

#1: CITY BUILDINGS & LIGHTING

CORE METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

City Buildings:

- 1.1 **kBtu per square foot, per year**
- 1.2 Dollars spent on energy per square foot, per year
- 1.3 Ratio of actual energy use to predicted energy use

Percent of LEDs in:

- 1.4 **Street lights**
- 1.5 Traffic signals
- 1.6 City buildings & property

DEFINITIONS

- **City buildings** include all city-owned or leased buildings fueled by two or more sources of energy. Excluded are unheated garages, pump houses, and some park buildings. Category C cities may not own or lease such buildings and thus do not report these three data points. **Water use** by city buildings and properties is reported under Metric 10: Drinking Water. (Elements 1.1-1.3)
- **Ratio of actual energy use to predicted energy use** – This is called the B3 Benchmark Index Ratio – it is an engineering model that predicts how much energy all buildings would use if they were built to and operated under the current State energy code. This ratio divides the actual energy use for the most recent twelve months of data available by the predicted energy use for the same period, and expresses the result as a number. Numbers 1.0 or under mean the city's buildings are performing better than predicted. (Element 1.3)
- **Street lights** include all street lights owned by the city and all those owned by any utility under a franchise agreement and should be counted as one fixture, regardless of the number of bulbs contained. (Element 1.4)
- Each **traffic signal** should be counted as one for purposes of calculating a percentage; thus, as sometimes only one of the three colors is changed out before changing out another color, counts may include 0.33 of a signal. (Element 1.5)
- **City buildings & property** includes both interior and exterior lighting for buildings (interior includes ambient and task lighting fixtures), garages, other city facilities (e.g. drinking/waste water plant), parking lots and ramps, ball fields, park lighting, trails, and the like. (Element 1.6)
- **Alternative data elements:** if you have been gathering or want to gather slightly different data, report those and explain in the notes section of the GreenStep reporting spreadsheet why they are a better fit for your city. For example, you may use Energy Star's Portfolio Manager or a proprietary building program, though GreenStep has not seen the ability of these programs to calculate actual-to-predicted ratios based on Minnesota's changing building code, nor to compare your city's data to other city data by type of building in Minnesota.

DATA SOURCES

- B3 Program Data at <https://mn.b3benchmarking.com> (Elements 1.1-1.3)
 - Note: Energy bill data through December 31st for all buildings must be put into the B3 system before the system can accurately calculate the GreenStep measures.
- Public works data; work orders; city purchasing data. (Elements 1.4-1.6)

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- Utility data reported under franchise agreements. ([Elements 1.1-1.3](#))

CALCULATION AND PUBLIC REPORTING

- **Category C GreenStep cities** that do not own or lease buildings should note that on the Step 4 reporting spreadsheet.
- **kBtu per square foot, per year** in all city buildings is calculated by the B3 database for the year proceeding the reporting year. When logged into your City's B3 Benchmarking Database page, use the "Report" dropdown menu to select EUI Report. Click "Show Report Options" and set the "Duration" section dropdown as Jan to Dec for the reporting calendar year. In the "Consumption Summary By Year" table, report the number shown under "Actual kBtu/SF." ([Element 1.1](#))
- **Dollars spent on energy per square foot, per year** in all city buildings is calculated in a similar way by the B3 database for the year proceeding the reporting year. Under the REPORTS tab, use the "Report:" dropdown menu to select EUI Report. Click "Show Report Options", then under the "Meters & Units" section and the "Units" dropdown menu select Dollars. Set the "Duration" section dropdown as Jan to Dec for the reporting calendar year. In the "Consumption Summary By Year" table, report the number shown under "Actual Dollars/SF." ([Element 1.2](#))
- **Ratio of actual energy use to predicted energy use** is also calculated in a similar way by the B3 database for the year proceeding the reporting year. Under the Reports Tab, use the "Report" dropdown menu to select Benchmark Report. Click Show Report Options and set the "Duration" section dropdown as Jan to Dec for the reporting calendar year. In the "Consumption Summary By Year" table, find the number under "Actual kBtu/SF" (includes only the sites that can be benchmarked), and divide it by the number under "Benchmark kBtu/SF" to get a ratio above or below 1.0 (lower is better) and report the ratio. If there is no Benchmark number, report the number shown next to "Index Ratio" from the BENCHMARK tab, note on the report where the number was taken from, and contact the B3 staff to correct the problem on the REPORTS tab. ([Element 1.3](#))
- **Percent of LEDs** can be a calculated number or an estimated number. First, count or estimate the number of installed LED fixtures in street lights on the December 31st before the reporting year. Then, divide by the count or estimate of total street lights. Repeat this procedure for traffic signals and building/property lights. Express the ratios as percentages. ([Element 1.4-1.6](#))

RATIONALE

In city buildings, the owner is also the tenant and thus all cost savings from short and long-term efficiency investments will accrue to the city and its taxpayers. Additional benefits from such investments include reducing greenhouse gases and lowering exposure to fuel price volatility. Energy efficiency (and other sustainability) opportunities abound in existing buildings, which are in a constant drift toward inefficiency. Many of the opportunities not only reduce operating costs, but improve occupant quality of life, create higher resale value, and improve worker productivity. The B3 database allows cities to compare sq. ft. energy use among all buildings of the same type across Minnesota. This makes it possible to target energy improvements to the lowest-performing buildings, investments which yield the greatest ongoing payback.

LEDs: probably the easiest and most cost-effective measure a city can do to improve energy efficiency is to convert lighting to LED technology. Payback periods can often be measured in months, not years. Utility and other financial incentives exist, and city staff need only assess and choose equipment, vendors and payment options. Therefore this is a simple measure that aims to focus attention on completing a transition to 100% LED fixtures such that savings begin accruing faster.

STEP 5 TARGETS

Though no state targets exist for cities, a relevant target is an Executive Order that requires state agencies with operational control over state buildings to achieve an aggregate 20% reduction in energy use from the baseline data entered into the B3 Benchmarking tool after the agency initiates their energy improvements. 20% in the Executive Order is a cumulative number

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

over many years: a very large reduction for one year unless most of the city's buildings undergo major retrofits at the same time. Year over year improvement targets are more reasonably in the 2 -5% range. To calculate yearly improvements:

Under the Reports Tab, in the Report drop down menu, select Baseline Report. Click Show Report Options, then in the Duration section set the dates from Jan to Dec of the reporting calendar year. Then, in the Options section, check Weather Normalize, and immediately underneath select Normalize Baseline from the dropdown menu. In the Comparison section, select Baseline and then click on the calendar and in the Baseline Editor that pops up click on January of the calendar year immediately preceding the reporting calendar year (e.g. Jan 2014 for CY2015). Click on Save and Close. Report both the Change From Baseline kBtu/SF and the % Change.

