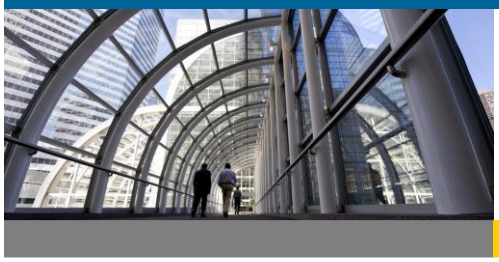


STEP 4: ASSESS THE CURRENT ENERGY PROFILE

WHAT: An energy profile maps out a jurisdiction's present energy landscape, including:

- Current and projected future energy use and supply data;
- An inventory of existing energy-related activities, projects, programs, and policies; and
- Information on available human and organizational resources to help implement a CESP.

A summary of findings and conclusions from this assessment, along with sections on the outcomes from previous steps, will be published as an Energy Profile.

WHY: In order to develop a CESP that will achieve the energy vision articulated during Step 3, you need to know where you are. The goals, strategies, and actions to be identified in later steps will be most effective if they are informed by and built on current energy use data and the existing organizational and policy framework. This will ensure that the plan is focused on true gaps and/or needs and that the actions identified are attainable. The current situation will also serve as the baseline for measuring future progress.

WHO: This step will be led by the Plan Manager and Leadership Team. Unless the planning effort is very small, the Team will likely need to identify and recruit additional internal or external expertise to help gather and analyze the necessary data (see discussion below).

HOW: To describe the energy framework, the Leadership Team will need to:

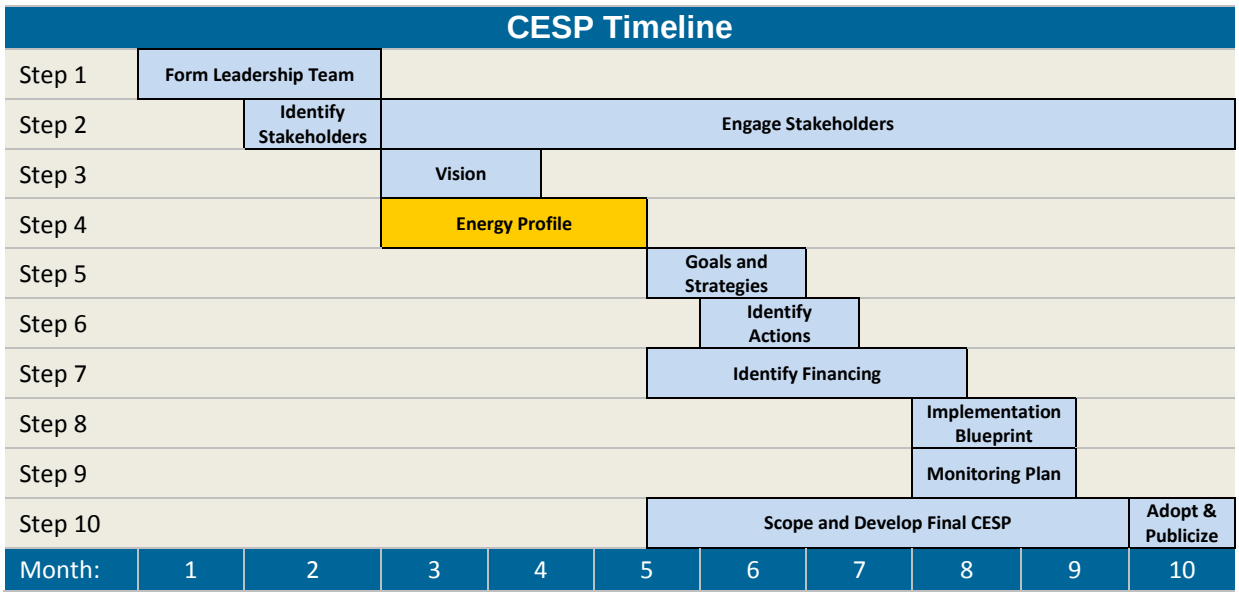
- Develop the Scope and Recruit Expertise for the Energy Profile Work
- Assess Current Energy Use and Supply
- Identify Potential Future Energy Supply
- Inventory Current Local, State, Regional, and Utility Policies, Plans, Projects, and Programs
- Identify Available Human and Organizational Resources
- Organize and Communicate Findings

