that we need to achieve closer to a 60% reduction below 1990 levels to significantly slow global warming. According to the IPCC, "a range of carbon cycle models indicates that stabilization of atmospheric carbon dioxide…could be attained only with global [human-caused] emissions that eventually drop to substantially below 1990 levels."

The longer we wait to achieve serious reductions in greenhouse gas emissions relative to business-as-usual practices, the more drastic those reductions will need to be. In the CCP resolution to develop a local climate protection plan, your governing body committed to taking a leadership role in combating global warming by reducing greenhouse gas emissions. It can do this by adopting an aggressive, ecologically meaningful target that will prompt creativity and innovation, along with near term milestone targets to build momentum.

CO_2 Reduction Targets of Select CCP Jurisdictions		
Jurisdiction	**% Below Baseline Emissions**	**Target Year**
Austin, TX	10-20%	2010
Berkeley, CA	15%	2010
Burien, WA	10%	2010
Burlington, VT	10%	2005
Chula Vista, CA	20%	2010
Durham, NC	5%	2025
Hillsborough Co., FL	20%	2010
Miami-Dade Co., FL	20%	2005
Minneapolis, MN	20%	2005
Oakland, CA	15%	2010
Portland, OR	20%	2010
Saint Paul, MN	20%	2005
Takoma Park, MD	20%	2010
Toledo, OH	20%	2020
Tucson, AZ	20%	2010

Once your local government has adopted a GHG emissions reduction target, be sure to email or fax your jurisdiction's target-setting resolution to ICLEI at:

ICLEI— Local Governments for Sustainability
Cities for Climate Protection Campaign
436 14th Street, Suite 1520
Oakland, CA 94612
Phone: 510.844.0699
Fax: 510.844.0698
Email: iclei_usa@iclei.org
Web: www.iclei.org/usa

Milestone 3: Developing the Climate Action Plan

The Climate Action Plan

Your local Climate Action Plan should include all actions your jurisdiction has already implemented since the base year and all measures your jurisdiction plans to implement in the future to meet its GHG emissions reduction target. What existing programs or policies are already reducing GHG emissions? A municipal building retrofit? Street lighting upgrades? A new residential composting program? Can these be expanded or enhanced to help meet your emissions reduction goals? What new projects may increase emissions, e.g. a landfill expansion, new housing subdivision or commercial development. Can they be modified to reduce emissions growth?

Build the Climate Action Plan around the measures and activities your local government has in place, then propose new measures to close the gap between your jurisdiction's projected growth and its reduction target. The Climate Action Plan needn't be a long document and it can be incorporated into another document your local government already produces (e.g., master plan, air quality plans).

Typical Elements of a Climate Action Plan:

- Summary of the baseline emissions inventory (Milestone 1)
- Summary of the emissions forecast (Milestone 1)
- Summary of chosen emissions reduction target(s) (Milestone 2)
- Description of implemented emissions reduction measures
- Description of new or proposed actions to be implemented that, together with existing measures, will enable the jurisdiction to meet its emissions reduction target(s)
- Implementation strategies for each proposed measure identifying costs, responsibilities, schedules, funding sources, etc.
- Procedures for monitoring progress made toward the achievement of the target and the status of implementation of the GHG reduction actions

Counting Existing Measures

Compile a List of Existing Measures

Many projects and programs that have already been implemented in your jurisdiction to save money, increase energy efficiency, reduce solid waste or improve local air quality are also GHG-reducing measures. For example, your local government may have established programs to reduce automobile use in the fight against air pollution. These include transit incentive and improvement programs, trip reduction and telecommuter programs etc. If your city or county has implemented any of these activities since the base year, and if the program has the effect of reducing the burning of fossil fuels, which it most likely will—then include it in the Climate Action Plan.

> The "Sample Emissions Reduction Measures" list at the end of this section provides lots of examples of GHG-reducing projects and policies. Use this list to help you identify measures your jurisdiction may already have underway as well as ideas for future progress.

Why look at existing measures? Including existing programs in your Climate Action Plan is smart and beneficial for several reasons. First, you might find that your local government already has implemented a series of measures that are yielding significant progress towards its reduction goal. Second, it is politically smart, as the jurisdiction can recognize elected officials and residents who have supported energy conservation and waste reduction programs in the past, and credit departments for their accomplishments. In addition, giving kudos to existing programs can potentially reinvigorate programs that might have lost some steam along the way. Third, GHG emissions (as measured in tons of CO_2e/year) is an excellent environmental indicator. It can be used to measure and compare the progress of programs.

If you have established an inter-departmental climate task team or advisory committee, this group will be very helpful in the process of identifying previously implemented measures. Members of this group can also provide access to data and facilitate meetings with key information holders. By incorporating the projects and work of other departments into the Climate Action Plan, you are also fostering their ownership and buy-in, which will be invaluable when it comes time to garner support and implement the plan.

Sample Climate Action Plan Outline

Hillsborough County Local Action Plan

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Quantifying GHG Reductions of Existing Measures

Quantifying GHG reduction benefits allows you to evaluate the progress your local government and community have made in reducing emissions to date. These results can also be used to determine which existing programs are achieving the most emissions reductions and to focus new measures accordingly.

Collect measures data

Data collection forms are provided at the end of this section to facilitate the process of quantifying existing measures. Data needed for quantifying the results of municipal, residential and commercial buildings measures include the type of fuel affected and the amount of energy saved from each measure implemented. For example, for renewable energy measures, find out the amount of energy that will be generated annually by the renewable source, and the type and amount of fuel displaced annually by the renewable source. Data for waste measures include tons and type of waste being reduced, recycled or composted and amount of methane being recovered. Much of this information can be found in existing project reports and updates, or from staff who are supervising the particular project.

In order to quantify the impact of recycling measures, **San Francisco** staff obtained data from the County's "Source Reduction and Recycling Element of the County's Integrated Waste Management Plan". In order to quantify CO_2 reductions from converting to LED traffic signals and exit signs, **Overland Park's** staff liaison spoke to the City's traffic engineer and obtained data on the amount of energy saved annually.

Input measures data into the Software

Enter the data and information collected in the data collection forms into the CACP software. The Software User's Guide will guide you through using the software to calculate GHG reductions, cost savings, and criteria air pollutant reductions achieved from each measure. Summary reports in the software's Community and Government Measures modules will demonstrate the progress your jurisdiction has already made through existing measures toward your emissions reduction goals.

Learning From Experience

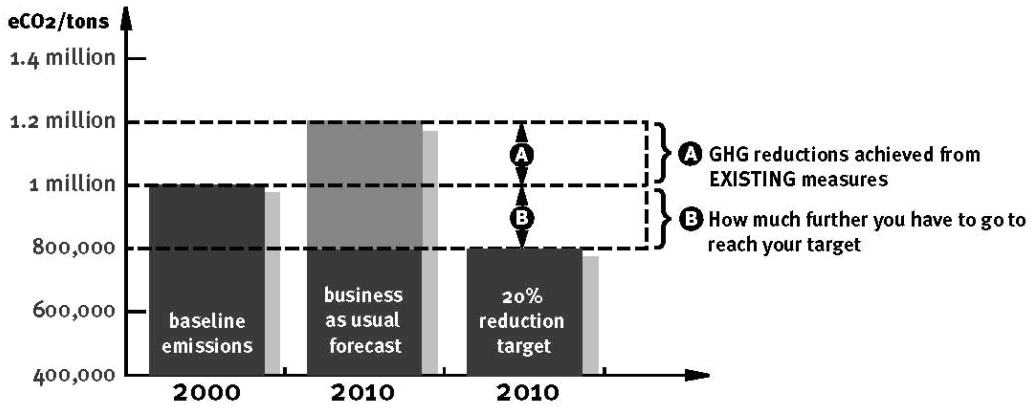
"We used the City Energy Policy and dozens of other plans as a base – including transportation, air quality, water quality, recycling, solid waste, downtown development, parks and tree planting, city purchasing, facility management, and utility integrated resource plans."

Susan Anderson – Director
Portland Energy Office
Portland, OR

Evaluating Progress Relative to the Target

After quantifying the emissions reductions achieved from existing measures, determine how far your jurisdiction has already come in approaching its emissions reduction target and how far it still has to go. Reports generated from the CACP software automatically perform this step by displaying the GHG reductions achieved from each measure and comparing these to your baseline emissions and reduction target.

Evaluating Emissions Reduction Progress



Selecting New Measures

Identify New Actions that Can Achieve GHG Reductions

Use results from the GHG inventory and forecast to look for the best areas and opportunities for reaching your local government's reduction target. These opportunities tend to lie in the sectors, facilities or operations that are projected to emit the most GHGs in the target year.

Where do the big numbers occur? Is it natural gas in the residential sector? Gasoline from personal vehicles? Landfill methane? Or looking at local government operations, does electricity for street lighting account for a large percentage of future GHG emissions? Heating oil at City Hall? Diesel consumption by heavy trucks? Identify those areas that provide the major opportunities for reducing GHG emissions to reach your goal.

Use any information on end-use energy consumption to further identify opportunities for emissions reduction. If heating oil in the residential sector is generating big numbers, what are the main uses of this fuel? Is it space heating or water heating? Similarly for local government operations, if the big numbers are coming from diesel consumption by heavy trucks, what are these vehicles being used for? Refuse collection? Street

maintenance and repairs? What kinds of actions could be taken to optimize these operations and affect these sources of GHG emissions? This type of exercise will help you identify the kinds of actions needed to achieve your local government's reduction goals.

Select New Measures to Reach Your Local Government's Goals

Identify potential measures. Remember to keep the findings of the emissions inventory and forecast in mind when drawing up new measures to ensure that you are targeting the biggest sources of emissions. Use the "Sample Emissions Reduction Measures" list at the end of this section to help you identify potential new measures. Information on measures that have been implemented in other communities, including basic descriptions, costs, and benefits, etc., is available through the ICLEI network.

You can also use your city or county's climate task team to brainstorm a list of potential projects and programs that can be implemented to further reduce GHG emissions. This is another opportunity to gain support from within and outside of your local government. Particular interests of different departments, elected officials, and community organizations can be incorporated. Be sure to include relevant community efforts, such as sustainability plans, greening and conservation activities, bicycle promotion groups, etc.