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February 2017

#2: GREEN BUILDINGS

OPTIONAL METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- **Public Buildings**
 - 2.1 **Number of city-owned (municipal) green certified buildings**
 - 2.2 Identify specific green building frameworks that have been used for city-owned buildings
 - 2.3 Municipal green square footage completed last year
 - 2.4 Percent of new municipal square footage that was green building certified in the last year

- **Private Buildings**
 - 2.5 **Number of private (non-municipal) green certified public buildings**
 - 2.6 Identify specific green building frameworks that have been used for private buildings
 - 2.7 Private green square footage completed last year
 - 2.8 Percent of new private square footage that was green building certified in the last year

DEFINITIONS

- **Include all buildings built, renovated, or maintained within the city** that are rated, certified, or verified by a third party as meeting minimal qualifications under a green building framework listed under GreenStep best practice action 3.1 (<http://www.pca.state.mn.us/6p38rhu>)
 - Include **public buildings** (owned by the city). (Element 2.1-2.4)
 - Include all **private buildings** (not owned by the city) within city limits that were built new or were expanded/renovated and/or are operated and maintained under a green building framework. (Element 2.5-2.8)
 - **Green building frameworks** include:

| | | |
|---------------|----------------------|--|
| LEED | Green Globes | IgCC |
| ENERGY STAR® | Minnesota GreenStar | Minnesota Green Communities |
| AHRAE 189.1 | ICC 700 | Indoor airPLUS |
| Passive House | Minnesota Green Path | B3-MSBG |
| | | Living Building Challenge (or Petal Recognition) |
 - **If a building “meets” minimal qualifications but is not third-party rated**, the city must submit a building expert’s credit calculation for that building. For example, if a builder reports to the city that all their housing units “meet LEED standards,” the city would ask for the architect’s LEED checklist and submit that to the GreenStep program.

- **Green building frameworks may include city-defined green building standards.** Buildings may be included that qualify as a green building under a city program that has clear criteria which are publicly announced on the city’s web site. (Elements 2.2 and 2.6)

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

A city-defined green building framework should conform roughly to this MPCA definition:

- Green building, also called sustainable or high-performance building, means a significantly reduced impact on the Earth's resources compared to conventional building practices.
- We define a green building as one that is both economical to operate and healthy and comfortable for its occupants. It conserves resources (including energy, water, raw materials and land) and minimizes the generation of toxic materials and waste in its design, construction, landscaping, operations and maintenance. A green building includes the sustainability of its site. It also considers historic preservation and access to public infrastructure systems, as well as the entire life cycle of the building and its components.
- **Alternative Elements:** If you have been gathering or want to gather different data, report those and explain why they are a better fit for your city.

DATA SOURCES

- City building permits ([Elements 2.1-2.8](#))
- County tax records (for square footage) ([Element 2.7](#))
- Relevant city/state/national program data ([Elements 2.1-2.8](#))
- City staff knowledge of private development projects ([Elements 2.5-2.8](#))

CALCULATION AND PUBLIC REPORTING

- **Total city-owned and private green buildings in the city** – calculated for December 31 of a specified year. These are cumulative numbers, counting all existing buildings built to or operated under green standards over the previous years. The GreenStep program will normalize these data and report green buildings per 1,000 residents. ([Elements 2.1 and 2.5](#))
- **Municipal green square footage completed last year** is the total square footage of all new city-owned/controlled green buildings completed by December 31st of that year ([Element 2.3](#)). Divide that number by the total square footage of all new permitted buildings completed during the past calendar year, reporting the ratio as a percentage ([Element 2.4](#)). Follow the same procedure for private green square footage ([Elements 2.7 and 2.8](#)).

RATIONALE

Green buildings - including both the building and the building site - present an opportunity to shape the face of a city and to "cement in" reduced operating costs and other benefits beyond what results from conformance with the State Building Code. Studies in Minnesota and nationwide have shown that green buildings deliver numerous benefits to the building owner, the building tenant, to the community, and to society. Benefits include capital cost savings (in some cases), reduced operating costs, higher resale value, increased occupant health and productivity, heat island mitigation (through building and site design), and decreased energy, water, and materials use. City and private investments in buildings can be maximized by incentivizing the use of green building frameworks, which include codes, standards, rating systems with certification, and guidelines with verification.

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February 2017

#3: City Fleets

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NAL METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

City Vehicles:

- 3.1 Vehicle miles traveled (VMT) for gasoline fleet
- 3.2 **Average miles per gallon (MPG) for gasoline fleet**
- 3.3 Vehicle miles traveled (VMT) for diesel fleet
- 3.4 **Average miles per gallon (MPG) for diesel fleet**
- 3.5 Number of electric vehicles in city fleet

DEFINITIONS

- **City vehicles** include owned and leased utility vehicles, cars, vans, trucks, and heavy equipment, such as those used in snow plowing, street sweeping, earth-moving, and construction. Include police cars, other emergency vehicles, and NEVs (neighborhood electric vehicles: battery electric vehicles with a top speed of 25 MPH and which, while usually used by parks departments, can be driven on public roads). Also include data from city-employee-owned vehicles used for city business for which the city reimburses employees. Transit and school buses are generally excluded because they are not fully owned and controlled by city government. ([Elements 3.1-3.5](#))
- **A city's fleet is divided** for the purposes of this metric into gasoline, diesel-fueled, and electric vehicles. Typically these are distinct fleets: passenger cars, heavy-duty vehicles, and full-electric cars, with widely divergent average miles per gallon efficiency. ([Elements 3.1-3.5](#))
- **Vehicle miles traveled for gasoline fleet** include those miles driven by hybrid electric and hydrogen fuel cell vehicles. ([Element 3.1](#))
- **Average miles per gallon for gasoline fleet** are not adjusted (normalized) for the differing energy content of standard gasoline (E10), E85, and other ethanol blends. The gallons of different blends should all be added together. Gasoline gallons also do not count gasoline-equivalents for electricity and hydrogen used in hybrid electric and hydrogen vehicles. ([Element 3.2](#))
- **Vehicle miles traveled for diesel fleet** include those miles driven by CNG (compressed natural gas) vehicles. ([Element 3.3](#))
- **Average miles per gallon for diesel fleet** are not adjusted (normalized) for the differing energy content of standard diesel (B10) and other blends. The gallons of different blends should all be added together. Diesel gallons also do not count gasoline-equivalents for natural gas used in CNG vehicles. ([Element 3.4](#))
- **Electric Vehicles** are owned and leased vehicles where the drive-train is powered exclusively by an electric motor. This would include NEVs, all electric vehicles such as the Nissan Leaf, and also the Chevrolet Volt and similar cars where the gasoline engine charges the battery. ([Element 3.5](#))

DATA SOURCES

- City fleet data ([Elements 3.1-3.5](#))

- City administration, public works, and parks departments ([Elements 3.1-3.5](#))

CALCULATION AND PUBLIC REPORTING

- **VMT for the city's gasoline and diesel fleets** are total miles driven during the calendar year preceding the reporting year by various vehicles as defined in the Definition section. ([Elements 3.1 and 3.3](#))
- **MPG for the city's gasoline and diesel fleets** are calculated as follows: total all miles driven during the calendar year preceding the reporting year by various vehicles as defined in the Definition section (this is the VMT); divide gasoline fleet miles by total gallons of gasoline used, and divide diesel fleet miles by total gallons of diesel used. The two numbers represent each fleet's average miles per gallon. ([Elements 3.2 and 3.4](#))
- **For electric vehicles**, report the number owned or leased by the city as of the December 31st preceding the reporting year, and report total miles traveled by all electric vehicles during the calendar year preceding the reporting year. ([Element 3.5](#))

RATIONALE

Tracking miles driven and gallons used is widespread and simple to do for two generally distinct vehicle categories. The two resulting measures are simple ones for city leaders and tax payers to track. Improvements in MPG represent a mix of cost and energy savings and fewer air emissions from improved vehicle efficiency and improved fuels. In simplifying the MPG average calculation by not counting the gallon-equivalent energy content of hybrid and hydrogen electricity and CNG, phasing in of such vehicles is incentivized by the resulting higher MPG numbers.

