CMAP

Sustainability Indicators Guide

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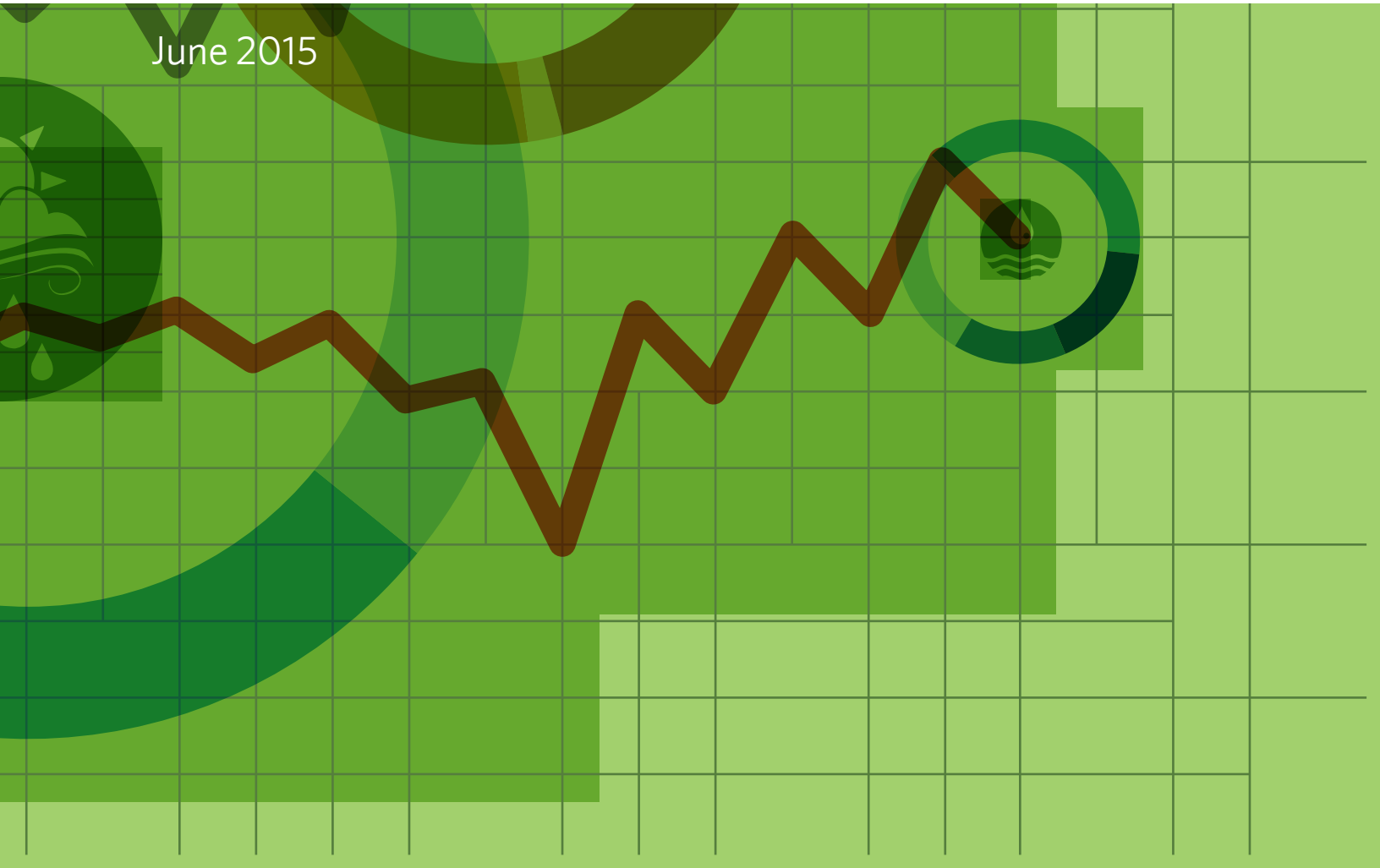

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Unless otherwise specified, all photos are by CMAP staff.

Introduction

One of the hallmarks of sustainability planning is the ability to measure the environmental impacts of sustainability-related programs, policies, and practices. The Chicago Metropolitan Agency for Planning (CMAP) is committed to assisting communities in the Chicago region with effectively planning for and achieving sustainable and livable communities. This Sustainability Indicators Guide, in conjunction with the CMAP Sustainability Planning White Paper (published separately), comprise a comprehensive overview of the planning tasks required to create a sustainability plan at the local level. More specifically, the content of this guide is meant to provide a blueprint for selecting local sustainability indicators, establishing baselines and targets, and measuring progress. It also offers a list of recommended sustainability indicators that are useful and meaningful to all communities in our region.

