LOCAL GOVERNMENT
ENERGY PLANNING WORKBOOK
MAY 2017

MINNESOTA LoGo PEP

Developed by:
Great Plains Institute

The development of this workbook is supported by the Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE), under Award Number DE- DE-EE0007229. This project was made possible by a grant from the U.S. Department of Energy and the Minnesota Department of Commerce. The team includes LHB, Great Plains Institute, and the University of Minnesota's Energy Transition Lab and Center for Science, Technology, and Environmental Policy.

ENERGY PLANNING

WHAT IS ENERGY PLANNING?

Energy planning involves thinking about energy as a development resource. Cities can use energy planning to examine how energy is used and what resources are available for development in their community. Energy plans involve inventorying existing conditions, identifying goals, and planning for action.

WHO SHOULD USE THIS WORKBOOK?

This workbook is designed for Minnesota communities that are either updating their comprehensive plan or developing a stand-alone energy plan. Communities in the Metropolitan Council seven-county area are required to update their comprehensive plans every ten years – this template can serve as a guide for metro communities to plan for energy.

HOW SHOULD I USE THIS WORKBOOK?

This workbook provides a framework for communities, guiding them through what to include in an energy plan. However, each community is unique, with different resources available to them and varying goals related to energy. This workbook should be used as a guide for decision-making, not as prescribed recommendations. Use in conjunction with the Energy Planning Guide and other LoGoPEP materials.

EXISTING CONDITIONS

Existing conditions help communities know where they are. In the case of energy, it is beneficial for communities to know their energy profile: how much energy they use and where it comes from. Compiling an inventory of existing programs, resources, tools, and projects can help a community understand its energy landscape and allows a more comprehensive understanding of these factors to better shape the energy future.

ENERGY USE PROFILE

Assess what kind of energy is used and how it is used within city boundaries.

1. **Energy consumption by fuel**
   - Electricity
   - Natural Gas
   - Other fuels
   - Transportation fuels
2. **Energy consumption by sector**
   - Commercial & Industrial
   - Residential
   - City Operations
   - Transportation
3. **Carbon intensity of electricity**

CLEAN ENERGY RESOURCE

Determine what clean energy resources are available in your community and how much. Different tools are available to map and calculate solar and wind resources, while energy efficiency can be measured through benchmarking.

Understanding these resources and where they exist can help cities set goals and prioritize development opportunities.

INVENTORY OF EXISTING PROGRAMS

Compile an inventory of existing government, community, and utility programs to help navigate the energy landscape. Programs can include:

- **Incentives** (e.g. Utility Rebate Programs)
- **Technical Assistance** (e.g. GESP)
- **Financing Mechanisms** (e.g. PACE)

Also document city efforts to support clean energy in your community.

EXISTING CONDITIONS

ENERGY USE PROFILE

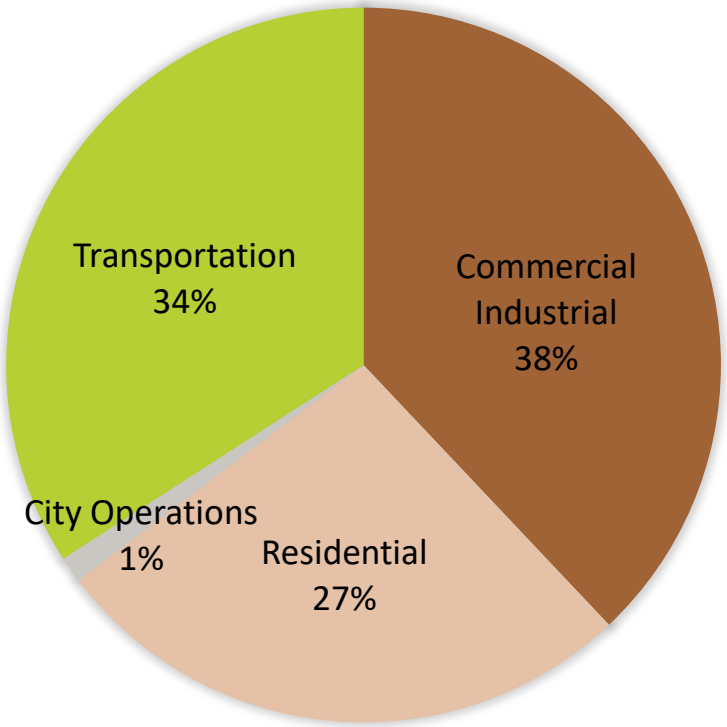
In order to establish a baseline to be able to set goals and measure progress, cities will need to assess their current energy consumption. This is done by gathering data for the commercial and industrial, residential, city operations, and transportation sectors. Much of these data can be collected from the Regional Indicators Initiative (note that city operations is not included in RII data and transportation is provided as vehicle miles traveled).