WHEN: Develop the energy profile at the beginning of the CESP process, before setting goals and identifying strategies and actions. This step can be accomplished in as little as a few weeks or take up to several months, depending on the scope of the plan and profile and size of the jurisdiction. To avoid a major time lag for this step, the Plan Manager and Team can start identifying resources and gathering information for the profile early on, in parallel with Steps 1-3.

Develop the Scope and Recruit Expertise for the Energy Profile Work

Define the Scope of the Profile

Determine the level of detail for this inventory up front. Detailed information is useful, but is not always necessary for some levels of decision making. Receiving additional information often involves additional costs and more data collection and/or estimation tasks. Therefore, more-detailed information on energy use should be acquired only if it adds real value to the decision-making process.



A high-level approach to an energy inventory builds from the top and provides an overall idea of total energy use and a good understanding of policies and available resources.

- This type of analysis usually aggregates information on energy consumption by end-use departments or sectors. For example, energy consumption can be categorized into sectors such as residential, commercial, transportation, and agricultural.
- Examples:
  - **Local government CESP** – one year of data for total energy use based on billing analysis and broken out by departments or management groups;
  - **Community-wide CESP** – one year of data for total energy use by sector based on utility annual report overview; simple transportation overview.
- Value of a high-level approach:
  - Largest areas of opportunity and saving will be evident.
  - Will illustrate commonalities – can identify similar cities who many have already implemented their plans and can offer some lessons learned.
  - Easy and inexpensive to update every year – gives a useful picture for ongoing monitoring.
  - Will take less time and expertise to undertake.
- Drawback: less useful as a specific management tool for focused activities such as building energy management.

A detailed analysis collects very specific information at the building (or facility) or even equipment level. It might include: building energy modeling; extensive stakeholder interviews; and information from multiple years.

- This type of analysis breaks information on energy consumption down into sub-sectors – such as by building type, transportation sector, or even by end use (lighting, HVAC, etc.); employs detailed analytical tools and technical expertise.
- Examples:
  - **Local government CESP** – include extensive benchmarking for buildings and facilities; undertake more-complex transportation analyses.
  - **Community-wide CESP** – break out energy use by building or economic type within sectors.
- Value of a more-detailed approach:

  - Provides facility-level information to target specific projects to include in the plan; provides more granular benchmarks to track progress and verify savings.
  - Identifies market segments for targeted community programs.
- Drawback: More expensive and time-intensive to undertake.

A **mixed approach** is often appropriate – do high-level reviews for most areas, with detail analyses for sectors that are sure to be included; or defer detailed analyses like benchmarking or targeted community sector analyses until policies, programs, or projects that will need close monitoring have been identified.

Identify and Recruit Expertise

The Leadership Team should establish a task force, research team, or subcommittee charged with developing the profile. This task force will be overseen by the Leadership Team and managed by either the Project Manager or another leader identified as part of the group. For a large plan, different components of the profile (see sections below) will benefit from different work groups with specific expertise.

Depending on the amount and specificity of the information needed to develop the energy profile, recruiting additional expertise to participate on the task force and assist in the work will be helpful. Look in the following places for help:

- For a local government CESP:
  - Representative from the jurisdiction's Department of Public Works (DPW) or facilities manager – they will help find information or provide referrals
  - Analyst with computation skills to help compile and analyze the data
  - Employees with financial information – from budget or finance department
  - The task force may need reach out to other stakeholders for additional information, so be sure to have someone in the group who is familiar with all government offices and expertise. Help from the local utility companies will be particularly beneficial, as they will provide much of the energy use data as well as information on forecasts, programs, and policy.
- For a **community-wide CESP**: in addition to the above, be sure to have committee members with the right expertise and/or connections to:
  - Electric and gas utilities.
  - Large energy consumers (or business groups such as trade associations, Chamber of Commerce).
  - Institutions (e.g., higher education organizations, large office complexes, hospitals).
  - Broad community interests.