Learning From Experience

"We pitched the Local Action Plan as a way for city staff and department heads to get some of their 'wish list' of activities – things they wanted to do but didn't have the resources for – implemented. After presenting it in this manner, we received quite a lot of support."

Neal DeSnoo – Energy Officer
Berkeley, CA

Look at existing plans and documents such as your local government's General Plan or Sustainability Plan. Do they propose or recommend new actions that would also bring about GHG reductions? If so, include these actions in the list of new measures in your local Climate Action Plan. Ideally many of your proposed measures will already have the support and endorsement of other local government departments and community groups.

Evaluate potential measures. Look at the list of potential measures to determine basic feasibility and effectiveness. Pare down the list to those measures that seem most promising; refine the ones that seem most practical and effective. You will want to winnow your list because your next step will be to quantify the GHG reductions that you hope to achieve from each proposed measure. Not all of the measures need to produce big emissions reductions. Some may be included primarily for their educational value or for other reasons that make sense in your city or county.

Additional criteria that can be used to rate potential measures include:

- Initial implementation cost
- Financial rate of return
- Staffing requirements
- Political and public support

- Impact on raising public awareness
- Associated co-benefits such as improved air quality, reducing traffic congestion, creating jobs and other economic opportunities and saving money

Example: Chula Vista's Measures Criteria

The City of Chula Vista, CA created a Technical Advisory Committee which reviewed and selected measures for its local Climate Action Plan according to the following criteria:

- Overall appropriateness of each measure to the City's geography and character
- General acceptability of the measure to the public at large
- Acceptability of the measure's technology requirements
- Feasibility of funding implementation of the measure
- Presence in Chula Vista of an established and/or growing market for the measure
- Ability to quantifiably gauge results and benefits from implementing the measure
- Useful life or durability of a measure's CO_2 savings
- Availability of an organization willing and capable to implement the measure

Quantifying GHG Reductions of New Measures

Data collection forms at the end of this section will help you gather the necessary information to estimate GHG reduction potential for each proposed measure. Use these forms and the CACP software in planning and choosing new measures to reach your jurisdiction's emissions reduction target.

In many cases, just as with existing measures, experts in the field or in appropriate departments will be able to provide the necessary data or estimates for new, proposed measures. For example, the solid waste department could provide current numbers on waste diversion and make estimates on the amount that diversion rate could increase with the implementation of a home-composting program. The numbers will vary depending on whether the measure is a voluntary program or mandatory. The local electric utility might tell you that a building insulation incentive program might reasonably be expected to result in a reduction of 0.5% in natural gas consumption each year.

Examples of Emissions Reduction Measure Descriptions to Include in a Climate Action Plan:

EXAMPLE MEASURE: New Carpool Program for Downtown Employees

1.) Identify the best person to talk with about this measure. This person might be the municipal commute coordinator or the regional rideshare program

coordinator.

2.) Use the Measures Data Collection Form for Carpool and Vanpool programs at the end of this section when speaking to the commute or rideshare coordinator. The form contains all the information needed for you to gather estimates of factors that go into reducing vehicle miles traveled (VMT). Some of these factors include:
    - Expected number of downtown employees that would participate in the program
    - Number of people in each carpool vehicle
    - Average length of daily round-trip commute
3.) Input these factors into the Community Measures module of the CACP software which will automatically generate estimates of GHG and CAP reductions resulting from the carpool program.

EXAMPLE MEASURE: Residential Curbside Recycling Program Expansion

1.) Identify the best person to talk with about this measure. This person is likely to be your jurisdiction's recycling coordinator or someone working in the Solid Waste Management Department.
2.) Use the Measures Data Collection Form for Waste Reduction, Recycling and Composting programs at the end of this section when speaking to your recycling coordinator or solid waste management person. Get estimates on:
    - Potential amount of waste diverted or reduced through expanding residential recycling
    - Cost savings per ton of waste diverted
3.) Input these factors into the Community Measures module of the CACP software which will estimate GHGs and CAPs reduced as well as savings accrued from the program.

EXAMPLE MEASURE: Boiler Upgrade in City Facilities

1.) Identify the best person to talk with about this measure. He or she will most likely work in the Public Works or Facilities Department or in the Energy Office.
2.) Use the Measures Data Collection Form for Energy Efficiency Measures for Municipal Buildings and Facilities when speaking to your Energy or Public Works person. Obtain estimates on factors that will affect future energy use:
    - Number of boilers that would be feasible to upgrade
    - Type and quantity of fuel used by existing boilers
    - How much energy and what type of fuel the new boilers will use
    - What percentage efficiency improvement will be attained from upgrading the boilers
3.) Input these factors into the Government Measures module of the CACP software which will automatically generate estimates of GHG and CAP reductions resulting from the boiler upgrade project.

EXAMPLE MEASURE: Municipal Procurement Switch to Buy Green Power

1.) Identify the person who will know the potential impacts of implementing such

a measure. This person will most likely be in your Public Works Department, Energy or Procurement Office.

2.) Use the Measures Data Collection Form for Change in Energy Source when speaking to your Energy Officer. Obtain estimates on:
    - How much electricity (e.g., how many million kWh) such a purchase would represent;
    - What emissions coefficients for electricity should be used (either use the CACP software defaults or contact your electricity provider for customized information); and,
    - What fuel mix of green power will be purchased (e.g., 100% renewable vs. 65% renewable and 35% non-renewable).
3.) Input these estimates into the Government Measures module of the CACP software which will automatically generate estimates of GHG and CAP reductions resulting from the green power purchase.

If you have questions on which factors are needed for inputting into the CACP software to calculate GHG or CAP reductions, or if you have difficulty coming up with estimates, ICLEI staff can help you draw up a list of factors and help you make assumptions based on the experience of other local governments.

Measure impact of actions, select actions for Climate Action Plan

Now the process is one of refining, substituting, and winnowing. What's the total GHG emissions reduction predicted from these proposed new measures? Combined with continued implementation of existing measures, how many tons of GHG emissions reduction will be achieved? Does this amount reach the target? How many more tons need to be reduced? As you refine measures and adjust the data entered in the CACP software Measures modules, software reports will indicate how close you are to your jurisdiction's emissions reduction goal.

Completing the local Climate Action Plan

After identifying previously implemented measures, selecting new measures to implement, and quantifying the emission reduction benefits of all of these measures to demonstrate their potential contribution to achieving your emissions reduction target, the final step is to incorporate all of this information into your local Climate Action Plan. Your Climate Action Plan should also include additional guidance regarding the proposed implementation process for each measure, such as anticipated costs, implementation timeframe, and departmental responsibilities.

Once your local government has developed its Climate Action Plan, be sure to email or fax it to ICLEI at:

ICLEI— Local Governments for Sustainability
Cities for Climate Protection Campaign
436 14th Street, Suite 1520
Oakland, CA 94612
Phone: 510.844.0699
Fax: 510.844.0698
Email: iclei_usa@iclei.org
Web: www.iclei.org/usa

Sample Emissions Reduction Measures

Below is a sector-by-sector list of just some of the measures local governments can implement to reduce greenhouse gas emissions in their communities and in their own facilities and operations. Use this list to identify existing measures to highlight in your Climate Action Plan, as well as to brainstorm on new measures that can be enacted in the future.

Community-Scale Measures

Residential Energy Measures

- Building codes
  - Energy efficiency standards for new construction or major renovations
  - Requiring light colored, high albedo rooftops and pavement
- Ordinances for energy efficient retrofit in existing building stock at time of sale
- Solar access ordinances
- Solar hot water/pool heating and solar PV applications, ordinance, or incentives
- Green building design incentives, guidelines, or ordinances
- Passive solar design and solar orientation incentives, guidelines, ordinances
- Financial incentives (e.g., tax incentives, rebates, loans) for:
  - Installation of photovoltaics, other renewable energy application
  - More efficient appliances, e.g. refrigerators, lighting, water heaters
  - Improving efficiency in existing and new buildings
- Home insulation or weatherization programs
- Distribute water saving devices, such as low-flow shower heads and faucet aerators
- Distribute compact fluorescent bulbs, other home energy saving devices
- Education and promotion of "cool communities" type landscaping
- Tree planting program to maximize shading of buildings

Commercial Energy Measures

- Building codes
  - Raising energy efficiency standards for new construction, significant renovations, remodeling, additions
  - Requiring light colored, high albedo rooftops and pavement
- Green building design incentives, guidelines, or ordinances
- Ordinance for energy efficient retrofit in existing building stock at time of sale
- Solar access ordinance
- Provide energy services to business, e.g. audits, assessments for energy efficiency improvements, other technical assistance
- Cooperative or aggregate purchase or buyer program for lighting, efficient equipment
- Distribute compact fluorescents, lighting occupancy sensors, other commercial application energy saving devices

- Lower business fees or waive permits for energy efficiency improvements and use of solar energy
- Building Energy Tax Credit

Industrial Energy Measures

- Ordinances establishing energy efficiency requirements for new industrial permits
- Ordinances requiring industries to develop and implement energy conservation programs
- Ordinances lowering business fees or waiving permits for energy efficiency improvements and fuel switching (including use of solar energy), heat recovery/co-generation systems
- Provide energy services to industry, e.g. audits, assessments to recommend process changes, other energy efficiency improvements

Financing Energy Efficiency

- Establish financing program for efficiency improvements in the community, e.g. revolving loan funds through bonds, energy taxes, etc.