Electric vehicles are tracked separately, as their superior technology converts 59%–62% of the electrical energy from the grid to power at the wheels, as opposed to the inefficiency of conventional gasoline vehicles that convert only 17%–21% of the energy stored in gasoline to power at the wheels. See GreenStep's best practice #13 at <http://www.MnGreenStep.org> for ongoing life-cycle research on EVs that is dispelling various myths about oil vs. coal pollution, total transport energy, battery recycling, total costs, and other issues.

STEP 5 GOALS

Individual cities are best equipped to set realistic goals for improvement, and any improvement in this metric is good. That said, the State of Minnesota has the following goals:

- To transition 30% of total gasoline used in the state to biofuels by 2025.
- Past state agency fleet goals: (1) use vehicles with fuel efficiency ratings that exceed 30 miles per gallon for city usage or 35 miles per gallon for highway usage; (2) reduce the use of petroleum-based diesel fuel in on-road vehicles by 10% by 2010 and by 25% by 2015, using 2005 as a baseline; (3) reduce the use of gasoline in on-road vehicles by 25% by 2010 and by 50% by 2015, using 2005 as a baseline.

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February 2017

#4: INFRASTRUCTURE FOR WALKING & BICYCLING

OPTIONAL METRIC FOR CATEGORY A, B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 4.1 Miles of new or reconstructed sidewalks & trails completed in the past year
- 4.2 % of housing within 1 mile of a bicycle route**
- 4.3 Walk Score for your city or downtown

DEFINITIONS

- **Miles of new or reconstructed sidewalks & trails** include lengths of sidewalks added along streets and in parks where previously there were none, lengths of existing sidewalks that were substantially reconstructed (not just patched or repaired) and replaced, and lengths of new and reconstructed walking trails. (Element 4.1)
- **Bicycle routes** include marked on-road bicycle routes, marked/mode-separated bicycle lanes, and off-road bicycle paths (which include multi-use and unpaved paths). (Element 4.2)
- **Housing** includes residential housing units. (Element 4.2)
- **Walk Score** attempts to calculate and express with a number between 0 and 100 the degree to which a city (either on average, or in a specific address such as the 'center of downtown') facilitates people to walk/shop in it. It is an imperfect (especially for smaller cities) measure of walkability (existence of sidewalks) and mixed uses (existence of various commercial/civic destinations that one can walk to). Imperfections include Walk Score's inability to factor in the walking experience: we know for example that walkers rarely use an unshaded sidewalk closely sandwiched between a busy road and windowless building walls, despite useful commercial destinations close by. Additionally, Walk Score fails to count all businesses (such as home-based businesses, new businesses) and civic/useful destinations (such as family daycares). See details at <https://www.walkscore.com/methodology.shtml> (Element 4.3)
- **Alternative data elements:** if you have been gathering different data, report those and explain how they differ from these GreenStep elements and why you feel they are a better fit for your city.

DATA SOURCES

- City public works/engineering/parks records (Elements 4.1 and 4.2)
- GIS maps and/or city plat maps and census tract data (Element 4.2)
- <http://www.walkscore.com> (Element 4.3)

CALCULATION AND PUBLIC REPORTING

- **Count sidewalk and trail lengths added in the year** ending December 31st before the reporting year. While this element counts non-motorized routes, if including new snowmobiling trails makes sense for your city, report that in the notes section of the GreenStep reporting spreadsheet.
- **Sidewalk miles will be normalized** and reported on the GreenStep web site as annual new miles per 1000 residents. (Element 4.1)
- **Using a GIS system**, map a boundary (or zones if multiple bike routes) within which street biking (or, as the crow flies) is within 1 mile of a bike route/lane/path. Then calculate the number of residential dwelling units within the

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

boundary or zones. Finally, compare the number of units to total units in the city and express the ratio as a percent, which is a gauge of people's access to a minimum quality biking experience. (Element 4.2)

- **For smaller cities**, dwelling units in census tracts within a mile of bike routes can provide rough estimations. Or estimation from a city plat map may work fine. (Element 4.2)
- **At the Walk Score website** either type in your city name and report the resulting score, or type in the street address of what you consider the heart of your city and report that score. Other approaches could be used – for example, averaging the scores resulting from street addresses in the middle of each of your defined neighborhoods or each zoning district. The overall city average number will change if, for example, a large superblock is split by walkways/streets and if new businesses open. But usually the number will not change much from year to year. Yet the number remains as a reminder that the city can take actions to change the number. (Element 4.3)

RATIONALE

These three data points attempt to show the degree to which a city has and is building physical infrastructure – sidewalks, trails and bicycle routes – and mixed used development that allow, facilitate and encourage walking and bicycling. Reasons for city action in this area are many:

- 1) Forty percent of Minnesotans do not have a driver's license, cannot afford a car, or are either too young or old or too disabled to drive a car. As stated by Gil Penalosa, proponent of the "8-to-80 city" (<http://880cities.org>), *If you create a city that's good for an 8-year old and good for an 80-year old, you will create a successful city for everyone.*
- 2) Forty percent of U.S. auto trips are less than 2 miles, and 28% are less than 1 mile - a healthful, walkable distance for many people much of the year in Minnesota - yet most of these trips are taken by car.
- 3) Walking and bicycling options and supportive city infrastructure that allow a household to eliminate one of two cars saves an average of \$7,000/yr. which, if applied to a home mortgage or home equity loan, could finance \$108,000 (assuming a 30-yr. fixed 5% mortgage).
- 4) The National Association of Realtor's 2011 Community Preference Survey reveals that most Americans would like to live in walkable communities - where walking is desirable because of shops, restaurants, and local business within an easy walk from their homes - as long as those communities can provide detached single-family homes.

However, not every street and not every part of a city warrants sidewalks and bicycle routes, and streets that do may not warrant them on both sides of the street. So as is often the case, cities must view these data elements within the context-sensitivity of their own city and think more of comparing one's own numbers over time, not so much comparing your city to another city.

STEP 5 GOALS

A statewide Bicycle Plan and Pedestrian Plan exist, but at present there are no state-wide goals for cities. Therefore, individual cities are best equipped to set realistic goals for improvement. For example, in some small towns, no new/reconstructed sidewalks nor additional bicycle routes over time may be just fine, as the facilities are at 100% already. Or, a low Walk Score may simply represent a small town that can support only a handful of businesses/civic destinations.