This information-gathering effort can draw from a very broad set of participants if plan is extensive – For example, the City of Knoxville, Tennessee, acknowledged the following groups as assisting with the development of its energy inventory and report:

> *"…Staff from each department within Knoxville City Government, the Energy & Sustainability Task Force, Knoxville Utilities Board, the Tennessee Valley Authority, Knox County, the Public Building Authority, the Metropolitan Planning Commission, Knoxville Area Transit, the Transportation Planning Organization, Chestnut Ridge Landfill, Lenoir City Utilities Board, Southern Management Group, and East Tennessee AAA."*

This step will require substantial effort. When appropriate:

- Look for pro bono help with analysis from local stakeholders (interns or college/ university expertise).
- Use this part of the project as a professional development opportunity for one of the local government's financial analysts or junior engineers.
- Hire consultants in cooperation with surrounding communities..

Assess Current Energy Use and Supply

One of the most important parts of the energy profile is a clear assessment of what kind of energy is used and how it is used within the jurisdiction. In order to develop a CESP that will achieve the energy vision articulated during Step 3, it is important to know where the community is now. Then goals, strategies, and actions to be identified in later steps can be informed by and built on the current energy use and supply data. This will ensure that the plan is focused on true gaps and/or needs and that the actions identified are attainable. Gathering and evaluating this information also provides a baseline for measuring future progress. The information below is provided as guidance on what information to collect, where it can be found, and how it can be aggregated.

Data Sources for Information on Current Energy Use (Baseline)

High-level Information – Government Buildings

- Ask the Department of Public Works (DPW) or Finance Manager for a summary of the past year's fuel and utility bills for all of the local government's buildings, along with building size information, and calculate energy use per square foot. If energy bill management is more decentralized your jurisdiction, you may need to work with individual departments or your local utility to obtain this information.
- Convert various fuel usage data to a standard unit (typically Btu) to compare across type.
- Relevant metrics are provided in the table below. It is often appropriate to standardize use and cost by building or department, as budget authority will be at this level.
- Aggregate into collections of buildings, departments, campuses, etc. if they will be managed together.

Metric	Electricity	Natural Gas	Heating Oil	Propane/Other (Wood, etc.)
Cost	$/Yr	$/Yr	$/Yr	$/Yr
Energy Use	kWh/Yr	Therms/Yr	Gallons/Yr	Gallons/Yr
Conversion	Convert to MMBtu	Convert to MMBtu	Convert to MMBtu	Convert to MMBtu
Building Area	Total sq ft	Total sq ft	Total sq ft	Total sq ft
Standardized Use	MMBtu/sq ft	MMBtu/sq ft	MMBtu/sq ft	MMBtu/sq ft
Standardized Cost	$/sq ft	$/sq ft	$/sq ft	$/sq ft

High-level Information – Other Government Facilities and Infrastructure (Wastewater, Streetlights, Landfill, etc.)

- Ask the DPW Manager what other functions the local government has that consume energy resources, such as wastewater, streetlights, landfills, etc.; if necessary, ask for a referral who can help provide information on the past year's usage.
- Collect the same information as for buildings – calculate energy use per facility or department.

High-level Information – Government Vehicle Fleet and Other Transportation

- Ask the DPW for the past year's diesel consumption, gasoline consumption, and miles traveled for the local government's fleet vehicles, and calculate the fleet average miles per gallon. Be sure to include off-road vehicles, such as snow plows, mowers, etc.
- Relevant metrics are provided in the table below. It is often appropriate to standardize use and cost by department.
- Aggregate into collections of vehicles or equipment if they will be managed together – by department or other budget-line division.