Transportation Measures

- Implement policy shifting funding away from roads and highways to alternative transit
- Increase use of alternative transit—public transit, van-, carpooling, cycling, walking through:
  - Funding for facility, system and/or infrastructure improvements
  - Dedicated lanes for transit/HOV vehicles
  - Implement free bike share program
  - Work with transit authority to reduce public transit fares
  - Ordinance providing parking fee and road toll discounts for van- and car-pools
  - Jitney or shuttle service connecting neighborhoods to commuter lines
- Establish service center selling transit passes, coordinating car/van pooling, ridesharing, etc.
- Trip Reduction Ordinance or policies requiring or promoting programs to encourage use of transit, ridesharing, telecommuting, business-sponsored parking cash-out programs
- Establish solar PV or other electric vehicle charging station
- Establish or facilitate road tolls to decrease motor vehicle use
- Parking policies:
  - Implement program to remove public parking
  - Implement program of reduced parking fees for HOVs or high-MPG vehicles
  - Zoning ordinance that reduces minimum parking space requirements for new construction
  - Parking fees to fund transit use, bicycle or pedestrian improvements

Land Use Measures

- Zoning or land use policy changes to promote infill development
- Zoning ordinance that promotes high-density development
- Zoning change to reduce parking requirements and allowances
- Density bonuses and incentives for high-density, infill, and transit-oriented development
- Impact, facility, mitigation, and permit fees that discourage sprawl

Waste Reduction Measures

- Establish a center for reusing salvageable goods
- Conduct home composting education programs, distribute compost bins
- Collect curbside yard debris
- Implement or expand residential curbside recycling collection
- Improve or expand commercial recycling collection
- Community recycling drop-off sites
- Financial incentives to reduce waste such as:
  - Pay-as-you-throw or unit pricing
  - Special taxes and tipping fees
  - Advance disposal fees
- Landfill methane collection program

Measures Affecting Gas and Electric Utilities

- Use franchise agreement to require renewable energy in the electricity fuel mix
- Buy electricity from suppliers that provide green power
- Municipal utilities can increase renewable energy portfolio and promote green power through incentives and outreach
- Aggregate local government with businesses or residents into single power purchaser and negotiate for green power

Local Government Measures

Buildings

- Comprehensive municipal retrofit of existing buildings, parks, stadiums, swimming pools and other recreation facilities, e.g. lighting, insulation, HVAC systems
- Building-specific renewable energy applications, e.g. installing solar hot water heating for locker rooms of recreational facilities
- Lighting efficiency improvements
- Energy efficiency standards for renovations and new construction of municipal buildings
- Lighten colors of existing rooftops and street paving to reduce "heat island" effect
- Rooftop gardens, greening of buildings surroundings for cooling
- Building-specific fuel switch from electricity to natural gas

- Implement co-generation or heat recovery
- Procurement policies that specify energy efficiency standards in all purchasing and bid specs for office equipment, motors, lighting, appliances, etc.

Lighting

- Replace existing lighting with energy efficient and low-wattage lamps and ballast
- Reduce energy use through reducing hours of operation and/or number of lights
- Solar Photovoltaic (PV) powered street and emergency lighting
- Switch traffic signals, exit signs from incandescent bulbs to Light Emitting Diodes (LEDs)

Procurement

- Modify purchasing policies to specify energy efficiency standards in all purchasing and bid specs for office and heavy equipment, motors, lighting, appliances, etc.
- Purchase "green power" and specify renewable energy content for local government operations

Fleet

- Downsize current and future vehicles through procurement policy changes
- Reduce fleet size, i.e. total number of vehicles
- Improve scheduling and route efficiency
- Change procurement policy to specify high fuel efficiency for each vehicle class
- Improve maintenance regime for increased efficiency, e.g. check tire pressure
- Replace on-the-job driving with telecommunications, transit, bicycling, walking, and car-pooling
- Provide incentives to reduce municipal employee travel, e.g. trip reduction policies like subsidized transit passes, elimination of free parking, preferred parking for carpools, vanpools

Water

- Energy efficient retrofit of facilities, especially pumping processes
- Energy efficient specs for new construction of sewage and waste water system
- Improve energy efficiency of equipment
- Process changes to improve energy efficiency of treatment of drinking water, wastewater and sewage
- Change energy source from electricity to natural gas for existing operations

Waste

- Increase office recycling, e.g. paper, cardboard, cans, toner cartridges
- Recover food waste in cafeterias and kitchens of local government buildings for composting or other use
- Waste prevention in day-to-day operations—two-side copying, reduced paper requirements, etc.

- Purchasing preferences for recycled materials
- Compost park, street, and other landscaping debris for re-use by Parks and Recreation
- Recover landfill methane for energy production

Others

- Implement or participate in district energy programs, i.e. district heating and cooling
- Implement public education programs, e.g. special events, PSAs, curricula
- Implement urban forestry projects
- Establish energy efficiency or climate protection information clearinghouse

Milestone 4: Implementing the Local Climate Action Plan

Implementing emissions reduction measures is the most important part of the CCP process. All of the groundwork you have done to this point has helped you to select and prioritize appropriate emissions reduction measures and to demonstrate your progress.

Below are tips on how to work through implementation issues such as schedules, budgets, identification of funding sources, assignment of responsibility to agencies and staff, and methods for monitoring and evaluating progress.

Example Measure from the City of Berkeley's Local Climate Action Plan

6.3 Bicycle Boulevards

Description: Bicycle boulevards are streets where the needs of cyclists are preferentially met, even if cars are inconvenienced. Most streets throughout the City would remain the way they are (oriented to automobiles), but a few streets would offer bicycles preferential treatment. The City Council has designated five strategically located North-South and East-West streets as bicycle boulevards. When improvements are made, bicycle boulevards will increase bicycle ridership and bicycle traffic will concentrate on those routes, further increasing safety.

Lead Agency: Advance Planning

Timeframe: Two years

Implementation: Advance Planning would work with the various interests in the community to gather input and design boulevards. Improvements would then be made to facilitate bike use on these streets.

Reduction in Resource Use: Assuming 1,000 more bicycle trips per day, miles per trip, vehicle miles traveled (VMTs) would be reduced by 1,825,000 annually. Assuming 0.38 kg CO_2/VMT (solo travel @23 mpg), carbon dioxide is reduced by 1,000 metric tonnes annually.

First Cost: The consultant plan for design will cost approximately $40,000. Depending on the recommended design, implementation cost will vary, but improvements are anticipated to cost up to $750,000 to implement.

Annual Cost: An additional $30,000 per year for maintenance of improvements.

Funding Source: City funds and grants.

Annual Dollar Savings: Assuming VMTs are reduced by 1,825,000 annually and using the Internal Revenue Service expense figure of $0.30/mile, savings to drivers are $550,000 per year.

Administration and Staffing

A key part of effective implementation is assigning and defining management responsibilities for the individual components of each measure. These assignments can be specified in the section of the Climate Action Plan that proposes potential measures. Wherever possible, use arrangements already in place—it's best if the Climate Action Plan is able to integrate well with existing workloads and systems. Below are several key administrative issues that should be addressed.

Program management

An appropriate staff person within your local government should be assigned overall responsibility for coordinating the implementation of the Climate Action Plan. The staff person and department responsible will vary from jurisdiction to jurisdiction. In **Olympia, WA** the responsible staff person is the city's Public Works Director; in **Boise, ID** it is the Air Resources Specialist; in **Burlington, VT** it's the Director of Planning and Zoning. **Santa Monica** and **Oakland, CA's** sustainability coordinators are responsible for coordinating implementation efforts. A variety of approaches can be successful.

Communication and coordination

It is a good idea to establish an interdepartmental committee to ensure effective communication and coordination between those responsible for implementing the Climate Action Plan's various elements. If a climate action team or interdepartmental task force was already established to assist in plan preparation, it could be continued to assist with coordinating the implementation phase. The City of **Tucson, AZ** established a Green Team comprised of representatives from city staff, community organizations and other stakeholders, to meet regularly to ensure cooperation and effective implementation of the Climate Action Plan and other related efforts.

Adequate resources

Adequate funding, staff and outside assistance are critical for implementation progress. If it is necessary to add staff or outside assistance, the Plan should acknowledge this.

> One possible way to use existing resources more effectively is to use volunteers or interns from the community to gather information or perform public outreach. Protecting the environment is an issue that appeals to many well-informed citizens.

Ensuring implementation of existing measures

Since you are counting on results from existing measures to give you a head start on meeting the jurisdiction's GHG reduction goal, it is important to identify and follow up on the actions or steps necessary to ensure that existing measures:

- Are actually implemented, if currently still in the planning stage
- Continue to be implemented, if already underway, or
- Are implemented fully and effectively, if, as is often the case, they face limiting pressures in areas of staffing or financing

The Climate Action Plan is an opportunity to renew and reinforce your local government's commitment to existing programs and projects that have the effect of reducing GHG emissions. By identifying them as key elements in your Climate Action Plan, measures that may have been languishing on the back burner can be brought back to life.

Learning From Experience

"Funding has not been a problem because we have been able to show a positive return on most expenditures, including cost avoidance."

George Moody – Environmental Compliance Manager
Overland Park, KS

Financing and Budgeting

By reducing energy or fuel bills, many measures will create financial savings that could be directed toward other measures that may be more difficult to fit into a budget.

The municipal operations portion of your Climate Action Plan can help you here. Its energy-saving measures may well provide enough financial savings to fund implementation of other measures in the Plan. But to capture these savings, the plan will need to identify and allocate these savings specifically for this purpose. Below are several key considerations in developing your budget.

What actions can be made part of existing projects or expenditures?

You will find many opportunities for integrating measures into existing processes. For example, your local government might choose to select more efficient vehicles (e.g., hybrids) when replacing older vehicles from your municipal fleet.

What actions will require new expenditures?

Adding more buses or routes to expand transit use may require significant up-front investment, whereas reducing number of vehicles in the municipal fleet or setting all computers on energy efficient sleep mode has no added cost.

Can funds be found in existing budgets?

Parking revenues, for instance, might be used to pay for alternative transit improvements, on the grounds that these improvements reduce parking demand. The energy-saving benefits of the measures you implement for your whole

Creative Financing!

Ann Arbor, MI

The City has established a $100,000 revolving loan fund to finance energy efficiency projects for municipal facilities. City departments apply for the funds, which pay for the efficiency improvements. The departments reimburse the Fund by paying back 80% of resulting energy savings over the next five years.

Portland, OR

One percent of municipal facility energy bills is placed into a fund (capped at $75,000) to pay for the city's Energy Manager. The Energy Manager helps identify financing for energy efficiency projects. In 1995 the city was selling bonds to finance capital projects, and the Energy Office got $1 million added to that sale to finance dozens of small-scale efficiency projects.

community will be vastly greater than the savings from local government operations, but many of them will accrue to the private sector, not to your local government. However, you can tap into some of these savings to fund program implementation through fees or surcharges on utility bills, building permits, and so on. Local needs and the political viability of this approach will affect pursuing such funding mechanisms.