The following sustainability-related terms are used throughout this guide:

Goals: Sustainability goals are broad outcomes for which communities strive. Goals are typically framed as overarching aspirations, such as reducing waste.

Indicators: An indicator is a "summary measurement that provides information on the state of, or change in, the system being measured."[1] "Indicator" is an umbrella term that encompasses baselines, targets, and interim measurements between baselines and targets. Sustainability indicators help local governments quantify the impacts of strategies that advance sustainability goals. For example, total vehicle miles traveled (VMT) illustrates a community's reliance on automobile travel. VMT can also be used to calculate auto-related greenhouse gas emissions.

Baselines: A baseline is a type of indicator that communities establish to describe an existing condition related to sustainability—for example, the community's existing waste diversion rate.

Targets: A target is a type of indicator that communities set to meet their broader sustainability goals—for example, achieving a waste diversion rate of 50 percent by a certain year.

Strategies: As discussed in the Sustainability Planning White Paper, strategies help operationalize targets by defining specific activities a community can undertake to help meet a target—for example, establishing a residential curbside composting collection program to improve its waste diversion rate. The indicators included in this guide reflect the strategies outlined in the White Paper.

Sustainability is a long-term endeavor that requires continued diligence. It may take decades to see significant change on issues such as climate change or land use patterns. Indicators help communities to continuously evaluate whether the strategies put into place are having measurable near- and long-term impacts. Selecting indicators from the outset can help local communities use consistent monitoring and evaluation standards and practices over a long period of time.

Indicator selection should occur during the plan development stage to ensure that the indicators chosen correspond to the strategies and objectives identified in the plan. Once the plan is complete and the community begins implementation, indicators should be used not only to assess progress, but also to inform whether any policy or programmatic changes are needed to better meet sustainability goals.

[1] A Framework for Sustainability Indicators at EPA. October 2012. http://www.epa.gov/sustainability/docs/framework-for-sustainability-indicators-at-epa.pdf.

Types of Indicators

There are many ways to evaluate progress, and different types of indicators may be suitable for evaluating different sustainability efforts. Outcome indicators and process indicators are two main categories of indicators that are widely used in local sustainability planning.

Outcome indicators track how well a particular goal is being met. If a community has an overarching goal to decrease energy consumption, an outcome indicator might be a 20 percent reduction in electricity consumed in the community by a certain year. The indicator is oriented around the desired end-goal of a quantitative reduction in energy consumption.

Process indicators are most appropriate for measuring the progress of preparatory actions, which are foundational steps that should be taken first in order to effectively deploy further resources and investments. Preparatory actions may include plan, policy, and code development, research and analysis, and education activities that support sustainability goals.[2] Process indicators measure how well communities are accomplishing a specific strategy or foundational steps toward an overall goal, but do not indicate whether an overall goal is met. Using the same example given above of decreasing energy usage, the community may also choose to track the number of homeowners engaged or homes retrofitted as a process indicator. Neither the extent of the outreach nor the number of retrofits provides information about the amount of electricity consumed, but they do provide information about how effectively the community's energy efficiency program has been administered. By revealing information such as low success rate in contacting homeowners, process indicators are important for helping communities assess whether they need to change the way their initiatives are managed or designed. They also help to ensure that intermediate steps are being taken toward achieving overall sustainability goals.

Together, both types of indicators can help communities to fully understand whether their strategies have been effective in achieving their goals. It is important to note that positive results measured via process indicators do not necessarily correlate with positive results measured by outcome indicators and vice versa. U.S. carbon emissions represent one real-world example of the mismatch between process and outcome indicators. In the last several years, the U.S. has seen such major emissions reductions that, as of 2012, the country met emissions targets specified in the Kyoto Protocol. The reasons for this are actually attributed to the reduction in overall resource consumption due to an economic downturn rather than concerted efforts to mitigate climate change. As communities select the suite of indicators they use to measure success, they should make sure that the indicators demonstrate whether sustainability efforts are directly leading to positive outcomes.

[2] STAR Community Rating System Technical Guide.

Establishing Sustainability Indicators

The following steps outline a typical process that may be used to identify, select, establish, and monitor sustainability indicators. Variations on this process may be appropriate based on community needs, and should include public engagement activities to introduce and vet the indicators chosen (see Sustainability Planning White Paper for more details on public engagement).