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Minnesota GreenStep Cities
Performance Metrics for Recognition at Steps 4 and 5

February 2017

#5: CAR, TRANSIT, & BIKE OPTIONS

OPTIONAL METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- **Non-Gasoline or Diesel Fueling Stations**
 - 5.1 **Number of electric vehicle charging stations**
 - 5.2 Number of alternative fueling stations (e.g. e85, CNG)
- **Mobility Options**
 - 5.3 Does your city have a bike-sharing service? (Yes or No)
 - 5.4 Does your city enable car or ride-sharing services? (Yes or No)
 - 5.5 Number of telecommuting businesses/services
 - 5.6 Is the city served by weekday transit? (Yes or No)
 - 5.7 Does the city have structured transit routes? (Yes or No)
 - 5.8 Percent of housing units within ¾ miles of transit routes

DEFINITIONS

- **Number of electric vehicle charging stations** includes those gas stations and other sites that have one or more cords/fixtures for electric vehicle charging. (Element 5.1)
- **Number of alternative fueling stations (e85, CNG)** includes both the number of businesses with stations open to the **public** and the number of sites with EV charging and pumps for **private** use (such as city fleets, private fleets). (Element 5.2)
- **e85/other alternative fueling stations** include sites that dispense ethanol above the 10% state standard (such as E-85), biodiesel pumps selling biofuels above the 10% state standard, and compressed natural gas (CNG) and hydrogen pumps. (Element 5.2)
- **Bike sharing services** include bike-shares such as NiceRide or campus-based “yellow bike” programs. (Element 5.3)
- **Car or Ride-sharing services** include services such as HourCar, the availability of ride-sharing services such as taxi companies and Uber and Lyft van-pool services, organized ride-sharing services organized by a transit agency or by a campus or other entity (“ride boards”), but does not include dial-a-ride transit. (Element 5.4)
- **Telecommuting services** include telework and telemedicine sites/businesses open to the public, and the presence of a service such as eWorkPlace.com in your city. (Element 5.5)
- **Weekday transit** means transit available at least 9 hours a day, 5 days a week. (Element 5.6)
- **Transit** includes fixed-route transit service, deviated fixed-route service (where there is an established route but buses may stray roughly one mile from the fixed route), and dial-a-ride service (that may be run by organized volunteers, and where one may need to arrange a ride 24 hours in advance). (Element 5.6)
- **Structured routes** for GreenStep purposes means that the city is served by transit that has structured routes with established times and stops. This includes fixed-route and deviated fixed-route service. (Element 5.7)

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- **Housing** means residential dwelling units: count those that are within $\frac{3}{4}$ mile of a transit stop (bus, streetcar, LRT, commuter rail) and, for deviated fixed-route service, count dwelling units within one mile of the entire bus route. Dial-a-ride service is not included in this percent of housing measure. (Element 5.8)
- **Alternative data elements:** If you have been gathering different data or want to gather different data, report those and explain how they are a better fit for your city.

DATA SOURCES

- Lists by city of publicly available fueling stations are at <http://www.afdc.energy.gov/fuels/> and for the most up-to-date EV information, see <http://www.plugshare.com/> (Elements 5.1 and 5.2)
- City licenses, records, and common knowledge of city staff will be needed for counting the private fueling stations and the sharing services. (Elements 5.2-5.5)
- GIS maps, data from transit service web sites, city plat maps, and census tract data. (Element 5.8)

CALCULATION AND PUBLIC REPORTING

- **Annual measurement and reporting** for each of these data elements is based upon the cumulative numbers as of December 31st before the reporting year.
- **Fueling stations and sharing services will be normalized** and reported on the GreenStep web site as number of stations, and number of services, per 1000 residents.
- **Using a GIS system**, map a boundary (zones if multiple transit routes) within which street walking (or, as the crow flies) is within $\frac{3}{4}$ miles of all stops and 1 mile of deviated fixed-routes. Then calculate the number of residential dwelling units within the boundary/ies or zones. Finally, compare the number of units to total units in the city and express the ratio as a percent. A more detailed description of this GIS approach and links to data are at: <https://www.sustainablecommunities.gov/percentage-population-served-transit> (Element 5.8)
- **For smaller cities**, dwelling units in census tracts close to transit routes can provide rough estimations, or estimation from a city plat map may work fine. (Element 5.8)

RATIONALE

GreenStep cities across Minnesota report the development and use of transportation options beyond single occupancy vehicle (SOV) fossil-fueled trips for every transportation need. This metric tries to track the growth of options in a city. It covers fueling options for vehicles with a lower greenhouse gas footprint, in addition to those lower-fossil-fuel, non-SOV options.

Studies show Minnesotans are willing, on average, to walk up to $\frac{3}{4}$ mile to access a transit stop with at least hourly transit service, and so GreenStep picked this threshold. Studies also show, however, that economic viability of regularly scheduled transit requires housing densities, for portions of cities, above what we tend to see in many Minnesota cities. For example, as a very rough rule of thumb, at least 15 dwelling units per acre are needed to support one rush hour bus every 15 minutes. And very high levels of walking are facilitated in neighborhoods or mixed-use areas with about 20 housing units per acre.

The question for cities over a generation or two is: do we introduce transit first (and have to initially more heavily subsidize it) and then build denser, more mixed-use nodes, or do we build (zone) first (and increase congestion) and then introduce transit? Cities must fine-tune an evolution to fit their community culture, accepting the co-existence of several density zones within the city and region.

STEP 5 GOALS

Minnesota GreenStep Cities
Performance Metrics for Recognition at Steps 4 and 5

There are no state-wide goals for this metric nor any guidance useful at this point in time for all cities in Minnesota. Therefore, individual cities are best equipped to set realistic goals for improvement, and any improvement in this metric – higher numbers, higher percentages – has multiple clear, quantifiable benefits.

[NEED HELP? CONTACT](#)

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February 2017

#6: TRANSPORTATION MODES & MILES

CORE METRIC FOR CATEGORY A & B CITIES; OPTIONAL FOR CATEGORY C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- **Vehicle Miles Traveled**
 - 6.1 **City Population: Vehicle miles traveled per person, per day**
 - 6.2 **City Employees in Single Occupancy Vehicles: Vehicle miles traveled per person, per day**
 - 6.3 Percent of city population commuting 20 or fewer minutes
 - 6.4 Percent of city employees commuting 20 or fewer minutes

- **Transportation mode of commuters**
 - 6.5 Percent using single-occupancy vehicle
 - 6.6 Percent using a car/van pool & ride sharing
 - 6.7 Percent using transit
 - 6.8 Percent who bike or walk
 - 6.9 Percent working from home/telecommuting

DEFINITIONS

- **VMT (vehicle-miles traveled)** within city boundaries totals all miles measured and estimated to have been traveled by all road vehicles annually. Normalizing this total by a city's population and dividing by 365 gives an average VMT per person per day. (Element 6.1)
- **Percent of city population, and of city employees, who commute** to work in fewer than 20 minutes from home roughly captures the extent to which a city has a close and socially/personally beneficial mix of housing and employers, and thus the relative need for roads, transit and other transportation infrastructure like sidewalks. (Elements 6.3 and 6.4)
- **Transportation modes of commuters** in the city are estimated averages, counting journey-to-work trips by all employed people within the city, 16 years and older. (Elements 6.5-6.9)
- **Carpools** include van pools and ride sharing services (taxis, Uber, Lyft). (Element 6.6)
- **Alternative data:** If you have been gathering or want to gather different data, report those and explain why they are a better fit for your city. For example, you may want a different commuting time break point – perhaps under/over 15, or 30 minutes, or more than one percentage break point - to better reflect local conditions and commuting factors.