Where can we turn when municipal resources fall short?

Financial arrangements with local utilities
Many states and communities have programs in which the initial capital costs of measures that save energy can be financed by the local utility and repaid through savings in reduced utility bills. This is a no-cost way for your municipality to include measures that it otherwise would not be able to afford in its Climate Action Plan. Utility companies may also offer energy efficiency programs and incentives that may be tapped into and then directed to accomplish Climate Action Plan goals. Finally, benefits funds have been established by a number of the states that have enacted electric utility restructuring laws. Benefit funds must typically be used to finance energy efficiency and renewable energy activities.

Assistance through federal and state programs
ICLEI's program staff can help connect city and county liaisons to resources at the state and national level to provide opportunities for obtaining financial and technical assistance available to local governments.

Energy service corporations (ESCOs)
ESCOs finance energy improvements which are then paid back by the cost savings from reduced energy bills. These businesses encourage the implementation of energy-saving measures and may be valuable resources for technical assistance, financing, and program implementation.

Developing a Timeline

The schedule for implementing the Climate Action Plan's programs and measures should be timely enough to get your jurisdiction to its goal by the target year. Be practical—take into account the administrative, political, technical, practical, and other issues your jurisdiction will face in getting programs up and running.

Suggested issues to consider:

- Overall schedule should meet the target date set for meeting the GHG reduction goal
- The schedule should provide ample time for external review and input
- Put aside time for citizen involvement and input, committee and commission review as necessary
- Phase in implementation of measures—it makes sense to implement the simplest and easiest measures first. For projects or policies that will be more complicated

or controversial, take the time you need to lay the necessary groundwork to develop the best possible recommendations and generate the strongest possible support

Public Involvement in the Implementation Process

The implementation phase should continue to include strong public input, involvement, and buy-in. Consider establishing a community task force—or continue involving the existing task force that worked on formulating the Plan—to work with municipal staff and elected officials in the Climate Action Plan's implementation. Another key tool is to recruit volunteers and interns to assist in presenting the Plan to the public and helping in its implementation.

Learning From Experience

"We're a smaller city with limited resources. We were able to leverage our resources by using volunteers from the community to help out. We put together a volunteer task force at a town hall meeting on global warming. This was also a great way to get free public outreach and support, which paid off when Council adopted the plan."

Lucinda Smith – Environmental Planner
Fort Collins, CO

Milestone 5: Monitoring Progress and Reporting Results

To ensure that your Climate Action Plan is implemented effectively and on schedule, it is important to develop systems for monitoring its implementation, measuring results, keeping track of changing conditions, taking advantage of new information and ideas, and revising your targets and plans as needed.

Measuring results is important. This requires following up on the sources and data developed in preparing the emissions analysis and forecast. Are the figures changing in the way you predicted? If not, is it a result of inadequate program implementation, or were the measures adopted not up to the job? Tracking and measuring should be routine so that you can demonstrate the progress your local government is making. Incorporate GHG-reduction progress into other reports your jurisdiction is already producing. For example, **Santa Monica, CA** includes its GHG-reducing results in the city's sustainability progress report.

Quantifying GHG Reduction Results

The most convenient way to report on your local government's GHG reduction progress is to update the data on the measures in your Climate Action Plan. Use the Measures Data Collection Forms provided in this Guide to update data on both existing and proposed measures and enter new data into the CACP software. The software calculates a number of useful indicators—such as per capita GHG emissions or GHG emissions per commercial building square foot—that you can use in monitoring and reporting broad trends in your jurisdiction's performance.

Quantifying and recording the results of GHG reduction measures is important for several reasons:

- First, it allows you to see if your measures are yielding the results you had anticipated. If they aren't, you may want to modify them, or replace them with more appropriate measures.
- Second, it enables you to judge whether or not you are continuing to progress toward your GHG emissions reduction target.
- Third, quantifying emissions reductions puts a local government in good shape to take advantage of, and benefit from any emissions trading mechanism that may be established in the future.
- Lastly, reporting allows you to tout concrete results to your governing body and to local press.

Miami-Dade County, FL monitors the progress of its plan by collecting data on all implemented measures and running them through the CACP Software on an annual

basis. Using the software printouts, staff produce progress reports every 2-3 years on the implementation of the County's Climate Action Plan.

Portland, OR has produced 3 progress reports since the city finished its Climate Action Plan in 1993. Highlights of Portland's reports include:

- 3% decrease in per capita CO_2 emissions from base year 1990;
- The City's own facilities have decreased energy use by 15%, saving $1.2 million annually;
- Annual electricity demand by residents and businesses throughout metropolitan area has been cut by the amount of power used by 54,000 homes; and,
- Regional mass transit ridership has increased 30% since 1988.

Additional Benefits of Documenting GHG Reduction Results

In the future, there may be mandates to reduce GHG emissions. In order to fully implement the Kyoto Protocol—the international agreement to reduce GHG emissions—national governments may eventually regulate local governments, as well as other entities, to reduce emissions in order to achieve national targets. Having taken action to reduce emissions, and having monitored and documented the emissions reductions achieved, will make it easier for your local government to comply if such regulations are established.

Another motivation for documenting the emissions reductions your local government achieves is to be able take advantage of opportunities that may arise such as emissions trading. One mechanism national governments are considering to meet the emissions reductions required under the Kyoto Protocol is establishing a GHG emissions trading system. In such a system, local governments may be able to offer emission reduction credits accrued from reductions they have made, for sale to buyers (such as utilities or industrial companies), who need them to offset their own emissions in order to stay within an overall limit set by the national government.

Learning From Experience

"The Plan must be reinvented periodically to tie it to new initiatives and new opportunities. For example, half way through our planning effort we experienced Hurricane Andrew. This provided new opportunities for energy efficiency in the rebuilding effort. There must be a conscious and continuing effort to connect the principles of sustainability to whatever issues are politically active. The act of updating the Plan helps keep these issues on the local agenda."

Dr. Doug Yoder – Assistant Director
Dept of Environmental Resource Mgmt
Miami-Dade County, FL

Local governments that set up a mechanism for monitoring and reporting GHG emissions reductions have a strong advantage in terms of selling their emission reduction credits (as long as your ability to meet your jurisdiction's own local emissions reduction target is not compromised). Local governments in ICLEI's CCP Campaign that have quantified GHG emissions reductions will have an advantage.

Glossary of Terms

Atmosphere—The atmosphere is the gaseous envelope surrounding a planet. The Earth's atmosphere consists primarily of nitrogen (79.1% by volume) and oxygen (20.9% by volume), with carbon dioxide (CO_2) representing approximately 0.03%. In addition, the atmosphere contains traces of argon, krypton, xenon, neon, and helium, plus water vapor, traces of ammonia, organic matter, ozone, various salts, and suspended solid particles.

Base Year— CCP participants are encouraged to select an emissions analysis base year by finding the earliest year for which they can get comprehensive and reliable data (e.g. many communities choose 2000 as a 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.

Biodiesel—Biodiesel is a domestically produced, renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases. Biodiesel is safe, biodegradable, and reduces greenhouse gases and other air pollutants such as particulates, carbon monoxide, hydrocarbons, and air toxics. Blends of 20% biodiesel with 80% petroleum diesel (B20) can generally be used in unmodified diesel engines; however, users should consult their OEM and engine warranty statement. Biodiesel can also be used in its pure form (B100), but may require certain engine modifications to avoid maintenance and performance problems and may not be suitable for wintertime use. Users should consult their engine warranty statement.

Biomass—Biomass is the total dry organic matter or stored energy content of living organisms in a given area. Biomass most commonly refers to forms of living matter (e.g. grasses, trees) or their derivatives (e.g., ethanol, timber, charcoal) that can be used as fuels.

Carbon Cycle—The carbon cycle is a general term used to describe all reservoirs and flows of carbon on Earth. The flows tend to be cyclic in nature. For example, carbon removed from the atmosphere (one reservoir) and converted into plant tissue (another reservoir) is returned back into the atmosphere when the plant is burned or decomposes.

Carbon Sink or Reservoir—Within the carbon cycle, this is the physical site at which carbon is stored (e.g. atmosphere, oceans, Earth's vegetation and soils, and fossil fuel deposits).

Carbon Dioxide—Carbon dioxide, abbreviated CO_2, is essential to living systems and released by animal respiration, decay of organic matter and fossil fuel burning. It is removed from the atmosphere by photosynthesis in green plants. The amount of CO_2 in the atmosphere has increased by about 25% since the burning of coal and oil began on a large scale. Atmospheric carbon dioxide varies by a small amount with the seasons, and the ocean contains many times the amount of the gas that exists in the atmosphere.

Carbon Dioxide Concentration—The atmospheric carbon dioxide concentration, at 353 parts per million on a volume basis (ppmv) in 1990, is now about 25% greater than the pre-industrial (1750-1800) value of about 280 ppmv, and higher than at any time in at least the last 160,000 years. Carbon dioxide is currently rising at about 1.8 ppmv (0.5%) per year due to human-caused emissions and currently accounts for approximately 84% of U.S. GHG emissions.

Chlorofluorocarbons (CFCs)—CFCs are compounds of carbon that contain some chlorine and some fluorine. CFCs do not occur naturally; they are synthetic products used in various industrial processes and also as propellant gas for sprays. CFCs are typically used in refrigerants, solvents, foam-makers and for use in aerosol sprays. CFCs are significant contributors to ozone depletion and also contribute to global warming.

Climate—The term climate represents average weather together with its variability of representations of the weather conditions for a specified area during a specified time interval (usually decades or longer).

Cogeneration—Cogeneration, or combined heat and power, describes the simultaneous generation and use of both electric power and heat. The heat, instead of being discharged as a waste product without further use, is used in some fashion.