Metric	Diesel	Gasoline	Natural Gas
Cost	$/Yr	$/Yr	$/Yr
Volume	Gallons/Yr	Gallons/Yr	Gallons/Yr
Distance	Miles/Yr	Miles/Yr	Miles/Yr
Standardized Use	Miles/Gallon	Miles/Gallon	Miles/Gallon

High-level Information – Broader Community Buildings

- Ask the DPW Manager or finance department to provide a referral to the local government's key account manager(s) for the local utility(s). Ask these account managers for the past year's energy usage for the jurisdiction's zip code(s) by market sector – residential, commercial, institutional, and industrial.
- Collect census information from local government offices or the U.S. Census Bureau Fact Finder to search for specific local information. (http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml)
- Ask appropriate stakeholders for additional data they think will be helpful – commercial or institutional facility managers; school district financial officers; large industrial users' trade association; renewable energy vendors; homebuilders. Information on heating oil, propane, and other fuels will come from fuel dealers' trade associations.
- Relevant metrics: collect the same metrics as for government buildings if possible.
- When appropriate, aggregate by sector – residential, commercial, institutional, and industrial. Pull out information on specific businesses or institutions, etc., if they will have separate targets set as part of the plan.
- Per capita information will be useful in some instances: for example, comparing energy use in low-income vs. non-low-income residences.
- Parcel-level data are also very helpful here. From U.S. Energy Information Administration (EIA) information (see below), it is possible to put together a profile of the types of properties that would most benefit from energy efficiency, and then parcel-level data can show the prevalence of these property types within a certain jurisdiction.

High-level Information – Broader Community Transportation

- Check with the city and state's transportation departments and any Regional Planning Associations for recommendations on data sources and appropriate questions to answer.
- Three broad variables are related to transportation energy use:
  - Number and efficiency of vehicles – check with the state Department of Transportation.
  - Transportation fuels (consumption and cost) – check with the State Energy Office.
  - Travel behavior (vehicle miles traveled (total and per household), choice of transportation mode, etc.).
- These resources are also often useful:

- U.S. Census Transportation Planning Products (www.fhwa.dot.gov/planning/census_issues/ctpp/)
- National Cooperative Highway Research Program (NCHRP) (www.trb.org/NCHRP/NCHRP.aspx)
- Center for Neighborhood Technology Housing and Transportation Index (http://htaindex.cnt.org/)

Other Sources for High-level Information on Energy Use

- Regional Planning Associations
- State Energy Office and/or Public Utilities Commission: information by local area
- EIA:
  - State Energy Profiles – national, state, and limited local electricity data on production, consumption, cost, and expenditures (www.eia.gov/state/)
  - Building-specific energy information – summaries of typical building categories (residential, commercial) and the types of energy they use (www.eia.gov/consumption/residential/, www.eia.gov/emeu/cbecs/)
  - Petroleum section - national, state, and limited local fuel data on production, consumption, cost, and expenditures (www.eia.gov/petroleum/)

Compile this information together for decision support analysis and communication. The **Energy Data Calculation and Summary Tool** at the end of this chapter offers a worksheet for collection of summary energy use information across sectors and prepares simple pie charts to illustrate relative contributions to total energy use.

To identify additional trends over time, consider going back further and gathering data from previous years as well. Looking ahead, once the CESP has been completed, plan to perform this kind of high-level review on an annual basis to track changes over time. This may be incorporated into your monitoring plan discussed in Step 9.

Detailed Assessment Example – Energy Benchmarking for Government Buildings

Developing benchmarking information for local government buildings defines the current level of energy use at a detailed level. Energy and financial savings from individual projects are hard to detect in aggregated data – benchmarking can establish the appropriate level of detail necessary to identify impacts and compare similar buildings. Benchmarking also:

- Facilitates energy accounting.
- Provides a baseline to use when assessing future success.
- Provides a standardized level to use in comparing a facility's energy use to similar facilities in order to assess opportunities for improvement. For example, buildings or fleets that score low during the benchmarking process can make excellent initial projects that are sometimes quick and often very cost-effective.
- Delivers useful data for quantifying and verifying energy savings.
- Assists in continuous energy management practices by tracking energy use on an ongoing basis.