DATA SOURCES

- Regional Indicators Initiative has VMT per person, per day for selected cities, at <http://www.regionalindicatorsmn.com/travel-chart> (Element 6.1)
- Annual VMT for all city roads (federal, State, county, local) is MnDOT data, <http://www.dot.state.mn.us/roadway/data/> (Element 6.1)
- Percent of city population commuting by time from the Census' American Community Survey (ACS) table S0801: Travel Time to Work (Element 6.3)

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- Commute mode for all workers is found in the Census' American Community Survey (ACS) table B08301: 3-year estimates through American FactFinder 2 at <http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml> (Elements 6.5-6.9)
- City mapping data, city employee survey data, timesheet data for employee commuting trips (Elements 6.2 and 6.4)

CALCULATION AND PUBLIC REPORTING

- **Report VMT using** the annual MnDOT data, which totals all miles traveled by all road vehicles annually and normalizes it for each city by population to yield VMT/capita/day. Use data for a one-year period ending before the GreenStep reporting year. (Element 6.1)
- **Percent of city population commuting** fewer than 20 minutes is from the American Community Survey (ACS). Go to your city, click "Business and Industry" on the left, then go to "Commuting Characteristics by Sex." It displays table S0801. Use the latest data before the GreenStep reporting year. (Element 6.3)
- **Travel mode for all workers** comes from ACS table B08301, 3-year estimates. Use the dataset Community Characteristics by Sex for the appropriate city or county. Use the most recent 5-year estimate if a 3-year estimate is not available. (Elements 6.5-6.9)
- **Percent of city employees commuting** fewer than 20 minutes from home requires either estimates using employee home addresses and Google Maps or data from an employee survey. (Element 6.2)

RATIONALE

Vehicles are typically a significant expense for individuals, roads are usually a significant expense for city budgets, and vehicle emissions exact documented high health care costs and are a key contributor to greenhouse gases. In 2012, on-road transportation accounted for 27% of the average total of GHG emissions for the 22 cities participating in Minnesota's Regional Indicators Initiative.

Cities - through what they directly administer and in what they influence - can lower these transportation costs by providing and incentivizing more transportation options to their residents, businesses, and employees. Data on VMT, commute time and modal split is an essential first step, because it's hard to manage changes in what you don't measure.

STEP 5 GOALS

Among the Minnesota Department of Transportation's legislatively delegated authorities and purposes are the goals of: (1) promoting and increasing bicycling and walking as a percentage of all trips as energy-efficient, nonpolluting, and healthy forms of transportation, and (2) reducing greenhouse gas emissions from the state's transportation sector. Supporting these goals are Statewide Health Improvement Program (SHIP) dollars from the Minnesota Department of Health to increase active transportation in communities and work sites.

There are no statewide goals for this metric nor any useful guidance at this point in time for all cities in Minnesota. However, the national STAR Community Rating System (<http://www.starcommunities.org>) challenges cities to set a drive-alone maximum mode share of 60% and a bike + walk + transit minimum mode share of 25%. At this point in time GreenStep thinks individual cities are best equipped to set realistic goals for improvement, and any improvement in this metric – lower VMT, shorter commutes, mode-shifting away from single-occupancy car use – has multiple clear, quantifiable benefits.

NEED HELP? CONTACT

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February 2017

#7: LAND USE

CORE METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 7.1 % of land within commercial/mixed zoning districts built with a FAR at/above 1.0
- 7.2 % of land within residential/mixed zoning districts with dwelling units per acre (DUA) at/above 7.0
- 7.3 Market value per acre
- 7.4 Location Affordability Index numbers (three)
- 7.5 Acres of new development on previously developed land
- 7.6 **New affordable housing units as a percent of all new housing units**

DEFINITION

- **FAR (Floor area ratio)** is a common “building intensity” measure: gross floor area in a building divided by the lot or parcel size. For example, a structure with two floors of equal size that has a footprint that covers 50% of the lot will have an FAR of 1.0. Add a third floor and the FAR increases to 1.5 (Element 7.1)
- **Dwelling units per acre (DUA)**, similar to FAR, is a measure of rental and ownership housing intensity and specifically density. For this GreenStep Element, total only the housing units within residential (and mixed-use: residential plus commercial) districts that are zoned for a DUA of 1.0 or more, and divide by the net acreage. Exclude those city lands zoned for fewer than one house per acre so as to focus on the core city residential area served by city services such as a sewer collection system. Net acreage excludes undevelopable acres within the residential/mixed-use zoning districts. (Element 7.2)
- **Market value per acre** is a city-wide measure of development “efficiency” and an indicator of the economic sustainability / tax productivity of land use. Total acreage in a city rarely changes, but the total dollar value of the total acreage and buildings does. If a city has many parcels with a low market and taxable value (for example, many parking lots, a high proportion of single family houses on large lots) on which taxes are levied, this results – if the tax rate is not increased or if few nodes of dense development exist - in fewer tax dollars per acre with which to maintain and improve and add infrastructure and with which to provide city services. Total market value, however, is also affected by other factors beyond a city’s control (including building use, parcel ownership by non-profit organizations and inflation). (Element 7.3)
- **Location Affordability Index** estimates the percentage of a family’s income dedicated to the combined cost of housing and transportation in a given location – city, region, or neighborhood. Traditional measures of housing affordability ignore transportation costs. Typically a household’s second-largest expenditure, transportation costs are largely a function of the characteristics of the neighborhood in which a household chooses to live. Compact and dynamic neighborhoods with walkable streets and high access to jobs, transit, and a wide variety of businesses allow a household to afford more expensive housing because transportation costs can be cut dramatically. However, in greater Minnesota, the transportation percentage may be larger than the housing percentage and reporting the combined percentage and the two separate percentages can be very useful to a city. (Element 7.4)
- **Acres of new development on previously developed land** is an “in-fill” measure that should track increases in city-wide market value per acre and yet should change more dramatically each year. It focuses attention on developments that, rather than requiring more costly extension of city services as does “greenfield” development, better utilize existing infrastructure, make an area more viable for improved transit service, and enhance the economic and social viability of an area. (Element 7.5)

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- **Affordable housing** uses a federal definition and is a serious issue for many Minnesota cities, resulting, for example, in the inability for basic workers such as teachers to live close to where they work. As acres of infill development is to market value per acre, new affordable housing tracks the Location Affordability Index number, changing more dramatically each year and counts both the addition of new rental and ownership housing units and conversions of units into affordable units. (Element 7.6)
- **Alternative data elements:** If you have been gathering different data or want to gather different data, report those and explain how they are a better fit for your city.