Corporate Average Fuel Economy—The Corporate Average Fuel Economy (CAFE) standards were originally established by Congress for new automobiles, and later for light trucks, in Title V of the Motor Vehicle Information and Cost Savings Act with subsequent amendments. Under CAFE, automobile manufacturers are required by law to produce vehicle fleets with a composite sales-weighted fuel efficiency which cannot be lower than the CAFE standards in a given year. Standardized tests are used to rate the fuel economy of new vehicles.

Conference of the Parties (COP)—The COP comprises all the nations that have ratified or acceded to the United Nations Framework Convention on Climate Change (UNFCCC). The first COP meeting (COP-1) was held in Berlin in 1995 and COP meetings will continue to be convened annually unless the Parties decide otherwise. The COP's role is to promote and review the implementation of the Convention. It will periodically review existing commitments in light of the Convention's objective, new scientific findings, and the effectiveness of national climate change programs. The COP can adopt new commitments through amendments and protocols to the Convention. In December 1997 it adopted the Kyoto Protocol containing stronger emissions-related commitments for developed countries in the post-2000 period. ICLEI often coordinates the participation of local government officials at COP meetings.

Criteria Air Pollutants (CAPs)—The term criteria air pollutants refers to pollutants that are regulated under the U.S. Clean Air Act. As with carbon dioxide, the major sources of these pollutants are fossil fuels. Most measures that reduce carbon dioxide emissions also reduce criteria air pollutants. Criteria air pollutants include nitrogen oxides (NOx), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SOx), and particulate matter smaller than ten microns in diameter (PM-10). The CACP software

provides estimated emissions of CAPs as well as GHGs for emissions analyses and reduction benefits of measures.

Equivalent Carbon Dioxide (CO_2e)—Equivalent carbon dioxide, abbreviated as CO_2e and also known as global warming potential (GWP), is a unit that allows emissions of greenhouse gases of different strengths to be added together and framed in terms of comparative units. For carbon dioxide itself, emissions in tons of CO_2 and tons of CO_2e are identical, whereas for methane, an example of a stronger greenhouse gas, one ton of methane emissions has the same GWP as 21 tons of CO_2. Thus 1 ton of methane emissions can be expressed as 21 tons CO_2e.

Emissions Analysis—The emissions analysis represents the first milestone in ICLEI's Cities for Climate Protection methodology. It includes both base year inventories and forecasts of GHG growth for municipal operations and the community as a whole.

Ethanol Blend (E85)—Ethanol is an alcohol-based alternative fuel produced by fermenting and distilling starch crops that have been converted into simple sugars. Feedstocks for this fuel include corn, barley, and wheat. Ethanol can also be produced from "cellulosic biomass" such as trees and grasses. Ethanol is most commonly used to increase octane and improve the emissions quality of gasoline.

Ethanol can be blended with gasoline to create E85, a blend of 85% ethanol and 15% gasoline. E85 and blends with even higher concentrations of ethanol, E95, for example, qualify as alternative fuels under the Energy Policy Act of 1992 (EPAct). Vehicles that run on E85 are called flexible fuel vehicles (FFVs) and are offered by several vehicle manufacturers. See the EERE's ethanol vehicles page for more information on FFVs. In some areas of the United States, lower concentrations of ethanol are blended with gasoline. The most common low concentration blend is E10 (10% ethanol and 90% gasoline). While it reduces emissions, E10 is not considered an alternative fuel under EPAct regulations.

Global Warming—Global warming describes the recent trend of increasing average global surface and tropospheric temperatures that scientists believe is caused by increased emissions of human-induced greenhouse gases. The greenhouse gases (CO_2, methane, nitrous oxides and CFCs) are emitted into the atmosphere and increase the atmosphere's "entrapment" of heat.

Global Warming Potential (GWP)—Global warming potential is a concept developed by the Intergovernmental Panel on Climate Change that provides a comparative measure of the impacts of different greenhouse gases on global warming, with the effect of carbon dioxide being equal to 1.

Greenhouse Gases and the Greenhouse Effect—The Earth's climate is determined by a delicate balance between the solar energy that arrives from space and the heat energy that the Earth creates from the sun's rays. The energy that arrives from space should always equal the energy that the Earth emits back to space. When something disturbs this balance, our climate adjusts by cooling or warming the Earth to return things to

normal. A portion of outgoing heat energy is absorbed in the atmosphere by greenhouse gases such as water vapor, carbon dioxide, methane, and nitrous oxide. If these trace gases were not present, the average temperature on the Earth's surface would be -32 degrees Fahrenheit, and life as we know it would not have evolved here. But the natural greenhouse effect keeps the average global surface temperature at a comfortable 59 degrees Fahrenheit.

Today, the atmospheric concentration of the most important greenhouse gas, carbon dioxide, is higher than it has been in the past 650,000 years. Scientists participating in the British Antarctic Survey have succeeded in charting the atmospheric concentration of carbon dioxide over the last 800,000 years. Their research has shown that temperature unfailingly rises and falls in response to carbon dioxide levels. This increase is the result of an increased reliance on fossil fuels and deforestation, which has caused an imbalance between the absorption and release of carbon dioxide by vegetation. Other greenhouse gases, also found in the atmosphere in increasing amounts, are methane, nitrous oxide and the chlorofluorocarbons (CFCs).

IPCC—Intergovernmental Panel on Climate Change—The Intergovernmental Panel on Climate Change (IPCC) was jointly established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to:

- Assess available scientific information on climate change;
- Assess the environmental and socio-economic impacts of climate change; and
- Formulate response strategies.

It has emerged as the predominant international forum for the development of scientific knowledge and policy advice on matters related to climate change. Its periodic Assessment Reports are relied upon by governments to guide policy making on this issue. The IPCC's Third Assessment Report in 2001 projects that the Earth's average surface temperature will increase between 2.5° and 10.4°F (1.4°-5.8°C) between 1990 and 2100 if no major efforts are undertaken to reduce the emissions of greenhouse gases (the "business-as-usual" scenario). Furthermore the Third Assessment Report also found that "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities."

Kyoto Protocol—The Kyoto protocol was adopted by consensus at the third session of the Conference of the Parties (COP-3) in December 1997 in Kyoto, Japan. When ratified by a certain percentage of participating countries, it contains legally binding emissions targets for developed countries in the post-2000 period. By arresting and reversing the upward trend in greenhouse gas emissions that started in these countries 150 years ago, the Protocol promises to move the international community one step closer to achieving the Convention's ultimate objective of preventing "dangerous anthropogenic [human-induced] interference with the climate system."

According to the Protocol, developed countries commit themselves to reducing their collective emissions of six key greenhouse gases by at least 5%. This group target will be achieved through cuts of 8% by Switzerland, most Central and East European states, and the European Union (the EU will meet its target by distributing different rates among its

member states); 7% by the US; and 6% by Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine are to stabilize their emissions, while Norway may increase emissions by up to 1%, Australia by up to 8%, and Iceland 10%. The six gases are to be combined in a "basket", with reductions in individual gases translated into "CO_2 equivalents" that are then added up to produce a single figure. In 2005, the Kyoto Protocol went into effect after 141 industrialized countries signed on to the agreement.

Methane—Methane, abbreviated CH_4, accounted for about 8.6% of U.S. GHG emissions in 2005. Methane is produced by anaerobic decomposition of solid waste in landfills and sewage treatment facilities, wetlands and rice paddies, as a byproduct of fossil fuel energy production and transport and also from outgassing in livestock. It is also the principle constituent of natural gas and can leak from natural gas production and distribution systems and is emitted in the process of coal production. The methane concentration in the atmosphere has been rising steadily for several centuries, keeping pace with the increase in the world population and expansion of the world economy.

Nitrous Oxide—Nitrous oxide or N_2O (not to be confused with nitrogen oxides or NOx) is a potent greenhouse gas accounting for about 5.1% of U.S. CO_2e emissions in 2005. Main sources for this GHG are nitrogen fertilization of agricultural soils, agricultural run-off and motor vehicles equipped with catalytic converters.

Ozone—An ozone molecule consists of three atoms of oxygen. Ozone is much more reactive than oxygen and is toxic to human beings and living matter. At ground level it forms smog and causes damage to forests and humans. (In the stratosphere, it functions mainly as a filter for ultra-violet radiation and to a lesser extent as a greenhouse gas.) Ground level ozone formation is closely connected to climate change since the primary sources of emissions that cause it (e.g., motor vehicle use) are also global warming pollutants. Additionally the formation of ground level ozone requires not only pollutants but also heat and sunlight. As regions get hotter due to global warming, local ozone smog problems tend to be exacerbated.

Stratosphere—The stratosphere is the layer of the atmosphere above the troposphere extending to a height of ~ 50 km.

Troposphere—The troposphere is the lowest layer of the atmosphere where almost all weather phenomena develop.

Ultra-low Sulphur Diesel: Ultra-low sulfur diesel (ULSD) has begun to replace conventional diesel fuel. This new fuel contains 97% less sulfur than conventional diesel, is cleaner burning, and produces less particulate emissions in all engine types.

UNFCCC—The United Nations Framework Convention on Climate Change is the foundation of global efforts to combat global warming. Opened for signature at the Rio Earth Summit in 1992, its ultimate objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate

change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner." See also Conference of the Parties.

Urban CO_2 Reduction Project—A pre-cursor to the Cities for Climate Protection Campaign, this project involved local governments from U.S., Europe and Canada including—Portland, OR; San Jose, CA; Denver, CO; Saint Paul and Minneapolis, MN; Miami-Dade County, FL; and Chula Vista, CA.

ICLEI – Local Governments for Sustainability is an international association of local governments dedicated to solving local, regional, and global environmental problems through cumulative local action. There are over 600 ICLEI members comprising cities, towns, counties, and their associations from around the world.

ICLEI's Cities for Climate Protection® Campaign is a global effort to reduce the emissions of greenhouse gases and improve local air quality and community livability. More than 240 U.S. cities and counties are currently participating. Through the CCP, ICLEI provides software tools, training and technical assistance to help local governments reduce emissions through energy efficiency, renewable energy, waste management, land use planning, and transportation improvements.