Step 1: Select Sustainability Indicators

Indicator selection must consider local contexts and priorities. Communities should take four main considerations into account when selecting sustainability indicators: ability to be measured on a regular basis, usefulness for decision-making, responsiveness to policy change, and clarity and ease of comprehension. These points are meant to provide guidance on indicator selection, rather than impose strict criteria that all indicators must meet.

Ability to be measured on a regular basis

One of the main purposes of collecting indicators is to understand trends of a particular sustainability goal over time. First and foremost, indicators must be measurable. Also, it should be possible to collect data related to the indicators at regular intervals. The ability for a given community to collect data varies based on capacity and resources. For instance, it may be feasible for a community to calculate total acreage of green infrastructure, but if the task requires significant staff labor, it may not be reasonable to perform regularly for the purpose of tracking green infrastructure as an indicator. On the other hand, measuring kilowatt-hours of energy usage can be easily compiled from utility billing on a regular basis. The community should strive to be strategic in the number of indicators chosen and be aware that selecting many indicators that are relatively easy to measure may still add up to a large staff commitment in terms of time.

Usefulness for decision-making

Just because indicator data is easy to collect does not necessarily make it relevant or useful for decision-making. Indicators should not be used exclusively for descriptive purposes; rather, they should be designed to help determine whether a particular strategy is leading toward a desired result. If a strategy is not meeting its objective, indicators should be used to drive or shape any subsequent policy, programmatic, and budgetary adjustments that may be needed to make the sustainability effort more effective.

Responsiveness to levers of change

It can be difficult to isolate the impact of municipal-scale efforts because many sustainability issues cross political boundaries. The sustainability indicators that a municipality uses may differ from indicators for regional, state, or national scales. As municipalities choose indicators, they should take into account whether the indicator measures an outcome that can be influenced on a municipal level.

For instance, a municipality may want to adopt an anti-idling ordinance to improve air quality. Air pollutants are amenable to regular measurement and that measurement is useful for informing policies, but since air quality is ambient in nature, municipal policy changes may not result in direct or observable changes in air quality at the local level. This does not mean that the municipality should not pursue the ordinance. Rather, it may mean that tracking air pollutants is more effective to monitor at a sub-regional or regional level to understand the aggregate influence of local efforts on air quality.

In addition to geographic considerations, municipalities should consider the time-scale of indicators. Some indicators, such as ecological restoration or global temperature rise due to climate change, are only observable over the span of several years or decades. Time-scale responsiveness may be a particularly important concern for elected officials or other decision-makers who operate on election cycles or other defined schedules. The ability to demonstrate clear successes in the short-term is also important for maintaining momentum and motivation among municipal staff and residents alike. Local leaders may want to consider a mix of indicators with short- and long-term responsiveness.

Clarity and ease of comprehension

Indicators are not only useful for decision-makers and municipal staff; they can also be important tools of communication to educate and share progress with community partners, property and business owners, and residents. If municipalities select indicators that are overly technical or complex, it may be difficult to convey goals or progress to general audiences. For example, reporting total potable water consumption by a community provides an easy to understand picture of how much water a community uses. Other important process or outcome measurements such as surface and subsurface water table heights provide useful internal data, but relevance to the main message of encouraging water conservation may not be as easy for the public to understand. To resolve this, municipal staff may choose to separate indicators into those used for internal purposes and simpler indicators that are better suited for public consumption.

Step 2: Establish Baselines

After choosing which indicators should be measured, the next step is to establish baseline indicators that quantitatively describe existing conditions and set a foundation from which to measure future progress toward goals. In order to facilitate assessment of progress on sustainability over time, a community should choose a baseline year from which progress is measured. For example, targets for carbon emissions reductions are commonly based on a percentage of reduction from 1990 or 2005 baseline levels. Most other indicators should use the year previous to the plan's development as the baseline year if possible, as data and information are most up-to-date and comprehensive for that calendar year. If data is not available to measure a particular indicator, the community should begin collecting data and use the current year as the baseline.

Step 3: Set Targets

Once baseline indicators have been determined, municipalities should set specific targets to achieve their sustainability goals. Overall, target-setting is derived from a combination of ambition, feasibility, constraints, and best estimations that inform a self-determined goal. A local government should cater sustainability targets to the community's priorities, capacity, funding, and political will. The following considerations serve to provide guidance to municipalities about how to set appropriate targets.