DATA SOURCES

- City records, zoning and plat maps, and if available, your Geographic Information System.
- City, County property assessor's records.
- Annual LMC report at <http://www.lmc.org/page/1/property-tax-reports.jsp>
- Building permit records.
- <http://www.locationaffordability.info/lai.aspx> (Element 7.4)

CALCULATION AND PUBLIC REPORTING

- **Annual measurement and reporting** for these data elements is based upon 12 months as of December 31st before the reporting year. Acres of infill development and of new affordable housing will likely change significantly each year. The other elements will likely change slowly and so cities may choose to re-measure them every 2-3 years. In years when no re-measurement is done, simply repeat the previously years' measure and report this in the notes section of the GreenStep reporting form. (Elements 7.1-7.6)
- **% of land within commercial/mixed zoning districts built with a FAR at/above 1.0:** Ideally, use a spreadsheet of property tax records to total gross floor area of all buildings within city land zoned for commercial and mixed use, and divide that total by the total footage of all parcels in those zoning districts. Use permit records to update the data annually. See more details on calculating FARs under Land Use at <http://www.metrocouncil.org/Handbook/Resources.aspx> (Element 7.1)
- **% of land within residential/mixed zoning districts with dwelling units per acre at/above 7.0:** First, take data only from residential and mixed-use (residential plus commercial) districts that are zoned for a DUA of 1.0 or more. Ideally, use a spreadsheet of property tax records to total housing units within those relevant zoning districts and divide that total by the net acreage of all land in those zoning districts. Use permit records to update the data annually. See more details on calculating net residential density under Land Use at <http://www.metrocouncil.org/Handbook/Resources.aspx>
Net acreage excludes undevelopable acres within the residential/mixed-use zoning districts: land covered by arterial road rights-of-way, wetlands, water bodies, public parks and trails, public open space, and other land protected by local ordinances such as steep slopes. (Element 7.2)
- **Market value per acre:** Total the market value in dollars of all parcels (land plus buildings) in the city, and divide by the total land acres within city limits. (Element 7.3)
- **Enter your city name into the Location Affordability Index** web site and report (1) the resulting percentage of a family's income dedicated to the combined cost of housing and transportation in the city, (2) the percent of income going to housing, and (3) the percent going to transportation. Use the default values on the web site – median-income family, combined rental/ownership – but change them if the resulting calculation is more relevant and report this in the notes section of the GreenStep reporting form.
- Because what is affordable is different for everyone, users can choose among eight different family profiles--defined by household income, size, and number of commuters--and see the affordability landscape for each one. (Element 7.4)
- **Acres of new development on previously developed land:** Consider as "previously developed" those parcels where the built (improved) value of the parcel was at least 10% of total parcel value (land plus building value) prior to the new development. Therefore do not count empty lots on the edge of, or within, the city that have never been built

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

on. Count the gross footage (converted to acres) of construction on: parcels where an empty building is demolished; on brownfields (unused, abandoned parcels); on parcels where the building is more than 50% reconstructed; on parcels where a vacant/abandoned building is rehabilitated.

If counting empty lots never built on makes this measure much more relevant for your city, do so and report this in the notes section of the GreenStep reporting form. (Element 7.5)

- **New affordable housing units:** According to US Housing and Urban Development, housing is affordable “when the occupant(s) is/are paying no more than 30% of their income for gross housing costs, including utilities. Some cities may define affordable housing based on other, locally (for example, county) determined criteria and should note that criteria in the notes section of the GreenStep reporting form. For each GreenStep reporting year, total the number of affordable housing rental and ownership units created within the city – either new construction, or reconstruction, or financially restructured units. Divide that total by the total number of all new housing (rental and ownership) created in the city during the year and report the percentage.

The Twin Cities Metropolitan Council has established new affordable housing targets for all metro cities for the period 2020 – 2040. GreenStep cities may report as an alternative data element (and note this on the GreenStep reporting form) new affordable units each year as a percent of their 2040 target. (Element 7.6)

RATIONALE

Land use exceeding FAR and DUA thresholds. Cities have authority over the two interrelated factors with the greatest long-term potential to increase energy efficiency, reduce greenhouse gas emissions, and buttress financial security: land use (through comprehensive planning) and transportation, especially public transportation. By choosing a mix of allowing, encouraging, facilitating, incentivizing and requiring a higher commercial and residential intensity and density (and mixed-use development) in already developed areas, cities can help create compact, human-scaled communities that are walkable and transit friendly, and that offer a more complete mix of uses, services, and housing options for families at all income levels. A FAR above 1.0 generally results in buildings with two or more floors – an historically durable and financially productive building form in Minnesota – and thus 1.0 is set as a GreenStep threshold measure. A DUA at/above 7.0 is the threshold established by the national STAR Community and LEED for Neighborhood Development rating systems - largely because long-term viability of transit and infrastructure replacement becomes difficult below 7.0. In state policy, as a condition for funding, Minnesota Housing requires 6+ DUA for single-family projects.

Market value per acre. As the adage goes - “land: they ain’t makin it anymore” – and so it makes sense to make existing acres more productive in terms of taxes. A narrower and related measure that has been explored in the rural Twin Cities exurban areas is property taxes collected per linear foot of road, a key indicator for tracking and answering the basic question of whether enough tax money is being saved so that roads can be repaired/rebuilt as their useful life ends. **New development on previously developed land** is the major way to increase market and taxable value per acre and has been chosen as a Metropolitan Council measure in its Thrive MSP 2040 plan, which has a focus on growth in infill areas and on redevelopment that does not require the extension of water, sewer, and road infrastructure.

The Location Affordability numbers help the city, businesses and residents get a more complete understanding of the costs of living in the city, pointing to aspects of housing and transportation where changes can result in financial savings to individuals.

New affordable housing. A mix of housing opportunities is valued by all cities and cities typically measure a number of data points: median or average rents; rental vacancy rates; home sale numbers and median price; number of houses on the market; percent housing affordable [to some defined subset of the population]; mix of rental, ownership and senior housing; mix of single-family housing and 2-4-plexes and multi-family housing. An argument can be made for the preeminent value of any one measure for a specific city. That said, affordability and the need to add more affordable housing is a widely shared need among Minnesota cities and thus GreenStep has chosen this measure.

- Being mindful however of the Location Affordability Index, this data element is not to be construed as simply “the more the better.” Building affordable units in locations that lack the public transportation infrastructure and social

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

service networks that lower-income households so importantly benefit from is not necessarily good public policy; nor is over-concentrating affordable housing, for example, in a central city location.

STEP 5 GOALS

There are no state-wide goals for this metric nor any guidance useful at this point in time for all cities in Minnesota. Therefore individual cities are best equipped to set realistic goals for improvement, and any improvement in the metric has multiple clear, quantifiable benefits.

The national STAR Community Rating System does set these two relevant targets:

- Aim for at least 75% of new housing units in each 3 year period to utilize existing water and sewer mains and existing roads without widening them.
- Aim for households, in at least 80% of those Census block groups that earn at or below the Area Median Income, to spend less than 45% on housing and transportation costs combined.