ICLEI – Local Governments for Sustainability, USA
Cities for Climate Protection Campaign
436 14th Street, Suite 1520
Oakland, CA 94612
Phone: 510.844.0699
Fax: 510.844.0698
Email: iclei_usa@iclei.org
Website: www.iclei.org/usa

Data Collection Forms

Community GHG Emissions Analysis Baseline Inventory and Forecast

Included here are the data collection forms needed for completing a greenhouse gas (GHG) emissions analysis at the community scale. The forms are broken down by sector and each form covers both the **baseline inventory and forecast**.

There are five data collection forms, one each for:

1. Basic Information and Indicator Inputs
2. Residential, Commercial and Industrial Sectors
3. Transportation Sector
4. Waste Sector
5. Other Emission Sources

Use these data collection forms when you're calling the utility company, transportation or planning department, solid waste staff or landfill operator for data. Fill the forms out and transfer data in the forms directly into the Clean Air & Climate Protection (CACP) Software. The tables in these forms mirror the tables in the software. Once waste, electricity and fuel use data is entered, the software will perform the calculations necessary to determine actual and projected GHG emissions from your community.

Paving the way

You can facilitate the inventory process by sending out a notice informing relevant staff and departments that you will be calling on them for help in collecting the data you need. Sending out a notice is also a good way of informing key players of the project, inviting them to participate and suggesting how Cities for Climate Protection (CCP) campaign activities may complement their own work.

Important: Keep good notes!

Keep good notes and records throughout the emissions analysis, such as:

- Contact information of data sources and date you received the data
- Assumptions in deriving baseline and forecast figures
- Reports and conversations you came across that helped in the analysis

Use the "Notes" windows in the software to store this information. This will allow anyone who looks at the emissions analysis at a later time to understand where the original data came from and what assumptions were made along the way.

Note—If you need electronic or more copies of these forms, call the ICLEI-U.S office at **510-844-0699**

completed by: _____ phone no.: _____ city/county: _____

Community Analysis Data Collection Form #1
Basic Information and Indicator Inputs

What data are you collecting and where can you get it?

Basic Year and Target Year – ICLEI suggests that you get started by choosing a base year and target year and collecting data for those years.

Indicator Inputs – The term indicator inputs refers to basic statistics about your jurisdiction, such as population, number of households, number of commercial employees, etc., that can help to provide additional perspective for your emissions analysis. These statistics are not required to calculate GHG emissions, but when provided enable the software to generate useful information such as "Energy use and CO_2e emitted per household and per capita" and "Energy use per sq. ft of commercial floor space". This information is especially helpful when presenting findings, writing the local Climate Action Plan and tracking progress. Your Planning Department, Chamber of Commerce and Building or Codes Departments will usually have this data.

GHG Coefficients for Electricity— Although electricity does not emit GHGs when it is used, there are significant GHG emissions at fossil fuel (coal, oil, and natural gas) power plants where it is generated. Under the CACP approach to quantifying GHG emissions, these power plant emissions are calculated based on end-use electricity consumption data using GHG coefficients for electricity. The software comes with a set of default electricity coefficients for 1990 through 2020 for each state. You may also try to find GHG coefficients specific to the electricity generated for use in your local jurisdiction. Your electric utility, public utility commissions or energy office should have this data.

Basic Information on Local Action Plan and Indicator Inputs

- Base Year for Community Emissions Analysis _____
- Target Year for Community Action Plan _____
- Community-wide Emissions Reduction Target _____%
- Your Jurisdiction's Electricity CO_2 Coefficients _____ tons of CO_2 per mil BTU
- Your Jurisdiction's Electricity N_2O Coefficients _____ tons of N_2O per mil BTU
- Your Jurisdiction's Electricity CH_4 Coefficients _____ tons of CH_4 per mil BTU

Find out these statistics for the year for which you're gathering data. Note that there are no indicator inputs for the waste and transportation sectors.

INDICATOR INPUTS	BASE YEAR	FORECAST YEAR
RESIDENTIAL SECTOR		
POPULATION IN BASE YEAR		
# OF HOUSEHOLDS		
COMMERCIAL SECTOR		
AREA OF COMMERCIAL FLOOR SPACE		
# EMPLOYEES IN COMMERCIAL SECTOR		
# COMMERCIAL ESTABLISHMENTS		
INDUSTRIAL SECTOR		
AREA OF INDUSTRIAL FLOOR SPACE		
# EMPLOYEES IN INDUSTRIAL SECTOR		
# INDUSTRIAL ESTABLISHMENTS		

completed by: _____ phone no.: _____ city/county: _____

Community Analysis Data Collection Form #2
Residential, Commercial, and Industrial Sectors

What data are we collecting?

Collect data on total electricity and fuel use in the residential, commercial, and industrial sectors for the base year and get estimates on how much electricity and fuel use will grow under business-as-usual conditions in these sectors by the target year.

Broad end-use information will be useful—e.g. 60% of residential energy use was used to heat pools, hot tubs and spas—as it will enable you to understand what activities are the main contributors to greenhouse gases in a particular sector. However, you are not expected to find out how total electricity and fuel use is broken down in detail—e.g. what % is attributed to refrigerators, hairdryers etc.

You may also ask for your jurisdiction's GHG coefficients for electricity—this represents the amount of GHGs emitted per unit of electricity used (see Data Collection Form #1 on Basic Information and Indicator Inputs). If you are unable to obtain this information, we can use the default provided in the software—be aware that the software average might be quite different from your jurisdiction's coefficient. When you find a GHG coefficient for electricity specific to your local jurisdiction later on, we can easily change the value in the software. The software will automatically update all GHG emissions values from electricity use.

Where can you get the data?

Most or all of the data you need about base year fuel and electricity consumption and projected growth in this consumption will be available from local fuel providers or utility companies, or in reports and summaries compiled by a local or state energy office, energy consultants, the planning department or public utility commission. A first step will be to identify and contact appropriate staff in these organizations and with their assistance, collect the required information. You might find difficulty in getting data for heating oil, for example since it is sold by private distributors. Focus on getting data for electricity and gas first. ICLEI staff can help you estimate figures for other fuel sources.

Units

Write down units and orders of magnitude for all data.

Keep good notes!

What defines each sector in your jurisdiction? Are apartment blocks of 100 units or more considered commercial or residential buildings? Are academic institutions commercial buildings? These distinctions can help pinpoint main GHG contributors within a sector and allow your jurisdiction to target GHG-reducing programs and policies accordingly. Also take note of data sources—from who and where you found data, including their contact information.

completed by: _____ phone no.: _____ city/county: _____

COMMUNITY ANALYSIS – RESIDENTIAL, COMMERCIAL AND INDUSTRIAL

ENERGY SOURCE / UNITS*	BASE YEAR		FORECAST YEAR**	
	Total amount used	**Unit**	**Total amount used**	**Unit**
RESIDENTIAL SECTOR				
Electricity (kWh, Gj, milBTU)				
Natural Gas (mmcF, therms, milBTU)				
Propane (mmcf, therms, milBTU)				
Biomethane (kWh,therms, milBTU)				
Fuelwood (tons, lbs)				
Solar (kWh, therms)				
Wind (kWh,therms, milBTU)				
Other fuels [specify]				
COMMERCIAL SECTOR				
Electricity (kWh, Gj, milBTU)				
Natural Gas (mmcf, therms, milBTU)				
Propane (mmcf, therms, milBTU)				
Biomethane (kWh,therms, milBTU)				
Fuelwood (tons, lbs)				
Solar (kWh, therms)				
Wind (kWh,therms, milBTU)				
Other fuels [specify]				
INDUSTRIAL SECTOR				
Electricity (kWh, Gj, milBTU)				
Natural Gas (mmcf, therms, milBTU)				
Propane (mmcf, therms, milBTU)				
Biomethane (kWh,therms, milBTU)				
Fuelwood (tons, lbs)				
Solar (kWh, therms)				
Wind (kWh,therms, milBTU)				
Other fuels [specify]				

*examples of commonly used units for a particular fleet

**The forecast is the projected % growth in electricity and fuel use from base year to forecast/target year. Use instruction on the next page as a guide to make projections

Notes, assumptions and resources

……
……
……
……

Forecasting growth in fuel and electricity use in your community

Utilities and planning departments often make projections for growth in community energy use. If you cannot obtain projection or forecast data, use the following questions to guide you in making estimates—What are your local planning agencies' projections on growth? What development plans are in the works? Are there new subdivisions or a new housing or commercial development? These could significantly increase future emissions. What changes are projected for commercial buildings and private residences? Which of these are likely to grow? Which will probably remain at the same level of emissions?

Identifying these trends will allow you to estimate the growth in GHG emissions between the base and target year. **For a mature built-up community in an urban area**, there may be little difference between the baseline and forecasted emissions. **For a young, growing community on the edge of an urban area**, emissions may increase in many sectors.

You can also make a first cut in estimating projections by adjusting baseline data in proportion to estimated growth or reduction in:

- **Household units for the residential sector,**
- **Commercial building floor area for the commercial sector, and**
- **Industrial sector employment for the industrial sector**

While data tables will support different growth rates for different fuel types, you may wish to assume the same growth factor for all fuels in the same sector.

Forecast Year 20 ____	Residential Sector	Commercial Sector	Industrial Sector
Projected % Growth	%	%	%

When entered in the software, the data on fuel and electricity consumption for the three sectors will show how much total energy was used in each sector (in mil BTUs). Furthermore, the software will convert this into quantities of GHGs emitted from each sector.

completed by: _____ phone no.: _____ city/county: _____

Community Analysis Data Collection Form #3
Transportation Sector

What data are you collecting?

The data collected on these forms will determine the baseline greenhouse gas emissions inventory and forecast for the transportation sector. Collect data on annual vehicle miles traveled (VMT) for different vehicle types in the base year and find out how much VMT is projected to grow by the target year under "business-as-usual" conditions. The CACP Software will convert this VMT data into amount of GHGs emitted by vehicles in your community during those years. You will also need estimates of the fuel economy (mpg) for each vehicle type—if you can't get fuel economy estimates, the software suggests default values (refer to "vehicle fuel efficiency" in Help Files). If you cannot get VMT data broken down by vehicle type for the base, get total community annual VMT for that year. If you cannot obtain any VMT numbers, go to Part 2 of this data collection form and gather the data described there.

Where can you get the data?