REGIONAL INDICATORS INITIATIVE

SECTOR	ENERGY (MMBtu)	EMISSIONS (tonnes CO_2e)	% OF TOTAL
Commercial/Industrial	2,250,824	236,436	38%
Residential	2,031,373	166,684	27%
City Operations	69,613	7,312	1%
Transportation	N/A	212,550	34%

* These numbers represent an average Twin Cities suburb. Actual data will vary.

GREENHOUSE GAS EMISSIONS BY SECTOR



EXISTING CONDITIONS

CLEAN ENERGY RESOURCES

RESOURCE	WHAT IS IT?	HOW TO FIND IT	HOW TO MEASURE IT
Solar	A city's solar resource includes areas with access to sufficient direct sunlight for the production of energy. It can be found on the ground or on rooftops.	In Minnesota, cities have access to the Solar Suitability App developed by the University of Minnesota, which can help identify the solar resource at a 1 meter resolution.	Solar energy is measured megawatt-hours.
Wind	A city's wind resource includes areas that have access to sustained wind at sufficient speeds to produce energy. A quality wind resource is typically found at 30 meters and higher.	The Minnesota Department of Commerce has developed wind speed maps at 30, 80, and 100 meter heights, which at 500 meter resolution can give a city a general sense of its wind resource.	Wind speed is measured in meter/second at the various heights. A good wind resource is greater than 5 meter/second.
Biofuels	Biofuels are the conversion of organic material (biomass) into energy. The resources can include food and yard waste, tree debris, and other organic material generated in urban areas. These can be used to generate electricity, heat, or transportation fuels.	Because bio resources vary, there is not good information available to know the resource in a given location. Cities should measure organic waste generated within their community and in surrounding areas that they could access.	Biomass is measured in tons. If a community has a bioenergy plant, they would measure generation capacity in MW or cubic feet for biogas.
Efficiency	The existing energy efficiency resource is energy consumption that can be systematically reduced through conservation, more efficient operations and technologies, and systems such as combined heat and power and district energy.	Regional Indicators Initiative provides a community-wide assessment of energy use for electricity, gas, and transportation energy. B3 Benchmarking and Energy Star Portfolio Manager can help public and private buildings benchmark their energy consumption against historical data, national averages, and code-based benchmarks.	Energy efficiency is measured in MMBtu for buildings, and vehicle miles traveled for transportation energy use.

EXISTING CONDITIONS

CLEAN ENERGY RESOURCES

Using the information on the previous page, cities can collect the appropriate information to get a better sense of their clean energy resources. This information can provide the basis for goal setting and community decision-making around clean energy resources. Cities can prioritize action based on location, opportunity, and support. For resources that need to be sited like solar and wind, communities can use the maps to identify locations for development with minimal land use conflicts. The table below is an example of what a city can use to document its clean energy resources.

	MEASURE	PRIORITIZE	IDENTIFY POTENTIAL ISSUES
Solar	1. Map the city's resource 2. Total rooftop in MWh 3. Total practical ground in MWh	Identify top sites for potential solar development on public and private buildings as well as public land.	Identify potential land use conflicts that may include: alternative development priorities, agriculture practices, urban forests, etc.
Wind	1. Map the city's resource 2. Identify resources at 30, 80, 100 meter hub heights in meters/second	Use the wind speed maps to determine potential areas for wind energy.	Wind turbines often have to be built at considerable heights; engage community to determine feasibility of wind installations.
Biofuels	1. Inventory existing organic material waste	Determine the quantity of available organic material waste and the feasibility of using it for electricity, heat, and/or transportation fuel.	Identify barriers and opportunities to use organic waste material for energy purposes.
Efficiency	1. Benchmark energy use in public buildings (kBtu/square foot) 2. Determine Regional Indicator results for community-wide energy and vehicle miles traveled	Identify poorest performing public buildings and prioritize those for energy improvements. Use energy information to prioritize energy programs for private buildings and transportation.	Efficiency improvements will require various financing mechanisms. Research existing programs and include them in the city's inventory.