The following tips will help in benchmarking government buildings:

- Ask the Department of Public Works (DPW) or Finance Manager for energy fuel use data (such as utility bill information) for each government building along with building size information. If energy bill management is more decentralized in your organization, you may need to work with individual departments or your local utility to obtain this information.
- Work with personnel such as IT staff, office managers, or facility mangers to collect building operating characteristic data.

- Convert various fuel usage data to a standard unit (typically Btu). Calculate the energy use intensity per square foot. These steps can be done with the aid of the **Energy Data Calculation and Summary Tool** and/or a benchmarking tool such as ENERGY STAR Portfolio Manager.
- Track the energy use for all fuel types at each facility and update for continued energy monitoring and analysis.
- Coordinate with the energy profile task force to ensure all facilities are accurately defined and the associated meter data is collected. Delegate data collection tasks as necessary.

There are excellent publicly available tools to assist with benchmarking efforts.

- U.S. Environmental Protection Agency's (EPA) Portfolio Manager – a free tool and set of extensive resources designed to help with:
  - Rating building energy performance.
  - Comparing across portfolios of buildings.
  - Setting investment priorities.
  - Verifying and tracking progress of improvement projects.
  - Gaining EPA recognition for superior energy performance.

Find more information at: www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

- Other places to find benchmarking resources and tools include:
  - Lawrence Berkley National Lab – http://energybenchmarking.lbl.gov, including Energy IQ – http://energyiq.lbl.gov.
  - Seek out colleagues in other cities or within the American Public Works Association.

While individual building benchmarking has these obvious advantages and is a practice encouraged for internal energy management, it can be more expensive and time consuming to undertake if it is not currently being implemented in across government facilities. Planners often decide it is more efficient to defer benchmarking until the CESP identifies areas for this level of concentrated focus.

Data Sources for Information on Current Energy Supply

Energy vision statements often include aspirations to move toward a more sustainable energy mix. In order to assess the potential for more renewable energy development, achieve cost savings from different fuel sources, enhance fuel source and cost stability, and realize greenhouse gas reductions, it is important to know where current energy comes from. Understanding the associated costs, risks, and benefits of various energy sources can help prioritize areas of improvement and investment.

Identify **energy sources currently available** and information about **costs, advantages, and problems** with these sources. Potential **sources for current energy supply** information include:

- Ask your jurisdiction's electric utility key account manager for the most recent year's report on the source of their fuel supply.
- Regulated energy (electricity, natural gas) – ask utility companies and the State Energy Office for the most recent information on generation, loads, rates, and any issues with current or future system reliability.
- Unregulated heating fuels – interview local fuel dealers or collect information from fuel dealers' associations; contact the state's department of forestry for wood-product fuels.
- Local energy generation from renewable energy – gather information from utility companies, the State Energy Office, and local renewable energy dealers and associations.
- Transportation fuel sources – check with the State Energy Office and Department of Transportation.
- EIA web site – the State Energy Data System (SEDS) has good summary information that can serve as a proxy for more-local data. www.eia.gov/state/seds/

When collecting data by interview, be sure to ask about costs, advantages, and problems with these energy sources. Assess whether the current supply mix **fits with the CESP vision**.

Identify Potential Future Energy Supply

Identify where energy will come from in the future in order to better understand the future energy mix and assess the potential for renewable sources as an option. Assess whether this potential future supply mix **fits with the vision**.

Potential **data sources** for **future energy supply** forecasts – these will be high-level estimates:

- Ask the local electric utility for their long-term forecast of electricity requirements and the types of power plants (and fuels) expected to provide energy.
- Ask the local gas utility for their long-term forecast of natural gas requirements and the source (supply basin) where the gas is produced.
- Contact the Transportation Authority and/or State Highway Department and ask for their long-term forecast of vehicle miles traveled, average vehicle efficiency trends, and fuel source trends.
- Review your state's most-recent energy plan.