You can usually get annual VMT data from your **planning department, local transportation authority, or metropolitan planning organization.** Some state transportation offices also have the data asked for here.

Keep good notes!

Take note of data sources—where and who you found data from, including their contact information

Average fuel efficiency of vehicles in your community

- Personal Vehicles _____ mpg
- Commercial Vehicles _____ mpg
- Passenger Bus _____ mpg
- Rail Transit _____ mpg
- Unclassified (include motorcycles and mopeds) _____ mpg

The above data is useful, but default values based on national average data are provided in the Clean Air and Climate Protection software if needed.

COMMUNITY ANALYSIS–TRANSPORTATION INVENTORY

PART 1: Obtaining VMT data

- Gather data for the table below to derive total annual VMT in your jurisdiction in the base year for each vehicle and fuel type.
- If you are able to obtain total annual VMT for your community, but don't have VMT broken down by vehicle and fuel type, just fill out the "Total Annual VMT" column first. The CACP Software's Transportation Assistant contains default values and will estimate the vehicle type breakdown for you.
- If you have daily VMT data, multiply the daily VMT figure by 330 to get annual VMT (330 days account for lighter traffic on weekends and holidays.). If you don't have total VMT, go to Part 2 of this form.

Vehicle and Fuel type	Personal vehicle Annual VMT	Commercial annual VMT	Bus (Transit) Annual VMT	Rail (Transit) Annual VMT	Unclassified Annual (VMT)	Total Annual VMT
Baseline inventory _____ (year)						
Gasoline						
Diesel						
Propane						
CNG						
E85*						
M85**						
Electricity						
Biodiesel						
Any other fuel (specify)						
TOTAL						
Types of Fuel - Gasoline, diesel, Biodiesel(B-20), Biodiesel (B100), CNG, Diesel (ULSD), Ethanol (E-10), Ethanol (E-85), Ethanol (100), Ethanol Diesel, LPG, Methanol (M-85), Electricity (Grid Average),						
Vehicle names or group - Auto-Full size, Auto Sub-compact/Compact, Heavy Truck, Light Truck/SUV/Pickup, Marine Passenger Vehicle, Rail-Commuter, Transit Bus, Vanpool Van, CNG						

* E85 is a fuel source with 15% ethanol and 85% gasoline (a.k.a. gasohol)

** M85 is a fuel source with 15% methanol and 85% gasoline

Notes, assumptions and resources

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PART 2: If you are unable to obtain VMT data

If local or regional transportation authorities do not have VMT data, ask them for Annual Average Daily Traffic (AADT) data and miles of different types of roads in your jurisdiction instead. You can also get an estimate of miles of roads in your community by using a ruler and a map. To calculate VMT for the Base years:

- Enter the number of miles driven on each different road type in column 2.
- Enter the Average Annual Daily Traffic figure (AADT) for each road type in column 3.
- Multiply columns 2, 3, and 4 together, entering the results in column 5.
- Add everything up and enter the results at the bottom of each column to calculate your total VMT.

Road Type	Miles of Road*	AADT**	Conversion Factor ***	Annual VMT
Base year _____(year)				
Collectors/ Local Roads			330	
Limited Access Highways			330	
Major Arterial Streets			330	
Total				

* Miles refers to the total length of highways, streets, or roads in your community.

** AADT represents the average annual daily traffic (AADT) figure for each of these road types.

*** Conversion factor translates data from daily to annual figures. 330 days accounts for lighter traffic on weekends and holidays.

COMMUNITY ANALYSIS—TRANSPORTATION FORECAST

Local or metropolitan transportation authorities or your planning department can provide forecast data. If projections broken down by vehicle and fuel type are not available, an estimate of the Total VMT in the forecast year provides a good approximation of the quantity of GHG emissions likely to result from the transportation sector by that year. If your transportation planning department doesn't have this projection, you can use forecasts of average fuel consumption, population or employment growth to get a first estimate of VMT growth.

How much is Total VMT expected to grow by the target year? _____ %

Once this data is entered into the Transportation sector of the CACP Software, the software will calculate the total amount of energy used (in mil BTUs) and will translate this into total CO_2e emitted.

completed by: _____ phone no.: _____ city/county: _____

Community Analysis Data Collection Form #4

Waste Sector

What data are you collecting?

Global warming pollution from the waste sector comes primarily from methane (CH_4), which is formed from decomposition of waste buried in landfills. In order to estimate the amount of methane emitted from your jurisdiction's landfill for a base year and a forecast year, gather data on the waste stream composition and the tons of waste generated from your community and sent to landfill. You will also need to obtain some basic information about the landfill to which waste from your community is hauled.

In requesting tonnage data, consider only waste that was generated in your jurisdiction and sent to landfill, regardless of where the landfill is located. Data you obtain will probably include the residential and commercial sectors and exclude industrial wastes—that's fine as very little industrial organic waste ends up in a landfill.

Not all waste is sent to landfills. If you disposed of waste through an alternate method during the year that you are analyzing, record the amount of waste for each disposal method. You will enter each of these quantities into the software separately.

The Software offers the option of estimating greenhouse gas (GHG) impacts of landfilling waste in two ways. ICLEI recommends the Methane Commitment Method, but both are valid:

• **The Methane Commitment Method** calculates the methane emissions that will eventually occur as a result of solid waste that is produced and landfilled in the current (or active) year. This method has been developed for the CACP Software because it can quantify the benefits of "three R" (Reduce, Reuse, Recycle) programs found in most American cities. When applied to waste reduction, recycling, composing or incineration measures that reduce the amount of landfilled waste, the methane commitment method quantifies the amount of methane that will be avoided as a result of the waste diversion program and counts that total methane reduction as the total annual effect of the program.

• **The Waste-in-Place Method** calculates the methane emissions that will occur as a result of waste already accumulated in landfills, as opposed to the current year's generation of waste. This method is used in national and state inventories of GHG emissions. This method calculates emissions based on the amount of waste in the landfill minus the amount of gas recovered. While not particularly sensitive to "three R" (Reduce, Reuse, Recycle) programs, the waste-in-place method is appropriate for estimating the amount of landfill gas available for flaring, heat recovery or power generation projects.

Where can you obtain the data?

Contact your local solid waste management department or recycling coordinator to obtain this data. The operator of the landfill where your jurisdiction's waste is taken may also have this data.

COMMUNITY ANALYSIS—WASTE INVENTORY

Methane Commitment Method

Tons of waste sent to landfill

How many total tons of solid waste generated from your community was sent to landfill during your chosen base year?

Base Year Landfilled Waste = _____ tons (landfilled waste only)

Waste stream composition data

Find out the composition breakdown of the total tons of waste landfilled in a given year. How many tons is food waste? How many tons or what percentage is paper products? You can either find out waste stream composition in tons or in percentage—total should equal 100%.

Waste Type	Base year	
	Tons of Waste to Landfill	% of Total Waste
Paper Products		
Food Waste		
Plant Debris		
Wood, Furniture, textiles		
All Other Wastes		
Total		100%

Waste composition varies from one community to the next, and you should endeavor to use values appropriate for your own community. If you cannot get local information, here are some values that are typical of U.S. waste streams and can be used as defaults:

Waste type	*% of total waste*
Paper Products	38%
Food Waste	13%
Plant Debris	10%
Wood and Textiles	4%
All Other Waste	35%

Methane recovery and indicator inputs

Is there recovery at the landfill where your local government waste is taken? __yes ___no

What is the estimated efficiency of the recovery? ___% ___unknown

Notes, assumptions and resources

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Other methods of community waste disposal in base year

Type of waste facility	Tons of waste	Composition of waste	
		Type of waste	Tons or Percent of Waste [specify]
Compost		Yard waste	
		Food waste	
		Other types of waste (list below)	
Recycling		Aluminium	
		Cardboard	
		Glass	
		Paper (mix)	
		Plastic	
		Steel	
		Wood	
		Phone Books, Magazines, Textbooks	
		Fiberboard	
Incineration		Paper Products	
		Food Waste	
		Plant Debris	
		Wood, Furniture, textiles	
		All Other Wastes	

COMMUNITY ANALYSIS—WASTE FORECAST

What is the projected percent growth in quantity of waste going to landfill from the base to the forecast/target year? If you are unable to obtain this projection, you may use a population growth projection instead.

Projected growth in waste from Base Year_____ to Target Year 20_____ : _____ %

completed by: _____ phone no.: _____ city/county: _____

Community Analysis Data Collection Form #5

Other Emissions Sources

This data collection form enables you to keep track of greenhouse gas (GHG) emissions not covered by the other data collection forms. Unlike the other data forms, inputs are not based on energy or waste data, but should be entered **as an amount of greenhouse gases emitted.** These inputs can be entered in the "Other" sector of the Community Analysis module of the software.

Direct Emissions of Greenhouse Gases from the Community			
Description of Emission Source	Greenhouse Gas Emitted	Quantity (indicate units)	
		Base Year	Target Year

Usually there will only be one gas emitted from a particular source, but in cases where more than one gas is emitted by a single source, use one row for each gas emitted. As with all data inputs, always note the UNITS and order of magnitude of each input.

The following GHGs are included in the "Other" sector of the CACP Software:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- HFC-23
- HFC-125
- HFC-134a
- HFC-152a
- Perfluoromethane (CF_4)
- Perfluoroethane (C_2F_6)
- Sulphur Hexafluoride (SF_6)
- Nitrogen Oxides
- Sulphur Oxides
- Carbon Monoxide
- Volatile Organic Compounds
- Particulate Matter

Data Collection Forms

Local Government GHG Analysis
Baseline Inventory and Forecast

Included here are all the data collection forms needed for completing the greenhouse gas (GHG) emissions analysis for local government (called **"Government"** in the Software) facilities and operations. This set of forms is broken down by sector and each form covers both the **baseline inventory and forecast.**

There are four data collection forms, one each for:

1. Buildings, Facilities, and Operations
2. Vehicle Fleet
3. Waste from Local Government Operations
4. Other Emission Sources

Use these data collection forms when you're calling the utility, transportation or planning department, solid waste staff or landfill operator for data. Complete the forms and transfer data from the forms directly into the Clean Air & Climate Protection (CACP) Software. The tables in the forms mirror the tables in the Software. Once waste, electricity and fuel use data is entered, the software will do the conversions necessary to determine actual and projected GHG emissions from local government facilities and operations.