EXISTING CONDITIONS

ENERGY CALCULATOR

Use the solar energy calculator to assist in setting clean energy goals and greenhouse gas emissions reductions. Input data into the outlined boxes.

Electricity Use	MMBtu/year	GHG/year
Total Electricity Use	1,700,575	236,296

Statewide Electricity Goals	MMBtu/year	MWh/year
State Solar Goal of 1.5% by 2020	25,509	7,476
State Solar Goal of 10% by 2030	170,057	49,841
25% Renewables by 2025 RES	425,144	124,603

Solar Resources	MW	MWh/year
Total Solar Resource	1,530.00	1,988,351
Total Rooftop Solar Resource	220.00	286,513
Top 10 buildings Solar Resource	21.92	28,490
Public Buildings Solar Resource	-	-

Local Government Goals		
Renewable Electricity Share	25	%
Renewable Electricity Generation	**124,603**	**MWh/year**
Renewable Electricity Capacity (Solar)	**95.85**	**MW**
Greenhouse Gas Reduction	59,074	tonnes CO_2e

Results

44% of the total rooftop solar resource is utilized, providing enough local renewable electricity to serve the equivalent of 16,405 households and resulting in a 25% reduction in greenhouse gas emissions

EXISTING CONDITIONS

INVENTORY EXISTING PROGRAMS

Federal, state, local, and utility programs and resources can shape how energy technology is used. Familiarity with these policies and programs can help cities determine their energy future. Cities should compile an inventory of existing programs that can be useful in supporting local energy initiatives. Below are a list of various programs available in Minnesota. The table below can be used by cities to create their own inventory.

ENERGY SOURCE	WHAT	WHO	TYPE	WHEN	WHERE	NOTES
Solar	Solar*Rewards	Xcel Energy	Production Incentive	On-going	Xcel Territory	Incentives available for projects <20kW
Efficiency and Solar	PACE	St. Paul Port Authority	Financing	On-going	In participating counties	Available for commercial properties
Renewables	Investment Tax Credit	Federal Government	Tax Credit	Through 2020	Nationwide	Scales down after 2020, ends 2023
Efficiency	GESP	Commerce	Assistance	On-going	Statewide	Public buildings
Wind	Windsource®	Xcel Energy	Green Purchasing	On-going	Xcel Territory	Xcel Customers
Solar	Solar Installation	Example City	Installation	May 2012	City Hall	20 kW system

DESIRED CONDITIONS

Desired conditions are forward-looking aspirations that are determined through a public engagement process to reflect the community's priorities. Using the existing conditions as a baseline, communities can develop goals and policies that are aspirational, yet achievable.

SETTING GOALS

- Set broad **energy** or **climate protection** goals
- Address specific **energy resources** that are available in your community
- Set **development** goals to improve energy efficiency of new buildings
- Consider specific **technologies**, such as goals for alternative fuel vehicles and public charging stations.
- Set goals that capture **co-benefits**: improving equity, creating local jobs, and improving habitat or water quality.

EXAMPLES OF COMMUNITY GOALS

Our community will:

- Reduce **greenhouse gas emissions** to match the State's reduction goals of 30% by 2025 and 80% by 2050.
- Secure 50% of the community's energy from **renewable energy sources** by 2030.
- Identify potential opportunities for **bioenergy** development.
- Install **electric vehicle charging stations** in every public and private parking lot and ramp by 2030.
- Increase participation in utility **energy efficiency** programs for residents so that 80% of homes have made improvements by 2040.

STRATEGIES

Strategies are the tools in the local toolbox that communities use to achieve desired outcomes: programs, regulations, operational procedures, and public investments. The following are examples of the types of strategies cities can include in their comprehensive plans.

ENCOURAGEMENT

- Promote Windsource® on city website
- Promote utility rebate programs through city communications
- Encourage net zero energy development
- Engage community in energy goal setting exercise

REGULATION

- Require energy efficiency and renewable energy within PUD ordinance
- Adopt an energy benchmarking ordinance
- Remove zoning barriers to renewable energy
- Adopt an energy stretch code (SB 2030)

INCENTIVES

- Enable PACE financing
- Offer regulatory incentives within zoning
- Expedite permitting for clean energy projects
- Offer technical assistance for private sector developments to incorporate net-zero and/or solar-ready designs

PUBLIC DEMONSTRATION, LEADERSHIP

- Participate in the Guaranteed Energy Savings Program
- Install solar on rooftops of public buildings
- Adopt net-zero energy standards for public facilities
- Sponsor a community solar garden for community residents and businesses