First and foremost, targets should be ambitious, but feasible. Targets should not simply be set by extrapolating previous trends; they should motivate action on sustainability issues. On the other hand, targets should not be so ambitious as to be impossible to meet. It is up to each community to define an appropriate level of ambition for each target based on local needs, constraints, and goals. Electoral and budget cycles are also factors to consider in target-setting. Elected officials may want targets that can be achieved within their term of office. The availability of funding may also dictate how ambitious a target can be.

Targets can also be determined by establishing incremental targets that lead up to an overarching goal. For instance, the state of California's policy goal for communities to achieve 75 percent recycling rates was based on an assessment of the current diversion rates (65 percent average in 2011), an assessment of the capacity to capture more recyclables, the volume of food scraps within the waste stream, and the potential to build viable markets for recyclables and compost.

Many existing plans, regulations, and policies at regional, state, federal, and even international levels can inform the targets that local municipalities adopt. While it may not be possible or appropriate to directly adopt those targets, communities may use them as starting points to determine their own targets. For example, communities in northeastern Illinois may want to align with the targets identified in GO TO 2040 for a consistent regional approach to a particular issue. There are other instances where national level regulations can help to determine targets. For example, the Clean Water Act defines standards that local jurisdictions can use as their own targets for pollutant load reductions. The STAR Community Rating System relies on TMDL and 303(d) regulations to determine whether a community has met the threshold for good water quality. International targets can also inform local ones. The Chicago Climate Action Plan greenhouse gas reduction goal targets, for instance, are based on the Kyoto Protocol's science-based assessments of emissions reductions targets.

Often times, target setting may be a combination of guesswork, logic, or math. For example, if a community has a baseline of two community gardens established in 2013 and wishes to set a goal number of community gardens as a process-related target indicator, it might make sense to estimate that about three gardens established per year would be an aggressive yet achievable goal (since the previous year, two gardens were established). The overall target could therefore be to establish 10 new community gardens by 2016.

Step 4: Monitor Progress

Communities should set regular intervals for creating and publishing progress reports that communicate indicator measurements and strategies that have been achieved to forward those indicators. Progress reports are ideally created every one to two years for sustainability plans, although that time horizon may be extended for communities with fewer resources. As communities are assessing progress, they should consider modifying targets as needed to be more realistic, aggressive, or relaxed as the situation merits.

Recommended Sustainability Indicators

The indicators presented here correspond with the sustainability strategies highlighted in the CMAP Sustainability Planning White Paper, but are not meant to serve as a definitive list. Communities may choose to modify the indicators included in this guide to better fit their specific goals and available data. In developing the list of recommended indicators, CMAP reviewed the STAR Community Rating System, LEED for Neighborhood Development rating system, and many other sustainability plans in the region and beyond. Communities may find it useful to peruse these documents in developing a catered list of their own indicators. Input on the recommended sustainability indicators list was sought from many groups, such as the CMAP Environment and Natural Resources Working Committee, the Prairie State Local Government Sustainability Network, GreenTown conference participants, Seven Generations Ahead, and the Metropolitan Mayors Caucus (the latter two organizations were a part of the project team to develop this document and the Sustainability Planning White Paper).

Table 1 represents CMAP's priority list of indicators for the region's communities to monitor at the local level. The recommended indicators align with the sustainability strategies discussed in the Sustainability Planning White Paper and focus on indicators that are easiest to measure and collect across a span of time. When available, communities can use Table 1 datasets and sources, such as CMAP's Land Use Inventory or the American Community Survey, to collect the information. A number of the recommended sustainability indicators are not collected by a third party, and require communities to perform independent data collection. The table provides guidance to communities on how they can go about obtaining data that is not otherwise readily available. Data collection for these indicators can require significant staff time to compile and analyze, but others can be easily requested from service providers such as waste haulers and energy utility companies.

Table 2 illustrates that indicators do not necessarily need to have a one-to-one correlation with sustainability topics. In fact, one indicator may provide insight on a number of topic areas.