NEED HELP? CONTACT

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February 2017

#8: OPEN SPACE, PARKS, TREES

CORE METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- **Open Space**
 - 8.1 Percent of total city acres in open space
- **Parkland Quantity & Access:**
 - 8.2 Acres of parkland
 - 8.3 Percent of housing within ½ mile of parkland
- **Tree Canopy**
 - 8.4 Percent canopy coverage
 - 8.5 Three most prevalent tree species (by percent genus)
 - 8.6 **Net number of new trees planted**

DEFINITIONS

- **Open space** for purposes of this measure is pervious land, public or private, that is not built upon. It includes public parklands, street boulevards, green space owned by homeowners associations, private golf courses, surface waters (ponds, lakes, streams, wetlands), empty lots, and working lands (forests and farmland). (Element 8.1)
- **Parkland** is a common measurement nationwide but has no standard definition. GreenStep defines it as protected public lands owned by the city and other governmental jurisdictions, and private land with conservation easements (including lands owned by conservation organizations), and private golf courses open to the public. Public lands include passive parkland, trails, greenways, golf courses, playgrounds, school land, recreation fields, fishing and boating lakes and streams, wetlands with walking access, picnic areas, public pools, and beach and lake access. Land should be legally protected from development through conservation easements, forest preserves, land trusts, and similar conservation mechanisms. (Elements 8.2 and 8.3)
- **Housing** means residential dwelling units: count those that are within 1/2 mile of parkland. (Element 8.3)
- **Percent canopy coverage** is the percent of all acres within city limits that are shaded by trees. measure the canopy over several land use classifications – parkland, residential, commercial/downtown – so as to target urban forestry actions, GreenStep at this point is asking for just one overall canopy measure. (Element 8.4)
- **Prevalent trees** is an estimation of what percent of a city's canopy is occupied by the top three most prevalent genus. For example, in 2014 the City of Burnsville reported that their city parks (not their total city canopy) comprised 23% Maples, 14% Spruce, and 13% Ash. (Element 8.5)
- **Net number of new trees** counts the number of trees – not including trees that replace dead, diseased or damaged trees – planted by the city and trees planted by others for which the city supplies money, labor or trees. While it is important for a city to track the type of trees planted by genus, GreenStep at this point is only asking for a raw net number. (Element 8.6)
- **Alternative data elements:** if you have been gathering or want to gather different data, report those and explain why they are a better fit for your city. For example, you may
 - Exclude private golf courses open to the public or stream/lake acreage in calculating acres of parkland
 - Measure % of population within ½ mile

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- Calculate your ParkScore (Trust for Public Land: <http://parkscore.tpl.org>), which rates park systems equally on three factors: park access, park size, and services and investment
- Track tree canopy coverage for only a subset of city acres. For example, a city whose land area encompasses mostly ag land may choose to measure percent canopy of only city parks, boulevards, a defined downtown, residential areas, and commercial areas

DATA SOURCES

- City maps, GIS maps and data, records, city tree inventories, and common knowledge of city staff (Elements 8.1-8.6)
- The size and location of parkland is usually tracked by local parks & recreation departments (Elements 8.1 and 8.2)
- Met Council's Community Profile at <http://stats.metc.state.mn.us/profile/> (Element 8.2)
- Free i-Tree canopy calculation using Google Maps at: <https://landscape.itreetools.org/> (Element 8.4)
- Statewide LiDAR coverage at 3.3-foot horizontal resolution available from the MN Geospatial Information Office (MnGeo) at <http://www.mngeo.state.mn.us> (Elements 8.1-8.4)
- The University of Minnesota's Remote Sensing and Geospatial Analysis Laboratory at <http://land.umn.edu/> provides satellite imagery for land cover and impervious surface datasets for several time periods for the state of Minnesota , and for more time periods for the Twin Cities Metropolitan Area. (Element 8.1)
- The Global Land Cover Facility of the University of Maryland at <http://www.landcover.org> develops and distributes remotely sensed satellite data that includes forest inventories. (Element 8.5)

CALCULATION AND PUBLIC REPORTING

- **Open space, parkland quantity and access, and canopy coverage and diversity** are annual measures as of December 31st before the reporting year. Since it typically takes a few years to see any change in these numbers, they need not be measured each year. In years when no new measurement is done, simply report the last measurement and note the calendar year during which the measurement was done. (Elements 8.1-8.6)
- **Percent open space** is acres of open land divided by total acres in the city. GIS mapping make such a calculation somewhat easy, but estimates based on city maps and Google maps are also fine. (Element 8.1)
- **Acres of parkland will be normalized** and reported on the GreenStep web site as acres per 1000 population. For cities in the seven-county Twin Cities metro area, use the Met Council web site to find your city. Then click on the tab titled Land Use and Development. Under Generalized Land use, click on Table for the number of acres under Park and Recreational, with or without golf courses. (Element 8.2)
- **Using a mapping (GIS) system**, map a boundary (zones if multiple areas) within which street walking (or, 'as the crow flies') is within 1/2 mile of parkland. Then calculate the number of residential dwelling units within the boundary/zones. Finally compare the number of units to total units in the city and express the ratio as a percent. (Element 8.3)
- **As the crow flies** is a simpler calculation, but for communities with greater GIS capabilities, street network distances more directly capture whether in reality a green space is within ½ miles of a resident's dwelling. (Element 8.3)
- **For smaller cities**, dwelling units in census tracts ½ mile or closer to parkland can provide rough estimations. Or estimation from a city plat map may work fine. (Element 8.3)
- **Percent canopy coverage** is calculated by iTree as acres within the city shaded by trees divided by the total acres within the city boundary. (Element 8.4)
- **Top 3 trees** is the percentage of each in the canopy being assessed. (Element 8.5)
- **Number of net new trees planted** is the only number for which there will be exact new 12-month data each calendar year before the reporting year. (Element 8.6)

RATIONALE

Open space – green and blue - provides a variety of ecological, economic and social goods and services. Ecosystem services include necessities such as air and water purification, stormwater infiltration and management, carbon sequestration, pollination, food and fiber production, nutrient cycling, and urban cooling. Tracking the percent of city acres in open space allows conscious choices about city policies and actions that either increase or decrease the proportion of open space.

Parkland is a subset of open space, which focuses on the extent to which residents can easily and equitably access green/blue spaces that promote activity and support physical and mental health. Spaces designed for congregating and active recreation contribute to healthy and active populations and have a particular impact on children, teenagers and older adults. Parkland also makes neighborhoods more attractive and provides meeting areas and activity hubs that can help build community. One-half mile to a green space is walkable for most people in 10 to 15 minutes without a vehicle and is a national standard.

Tree canopy is the major part of a city's green infrastructure, delivering many financial, energy, quality of life and carbon sequestration benefits that can be calculated by iTree and are well documented on the GreenStep web site. Investments in a city's green infrastructure are analogous to investments in a city's grey infrastructure of roads and utilities (sewer, gas, electric and telecommunication lines). People love and gravitate toward tree-lined streets. Thus tracking coverage, and tree diversity as a hedge against tree health threats exacerbated by climate change, and yearly planting efforts to increase the canopy, are important to a city.