Inventory Current Local, State, Regional, and Utility Policies, Plans, Projects, and Programs

Patterns of energy use are molded by current policies, programs, and projects in the local jurisdiction, as well as by other plans already in place. Becoming familiar with this landscape allows a more comprehensive understanding of these factors and helps identify ways to shape energy use in the future.

Compile an inventory of existing government (local, regional, and state), community, and utility activities. An **Inventory of Existing Energy Activities Template** has been included at the end of this chapter to assist you with this. **Data sources** for **energy policy, program, and project** information and **other jurisdictional plans** will include:

- Local government sources:
  - Planning Department
  - Department of Public Works and Department of Transportation
  - Mayor's Office
  - City/County Attorney
  - City Council/ Select Board/ County Commissioners
  - Budget and procurement offices
- Regional- or state-level sources:
  - Regional energy efficiency organizations
  - Regional planning entities
  - State energy office
  - State transportation office
  - State public utilities commission
  - State office of consumer advocate and/or people's counsel
- Utility programs and incentives: Contact local utilities or energy efficiency and renewable energy program administrators to find information on current program offerings. Ask about the participation and impact of these programs, challenges, and plans for the future.

- Broad policy databases:
  - Database of State Incentives for Renewables and Efficiency – DSIRE provides extensive listings of state, regional, and local policies and programs for energy efficiency and renewable energy (www.dsireusa.org)
  - ACEEE's State Energy Efficiency Policy Database (www.aceee.org/sector/state-policy)
  - DOE's Alternative Fuels Data Center – provides state-by-state information for transportation incentive, laws, prices, and infrastructure location (www.afdc.energy.gov/states/)
- Other stakeholders – At every stakeholder interview or meeting, ask about energy-related activities, projects, policies and programs that already exist: How did they come to be and what is their history and reputation?

Identify Available Human and Organizational Resources

Developing a good understanding of who does what within the jurisdiction will help identify current activities that affect energy use and recruit help to define and implement CESP activities going forward. The objective is to identify those people and organizations that will become local champions of the CESP vision and contribute to its success, as well as to understand challenges that may arise so they can be addressed.

Use the following strategies to gather stakeholder input on available **human and organizational resources.**

- Ask at every stakeholder interview or meeting for information on what they can contribute.
  - Solicit specialized expertise from stakeholders – especially from government department heads or staff who are focusing on energy improvements: individuals, elected officials, or organizations that bring appreciable skills and perspectives.
  - Be sure to assess resources from non-energy-related local government departments – they may have instituted activities that complement the CESP.
    - Housing and Urban Development Office – for example, using ENERGY STAR in buildings
    - Zoning and Permitting Office
    - Planning Office
- Ask for help from organizations with parallel interests – take advantage of potential common interests driven by complementary goals. For example:
  - Non-profit organizations
  - Local weatherization agencies
  - Economic development organizations
  - Private sector organizations (e.g., energy service companies, third party providers, lenders)
  - Utility-administered energy efficiency programs
- Identify relevant resources from local schools, colleges, and universities – for example: student researchers and interns to assist with appropriate tasks; relevant research (such as transportation research).

As the Leadership Team begins to shape ideas for the plan, it is useful to think about the internal and external factors that are favorable and unfavorable to achieving the goals that will be set. It can be worthwhile at this stage to undertake a **SWOT analysis** – a planning exercise intended to identify internal and external factors that will enable or inhibit successful execution of CESP initiatives.

Using the **CESP SWOT Analysis Worksheet** at the end of this chapter, meet with the Leadership Team and stakeholders who will have useful insights, to identify:

- **Strengths** – existing resources that can be used to attain the vision, including: tangible resources (stable funding, a community organization in place to drive transportation improvements, an effective energy tracking system) or intangibles (leadership or community mindset).
- **Weaknesses** – barriers or constraints that must be addressed to move the plan forward, including small obstacles (limitations on project development from cumbersome permitting processes) as well as obvious disadvantages (limited funding).
- **Opportunities** – external trends, conditions, or events that can be leveraged to support the plan initiatives, such as opportunities for federal funding, or rapidly lowering prices for solar systems.
- **Threats** – external challenges that might impede or limit implementation, such as protracted economic downturn or reduced utility financial support for EE projects.