Table 1. Recommended sustainability indicators

	Indicator	Rationale	Data Source
	**Land Use**		
	New developments in areas with existing infrastructure and services*	Process indicator to assess infill developments in locations where infrastructure and services already exist	Municipal permitting or GIS
	Residential density of areas with transit service	Indicates whether residential density level is supportive of transit and associated TOD land uses	GIS analysis
	**Transportation**		
	Commuting trips by transit, bicycling, and walking*	Illustrates mode split - breakdown of travel by different commuting types, including auto transport, transit, bicycling, and walking	2012 ACS 5-year estimates (S081: Commuting Characteristics by Sex); see also CMAP Community Data Snapshots
	Vehicle miles traveled (VMT) per household *	Outcome indicator that measures a community's motor vehicle travel distance, which gives insight on air quality and greenhouse gas emissions	CNT H+T Index or 2012 ACS 5-year estimates (S081: Commuting Characteristics by Sex); see also CMAP Community Data Snapshots
	**Open Space & Ecosystems**		
	Acres of park space per capita	Measures how much park space is available per capita in a community. The National Recreation and Park Association database provides guidelines on recommended park acreage by population size for communities to use in setting targets; see also APA Standards for Outdoor Recreational Areas	GIS analysis; CMAP Land Use Inventory (Open Space)
	Acres of protected lands*	Assesses protection of natural resources and the ecosystem services that a community receives from high-quality natural landscapes	GIS analysis; CMAP LUI (Open Space: Conservation)
	**Water**		
	Presence and/or rating of local waterbodies on Illinois EPA 303(d) List*	Indication of water quality for waterbodies within the community. The Illinois EPA 303(d) list, which identifies impaired waters, is a measure of water quality and health of local waterbodies. The list is released every two years and includes an overall rating of water quality, as well as an assessment of the causes for impairment. The presence of a waterbody on the 303(d) list signifies that the waterway is polluted, and the prioritization of waterbodies on the list denotes the magnitude of impairment	Illinois EPA
	New developments that incorporate green infrastructure BMPs	Process indicator that estimates the extent to which green infrastructure practices are being adopted as part of new developments	Municipal permitting
	Water use intensity*	Outcome indicator that measures whether overall "water use intensity" (building water use (gallons) divided by building square footage) is being reduced through water efficiency and conservation strategies	Water utility, County assessor data or building footprint data

Table 1. Recommended sustainability indicators (continued)

	Indicator	Rationale	Data Source
	**Energy**		
	Renewables in mix of energy supply*	Identifies mix of energy sources, which helps to understand GHG emissions and assess how current policies are contributing to sustainable energy sourcing	Energy utility
	Energy use intensity*	Outcome indicator that measures whether overall "energy use intensity" (building energy use (kBtu) divided by building square footage) is being reduced through energy efficiency or demand-side strategies	Energy utility, County assessor data or building footprint data
	Permits for renewable energy systems	Process indicator that assesses progress toward installing private, on-site renewable energy generation systems that reduce energy demand and create a decentralized energy network	Municipal permitting
	**Waste**		
	Waste diversion rate	Illustrates how well a community avoids sending solid waste to landfills. Waste diversion includes both recycling and composting	Waste hauler
	Solid waste generated*	Outcome indicator that captures the effectiveness of strategies that aim to minimize consumption. This is in comparison to the waste diversion rate, which does not indicate whether overall waste generation has decreased	Waste hauler
	Residential and/or commercial recycling participation	Assesses the percentage of households or commercial establishments that participate in a recycling program	Waste hauler
	**Air & Climate**		
	Greenhouse gas emissions generated*	Outcome indicator that broadly assesses the effectiveness of transportation, energy, and other sustainability strategies in reducing emissions	U.S. EPA

* = alignment with STAR Community Rating System. Indicators may be recommended on a per capita or per household level to normalize for communities in the region that have different growth rates and population sizes.