Paving the way

A good way to facilitate the inventory process is to send out a notice informing relevant staff and departments that you will be calling on them for help in collecting the data you need. Sending out a notice is also a good way of informing key players of the project, inviting them to participate and suggesting how Cities for Climate Protection (CCP) campaign activities may complement their own work.

Important: Keep good notes!

Keep good notes and records throughout the emissions analysis, such as:

- Contact information of data sources and date you received the data
- Assumptions in deriving baseline and forecast figures
- Reports and conversations you came across that helped in the analysis

A good place to store such information is in the "Notes" windows in the software—this way anyone who looks at the emissions analysis at a later time will know where the original data came from and what assumptions were made along the way.

Note—If you need electronic or more copies of these forms, call the ICLEI-U.S office at **(510) 844-0699**

Basic Information

- Government Base Year for Emissions Analysis : _____
- Government Target Year for Local Action Plan: _____
- Government Emissions Reduction Target : _____ %

completed by: _____ phone no.: _____ city/county: _____

Government Analysis Data Collection Form #1
Buildings, Facilities and Operations

What data are we collecting?

Collect data on the amount of **electricity and fuel used by local government operations and facilities** for the government base year. Find out if there are plans to expand these buildings or build new facilities by the government target year. Fill out the following forms, making sure to include all facilities and operations owned/managed by your local government—including street lighting, parks, water and sewage facilities, auditoriums, stadiums and recreation facilities, buildings at solid waste/recycling sites, etc.

Note that the government base and target years do not have to be the same as the community base and target years. The benefit of performing the Government inventory is that it provides a more detailed picture than the community inventory, as it attributes specific amounts of GHG emissions to each city or county facility and operation. This information can be used to identify and target main GHG producers within local government-owned and run facilities, improve the efficiency of these buildings and operations, and set an example to the rest of the community.

Where can we get the data?

Get the information you need either from **in-house financial records, utility bills, appropriate reports or studies.** These will typically be available from building managers, facility operators, departments that pay for electricity bills, or from your local utility company. In looking at utility bills for cost data, remember that you are focusing on costs of electricity and fuel used (number of BTUs or kWh), not add-ons like state and local taxes. In addition to energy consumption, the software accepts inputs on associated fuel and electricity costs. Although it is not needed to compute greenhouse gas emissions, we recommend you input this cost information. It will allow you to track costs as well as emissions, which may prove useful as you develop, promote, and implement the local climate action plan.

Before you begin gathering data …

Before you begin gathering data, make a list of facilities and operations owned or managed by your local government. Use the list below to get started on the inventory process. Your jurisdiction may operate other facilities not included here.

BUILDINGS AND FACILITIES	OPERATIONS
City or county buildings	Water supply
Police and fire departments	Sewage treatment facilities
Stadiums, swimming pools	Pumping stations
Parks, recreation centers	Other heavy equipment facilities
Libraries, hospital, clinics	Street lighting systems
Parking garages	
Schools and public housing	

It is best to get specific data on individual buildings or facilities, but it's OK if you cannot get data broken down to that level—you can still perform your emissions analysis by grouping buildings or facilities together (e.g. all swimming pools). Do not forget to indicate the unit that applies to the energy inputs and enter the total cost of fuel or electricity, if you have the data. The CACP Software automatically converts your inputs on fuel and electricity use into greenhouse gas emissions, taking into account the appropriate coefficients for each fuel.

completed by: _____ phone no.: _____ city/county: _____

GOVERNMENT ANALYSIS – BUILDINGS AND FACILITIES INVENTORY AND FORECAST

NAME OF BUILDING OR FACILITY AND ACCOUNT #	ELECTRICITY OR FUEL SOURCE	TOTAL ELECTRICITY OR FUEL USE/units		TOTAL COST/$ (Optional)		INDICATOR INPUTS AND NOTES (Optional)		
		Actual Use Base Year _____	Projected Use Target Yr. 20___	Base Yr. Cost	Target Yr. Projected Cost	Annual Operating Hours	No. of Occupants	Floor Area (sq. ft.)
	Electricity KWh, GJ, mmBTU							
	Light Fuel Oil gallons							
	Stationary Diesel gallons							
	Natural Gas mmcF, therms, mmBTU							
	Propane mmcF, therms, mmBTU							
	Biomethane KWh, therms, mmBTU							
	Solar KWh, therms							
	Wind KWh, therms							
	Other fuels [specify]							
	Electricity KWh, GJ, mmBTU							
	Light Fuel Oil gallons							
	Stationary Diesel gallons							
	Natural Gas mmcF, therms, mmBTU							
	Propane mmcF, therms, mmBTU							
	Biomethane KWh, therms, mmBTU							
	Solar KWh, therms							
	Wind KWh, therms							
	Other fuels [specify]							

*Make as many copies of this table as you'll need to account for all local government buildings, facilities and operations.

**Shaded columns represent optional inputs.

Notes, Assumptions and Data Sources

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completed by: _____ phone no.: _____ city/county: _____

GOVERNMENT ANALYSIS—OPERATIONS INVENTORY AND FORECAST

STREETLIGHTS—Streetlights, traffic signals, parks and recreation lights, others

NAME OF ITEM OR OPERATION	ELECTRICITY OR FUEL SOURCE	TOTAL ENERGY USE/units				COST/$ (optional)		INDICATOR INPUTS (optional) [# lights]
		Actual Use in Base Yr.		Projected for Target Yr.		Base Yr. Cost	Target Yr. Projected Cost	
			units		units			

*Shaded columns represent optional inputs.

WATER/SEWAGE—Sewage lift station, sewage treatment, water pumping, water treatment

NAME OF ITEM OR OPERATION	ELECTRICITY OR FUEL SOURCE	TOTAL ENERGY USE/units				COST/$ (optional)		INDICATOR INPUTS (optional) [output/1000 gallons]
		Actual Use in Base Yr.		Projected for Target Yr.		Base Yr. Cost	Target Yr. Projected Cost	
			units		units			

*Shaded columns represent optional inputs.

Notes, Assumptions and Data Sources

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completed by: _____ phone no.: _____ city/county: _____

Government Analysis Data Collection Form #2
Vehicle Fleet

What data are you collecting?

Collect fuel consumption data for the various **motor vehicles and heavy equipment used by your local government's fleet** in the base year and projected fuel consumption in the target year. Types of vehicles include cars, light vans and trucks, heavy trucks, specialized heavy equipment, police vehicles, motorcycles, and marine/air vehicles.

Where do you find the data?

Get this information through **fuel purchase records or fuel use reports** from your municipal energy office, transportation or fleet managers, public works department, or finance department. You can get a quick start by entering a single line for the fuel consumption of your entire municipal fleet, then add details later.

NAME OF DEPARTMENT	VEHICLE TYPE	FUEL USED Gasoline, Diesel, Other (specify)			COST/$ (optional)	INDICATOR INPUTS (optional)	
		Fuel Type	Actual Use in Base Yr.	Units		No. of Vehicles	Total Annual VMT
Inventory – Base Year ____							
Inventory – Forecast Year _____							
			Projected Fuel Used		Projected Cost		

*Make as many copies of this table as you'll need to account for all local government departments, equipment and vehicles.

**Shaded columns represent optional inputs.

Notes, Assumptions and Data Sources

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completed by: _____ phone no.: _____ city/county: _____

Government Analysis Data Collection Form #3
Local Government Waste

What data are you collecting and where can you find the data?

Waste counted here should include **waste that was generated at the facilities** operated by your local government and sent to landfill. Your **solid waste manager, landfill operator** or **refuse hauler** might have this data.

Waste tonnage and waste stream composition

How many tons of solid waste were or will be generated by local government operations—office buildings, stadiums, parks, etc. during the:

- **Base Year** _____**:** _____**tons** (Consider landfilled waste only)
- **Target Year** **20**____**:** _____**tons**

For the solid waste estimated above, what is the percent breakdown by type of waste, using the categories in the following table. The second column for "tons" is optional; if you have the data in tons you can fill out this column and then calculate the percentage breakdown needed for inputting into the software.

WASTE TYPE	TONS OF WASTE TO LANDFILL	% OF TOTAL WASTE
Paper Products		
Food Waste		
Plant Debris		
Wood, Furniture, Textiles		
All Other Waste		
TOTAL		**100%**

Methane recovery and indicator inputs

- Is there methane recovery at the landfill where your local government waste is taken? ☐ **yes** ☐ **no**
- What is the estimated efficiency of the recovery? _____ % ☐ **unknown**
- Number of local government employees in Base Year _____
- Number of local government employees in Target Year _____
- Cost of waste disposal (hauling and tipping) in Base Year **$**_____
- Cost of waste disposal (hauling and tipping) in Target Year **$**_____

Notes, Assumptions and Data Sources

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completed by: _____ phone no.: _____ city/county: _____

Government Analysis Data Collection Form #4
Other Emissions Sources

This data collection form enables you to keep track of greenhouse gas (GHG) emissions not covered by the other data collection forms. Unlike the other data forms, inputs are not based on energy or waste data, but simply **on the amounts of GHGs emitted.** These inputs can be entered in the "Other" sector of the Government Analysis module of the software.

DIRECT EMISSIONS OF GREENHOUSE GASES FROM LOCAL GOVERNMENT FACILITIES AND OPERATIONS			
Description of Emission Source	**Greenhouse Gas Emitted**	**Quantity** (indicate units)	
		Base Year	**Target Year**

Usually there will only be one gas emitted from a particular source, but in cases where more than one gas is emitted by a single source, use one row for each gas emitted. As with all data inputs, always note the UNITS and order of magnitude of each input.

The following GHGs are included in the "Other" sector of the CACP software:

Carbon dioxide (CO_2)
Methane (CH_4)
Nitrous oxide (N_2O)
HFC-23
HFC-125
HFC-134a
HFC-152a
Perfluoromethane (CF_4)
Perfluoroethane (C_2F_6)
Sulphur Hexafluoride (SF_6)