Pull together a summary of what the SWOT analysis indicated, including highlights of strengths and opportunities, as well as ideas for overcoming opposition. Include this information in the conversation as goals are developed (Step 5).

Organize and Communicate Findings

The information collected during the assessment will inform goal and strategy setting (Step 5), as well as the identification of actions for the CESP (Step 6). High-level findings make an effective first cut as areas for goal development – current success stories can be replicated, and clear trouble spots are opportunities for improvement. The findings will also provide clear information for the public about the current situation and be useful in engaging them in future steps.

While the energy profile results will become a key part of a broader CESP final report (Step 10), publishing a summary of findings and conclusions from this work into an Energy Profile at this stage has several advantages. As noted, this is important information to provide at goal-setting meetings – so a preliminary profile report specifically for use in setting goals and establishing actions for the CESP is a good idea. In addition, if the CESP process will take an extended period of time, providing this information to stakeholders and the broader public as an interim deliverable provides a progress report on the planning.

An Energy Profile may include the following sections:

- Executive Summary
- Stakeholder Engagement Process
- Energy Vision
- Energy Profile
  - Key Facts
  - Current Energy Use and Cost
  - Projected Future Energy Use and Cost
  - Related Efforts Underway (in the Community)
- Gaps & Challenges
- Next Steps for the CESP Process

Charts, graphs and pictures say a thousand words – information should be graphed or charted in a summary format that is easily communicated to others. Be sure to cite sources so results are defensible. Websites and newsletters are good places to distribute this kind of information to the broader public. Be sure as well to share with:

- Both the legislative and executive branches
- Every stakeholder that was engaged in the process of creating the report
- Conferences, public meetings, and other public outlets – to promote the results.

Examples of effective presentation of energy profile information:

- Knoxville (TN) Energy Inventory www.cityofknoxville.org/sustainability/Knoxville_Energy_Inventory.pdf
- Omaha (NE) Energy Profile (part of Omaha's Energy Plan) www.omahaenergyplan.org/index.php/energy-profile
- Berea (KY) Energy Inventory Report: Base Year 2010 (part of Berea's Energy Cost-Savings Plan) http://bereaky.gov/wp-content/uploads/2011/12/BECS_Data_small_PDF1.pdf
- Bloomington (IN) 2010 Local Government Operations Energy Use and Emissions Inventory http://bloomington.in.gov/media/media/application/pdf/11987.pdf
- Annapolis (MD) Energy Consumption and Greenhouse Gas Emissions of the Facilities and Operations in Fiscal Year 2006 www.annapolis.gov/Government/Departments/DNEP/Sustainability/EnergyInventoryFinal.pdf

Tools

Tool 4.1: Energy Data Calculation and Summary Tool (.xlsx)
Tool 4.2: Inventory of Existing Energy Activities Template (.xlsx)
Tool 4.3: CESP SWOT Analysis Worksheet (.docx)

Resources Recommended for More In-depth Guidance

- DOE Energy Data Management Portal www1.eere.energy.gov/wip/solutioncenter/portfolio_manager_initiative.html
- DOE Guidelines for Retrieving Customer Usage Data from Utilities (Webinar) www1.eere.energy.gov/wip/solutioncenter/pdfs/guideline_for_retrieving_customer_usage_data_from_utilities_slides_12-16-10.pdf
- DOE Clean Cities Transportation Tools (Webinar) www1.eere.energy.gov/wip/solutioncenter/pdfs/clean%20cities%20web%20sites%20and%20web%20tools.pdf
- EPA Local Climate and Energy Program – Developing a Greenhouse Gas Inventory www.epa.gov/statelocalclimate/local/activities/ghg-inventory.html