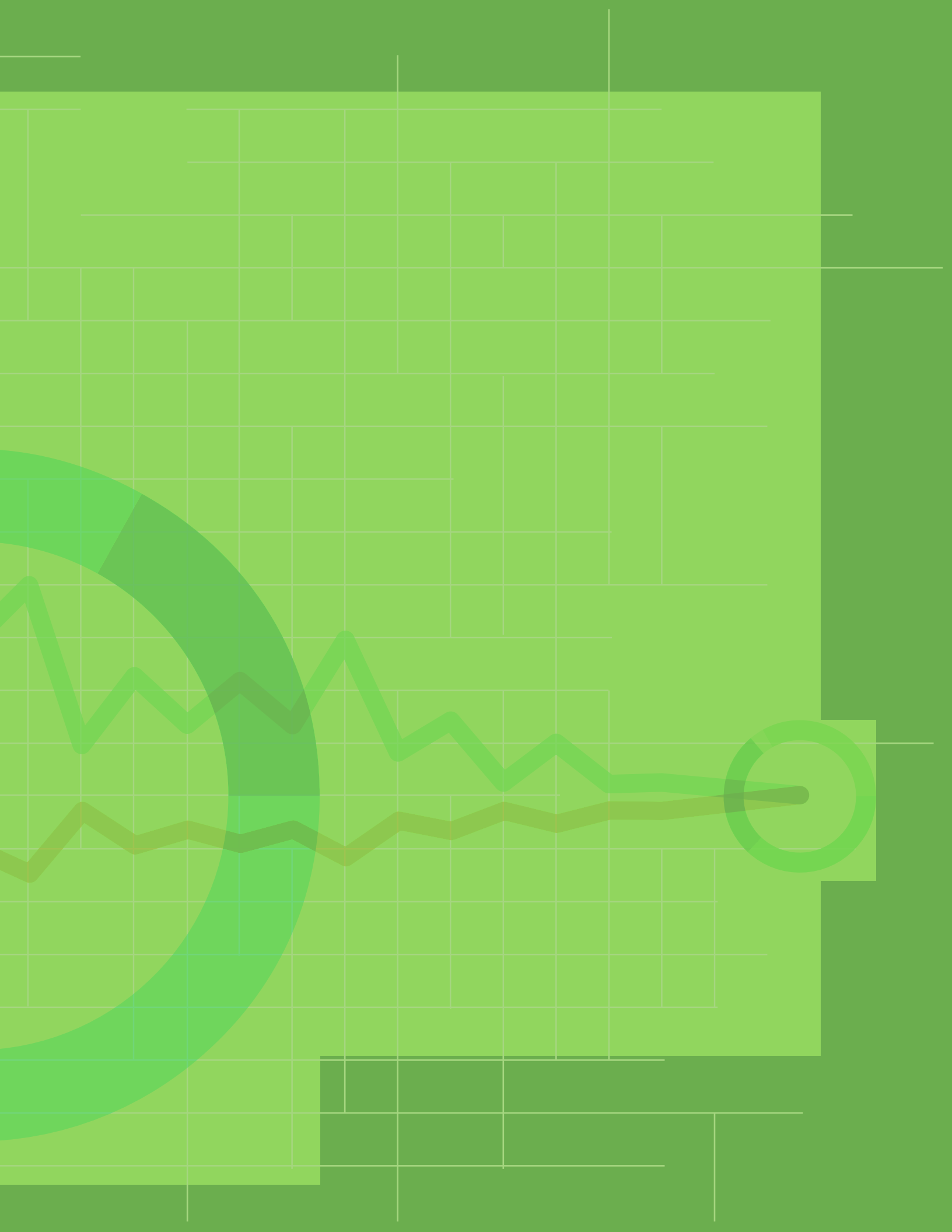
Table 2. Sustainability indicators by core topic

Indicator	Land Use and Development	Transportation and Mobility	Open Space and Ecosystems	Water	Waste	Energy	Air and Climate
Land Use							
New developments in areas with existing infrastructure and services*	■	■					
Residential density of areas with transit service	■	■					
Transportation							
Commuting trips by transit, bicycling, and walking*		■					■
Vehicle miles traveled (VMT) per household*		■					■
Open Space & Ecosystems							
Acres of park space per capita	■		■				
Acres of protected lands*	■		■				
Water							
Presence and/or rating of local waterbodies on Illinois EPA 303(d) List*				■			
New developments that incorporate green infrastructure BMPs				■			
Water use intensity*	■			■			
Energy							
Renewables in mix of energy supply*						■	■
Energy use intensity*	■					■	■
Permits for renewable energy systems	■					■	■
Waste							
Waste diversion rate					■		
Solid waste generated*					■		
Residential and/or commercial recycling participation					■		
Air & Climate							
Greenhouse gas emissions generated*	■	■				■	■

* = alignment with STAR Community Rating System.

Conclusion

CMAP strongly supports local community efforts to monitor sustainability indicators, and is particularly interested in facilitating the use of the "recommended sustainability indicators" outlined above across the region's municipalities. Ongoing data collection and analysis are needed to quantify a community's progress toward its sustainability goals. One of CMAP's primary roles is collecting and providing data that help the region understand how well it is meeting the objectives of the GO TO 2040 Plan. In addition to providing aggregate region-scale data through the Regional Indicators web page, CMAP also provides local-level Community Data Snapshots that can inform and support local planning activities. Future Community Data Snapshots will incorporate some of the recommended indicators above to provide communities with ready-made sustainability baselines for use in sustainability planning. By measuring recommended sustainability indicators at the local level across our region, we can develop a more robust picture of our region's sustainability and identify targeted strategies that will help to improve shortfalls and capitalize on opportunities.



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