

Resilience Roadmap

A Collaborative Approach to Multi-Jurisdictional Planning

Energy Profile Exercise

The energy profile exercise is provided to assist in determining what information to collect, where it can be found, and how it can be aggregated to inform resilient energy strategies for communities or campuses. The content has been adapted from the Department of Energy’s [Guide to Community Energy Strategic Planning](#).

Government Operations

Buildings

- Ask the Department of Public Works (DPW) or finance manager for annual 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.
- Use the [Energy Data Calculation and Summary Tool](#) to convert various fuel usage data to a standard unit (typically Btu) to compare across type.
- Relevant metrics are provided in Table 1. 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.

Table 1. Standard Building Energy Metrics

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	to MMBtu	to MMBtu	to MMBtu	to MMBtu
Building Area	total ft ²	total ft ²	total ft ²	total ft ²
Standardized Use	MMBtu/ft ²	MMBtu/ft ²	MMBtu/ft ²	MMBtu/ft ²
Standardized Cost	\$/ft ²	\$/ft ²	\$/ft ²	\$/ft ²

Vehicle Fleet and Other Transportation

- Ask the DPW for annual fuel consumption (diesel, gasoline, liquid petroleum gas, etc.) 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, boats, etc.
- Relevant metrics are provided in Table 2. 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.

Table 2. Standard Transportation Metrics

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

Community Operations

High 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 account managers for annual 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 use the [U.S. Census Bureau Fact Finder](#) to search for specific local information.
- 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 may 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 if they will have separate targets set as part of the plan. The U.S. Energy Information Administration's [State Profiles and Energy Estimates](#) website is a valuable resource for this task.

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's [Department of Transportation](#)
 - Transportation fuels (consumption and cost) – check with the state's [Energy Office](#).
- Travel behavior (vehicle miles traveled (total and per household), choice of transportation mode, etc.).
- Energy consumption data broken down by end-use sector (transportation, residential and commercial buildings, city and public sector, industry, electricity generation, heating, water, and waste) in MMBtu (millions of British Thermal Units, the standard measure).
- Load profiles for residential and commercial buildings that are indicative of the area's general energy use.
- Industrial-load data for major, local, industrial energy users.
- Local transportation-fleet characteristics (vintage, efficiency, and vehicle type).

Electricity Generation and Utility Data

- Existing grid-mix by generation type (coal, natural gas, hydro, and non-hydro renewables).
- Utility type (publicly owned [muni/co-op] vs. investor-owned utility).
- Current policies and rates applicable to renewable energy or distributed energy resources (e.g., net energy metering, capacity-based incentives, performance based incentives, local tax incentives).

Energy Cost Information

- Average electricity rates in \$/kWh (typically residential, commercial, and industrial).
- Utility tariff structure (e.g., demand charges, block charges, kWh charges, peak demand, etc.).
- Average prevailing heating costs (residential, commercial, and industrial).

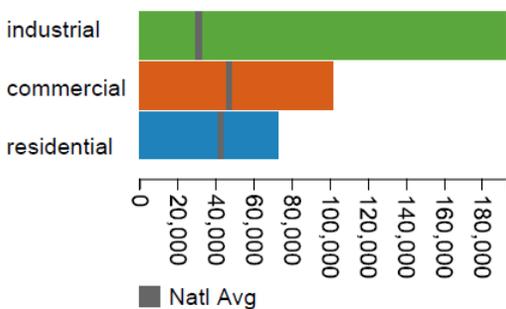
City Energy Profile for Golden, Colorado

This section provides analytically derived data about energy use in your city. As this is not measured data it should serve as a guide for energy decisions in your city, but not a replacement of actual energy use data. For any questions, please [contact us \(mailto:cleap@nrel.gov\)](mailto:cleap@nrel.gov).

Electricity Statistics for Golden, Colorado in 2013

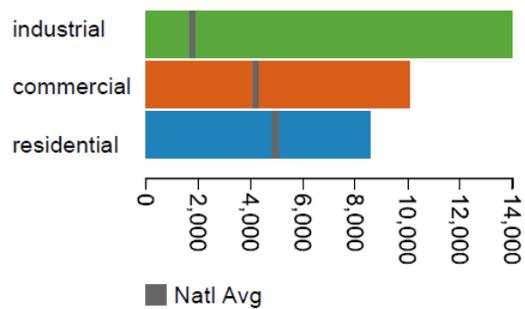
ELECTRICITY USAGE

(MWH)



ELECTRICITY EXPENDITURES

(\$1000)



total

Figure 1. An Estimate City Energy Profile Using DOE's [City Energy Profile Tool](#)

From Energy Profile to Resilient Strategies

The energy baseline gives context and insights into where energy is consumed throughout a jurisdiction. The baseline establishes how much electricity, natural gas, fuel is necessary to operate critical operations, government functions and overall community functionality. This is essential in developing rational, proactive resilient and preparedness strategies. Consider this, with an accurate energy profile available, resilience strategies become more specific and accurate. Using an energy use profile for strategic resilience development brings another level of clarity to effort, like understanding how much:

- Power on-site generation and backup systems would be needed to maintain critical operations like police stations, fire stations, schools and hospitals
- Fuel is necessary to maintain the viability of critical transportation systems including emergency response and public transportation
- Power on-site and backup systems would be needed to maintain the operation of interrelated infrastructure systems like water and waste water treatment and IT & communication services.

This Community Plan Checklist, adapted from the New York State Climate Smart [Communities Planning Evaluation Tool](#), includes a list of list of resources that may assist with the City Energy Profile.

Table 3. Checklist of Jurisdictional Plans

Plan, Ordinance or Code	Available?		Adoption Year	Next Update Due
	Yes	No		
Municipal Comprehensive Plan				
Zoning Ordinance				
Subdivision Ordinance				
Open Space Plan				
Natural Resource Conservation Plan				
Stormwater Management Plan				
Coastal Plan or Element in Other Plan				
Shoreline Restoration Plan				
Coastal Erosion Hazard Area Ordinance				
Multi-Hazard Mitigation Plan				
Floodplain Management Plan				
Flood Damage Prevention Ordinance				
Evacuation Plan				
Emergency Response and Short-Term Recovery Plan				
Continuity of Operations Plan				
Disaster Recovery Plan				
Long-Term Recovery Plan				
Economic Development Plan or Strategy				
Capital Improvements Plan				
Metropolitan Transportation Plan				
Historic Preservation Plan				
Local Waterfront Revitalization Plan				
Potential Threat Action Plan				
Energy Considerations				
Water Operations				
Other				
Other				