STEP 5 GOALS

There are no state-wide goals for this metric. Individual cities are best equipped to set realistic goals for improvement, and any improvement in the metric is desirable. Nationally there are some rough guidelines, listed below.

Thinking of open space as green infrastructure, a city begins to see climate adaptation benefits when 35% of a city's land area can be characterized as green infrastructure. The national STAR Community Rating System encourages communities to establish a jurisdictional target of 35%, while acknowledging that attaining this standard in highly urban environments may not be realistic.

Acres of parkland can vary widely due to a community's history, culture, demographics, density, development patterns, and distance to parks and open land adjacent to the city. 7 acres per 1000 residents is a minimum cited nationwide, but more like 20 acres is viewed as a reasonable target for most cities. 70% of a city's housing within ½ mile of a park is considered low, with 90%+ a reasonable target for most cities.

An overall city tree canopy of at least 40% is good, with sub-goals for canopy over parking lots of 50%, canopy over residential zones of 60% - 75%, and canopy over commercial/industrial zones at least 15%. A 10-20-30 tree-diversity guideline for reducing the risk of catastrophic tree loss due to pests is to have in the city tree canopy no more than 10% of one species, 20% of one genus, and 30% of one family.

NEED HELP? CONTACT

Jenna Fletcher, GreenStep best practice advisor for Parks and Trails, Trust for Public Land
651-999-5306 or Jenna.Fletcher@tpl.org

Ken Holman, GreenStep best practice advisor for Urban Forestry, MN DNR
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February 2017

#9: STORMWATER

CORE METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENT

9.1 Assessment number (percent) from the Minnesota Blue Star City program

DEFINITIONS

- **The Minnesota Blue Star City Program**, developed by Friends of the Mississippi River, is a self-assessment, certification, and recognition program designed for municipalities and developed in concert with GreenStep's Stormwater Best Practice.
- **This self-assessment covers** a wide range of policies and practices in three areas: Water-Friendly Planning & Preservation; Stormwater Management Standards & Practices (including street sweeping); Stormwater Pollution Prevention (including street salt alternatives).
- **The assessment attempts to express with a percentage** the degree to which a city is minimizing stormwater volume and pollutant loading across its entire land area.
- **Alternative data elements:** if you have been gathering different stormwater data that directly measure city-wide stormwater volume and pollutant loading, report those data and explain why you think they are a better measure than this GreenStep metric.

DATA SOURCES

- City public works/engineering records, and common knowledge of city planning and other staff
- <http://www.bluestarmn.org>

CALCULATION AND PUBLIC REPORTING

- **Complete the assessment by December 31st each year** and report the resulting number in the following GreenStep Step 4 reporting year.

RATIONALE

Increased stormwater runoff and associated water pollution are often a result of land use changes and urbanization, which negatively impact water quality. This, in turn, compromises clean drinking water and fishable, swimmable waters that support plants, animals and our local quality of life. Using the low-impact development, green stormwater infrastructure and maintenance approach reflected in the Blue Star Assessment, pollutant loading from stormwater sources is minimized, water is managed on-site in such a way as to mimic predevelopment hydrology, and water quality benefits are recognized in the receiving waters. Cost savings are typically realized through this approach.

The status of city surface water bodies (into which stormwater flows) has been assessed in many cities, with extensive data available. Cities are at various points in a many-years' process of meeting, as they are established, TMDLs (Total Maximum Daily Loads) of allowable pollutants under the U.S. Clean Water Act. Data and reports from these regulatory activities are generally difficult for community members to understand and act on.

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

This GreenStep metric, in contrast, aims to “go back ‘upstream’” to reflect, with one number, the totality of actions a city is taking to both prevent the generation of stormwater volume and pollutants and to keep them from reaching bodies of water (including groundwater). Extensive evidence exists for the stormwater volume and pollutant efficacy of the specific management practices assessed in Blue Star. The assessment questions, however, do not get directly at city-wide stormwater volumes and total pollutant loads, direct measurement of which is extremely complex and expensive. Thus the Blue Star assessment number is an indicator and not an outcome/direct results measure as are other GreenStep metrics such MWh of renewably generated energy within a city.

STEP 5 GOALS

Individual cities are best equipped to set realistic goals for improvement. Feel free to discuss yours score, ways to improve it, and comparison issues with other cities and with the metric advisor listed below in the Contact section.

Minimal Impact Design Standards (MIDS: see GreenStep action 17.1 at <http://www.MnGreenStep.org>) represents the State of Minnesota’s guidance on cutting-edge stormwater management. MIDS contains three main elements: (1) a higher clean water performance goal for new development and redevelopment, focused on infiltrating rainwater, that provides enhanced protection for Minnesota’s water resources; (2) new modeling methods and credit calculations that standardize the use of a range of innovative structural and nonstructural stormwater techniques; (3) a credits system and ordinance package that will allow for increased flexibility and a state-approved streamlined approach to regulatory programs (TMDLs, impaired waters) for developers and communities.

NEED HELP? CONTACT

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February 2017

#10: DRINKING WATER

OPTIONAL METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 10.1 **Residential gallons used per person per day**
- 10.2 **Business gallons used per job per day**
- 10.3 **Annual city operations' gallons: summer & non-summer**
- 10.4 Ratio of maximum day use to average daily use
- 10.5 Annual energy used per million gallons water distributed (MMBtus)
- 10.6 Annual cost in dollars spent per million gallons of water distributed
- 10.7 **Percent of annual losses in drinking water system**
- 10.8 Trend of source water levels: falling, stable, or rising

DEFINITIONS

- **Exclude water used by other water withdrawal permit holders within the city**, unless you note in your submittal to GreenStep that your city comprehensively tracks and includes this data. Other permit holders include residences with private wells or commercial, industrial, or agricultural uses with separate use permits. Public data exists only for users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. (Element 10.1)
- **Business gallons** include water sold to commercial, industrial, and institutional accounts. (Element 10.2)
- **For city operations**, use of water during the typical landscape irrigation/city pool months of June through October will dwarf water use for city buildings, and so data for November through May water use is a reasonable proxy for baseline water use by buildings. Cities should feel free to use more precise data if it exists. (Element 10.3)
- **Include water losses in gallons used** by residences and by commercial/industrial/institutional accounts. Note that Regional Indicators Initiative data do not include water lost to distribution leakage so as to most accurately represent actual consumption/use by people and use by businesses. (Element 10.7)
- **Exclude wholesale water volumes** - water sold to users not within city boundaries – EXCEPT when calculating percent of losses, MMBtu (million Btus) and dollars per million gallons of water distributed, and trend data.
- **Alternative Elements**: if you have been gathering or want to gather different metrics, report those and explain why they are a better fit for your city.

DATA SOURCES

- City Water Supply Plan submitted to the MN Dept. of Natural Resources
- City records
- B3 water tab data
- Infrastructure Stress Transparency Tool (MN State Auditor): <https://www.auditor.state.mn.us/maps/>
- Regional Indicators Initiative: note the RII commercial/industrial category combines businesses and city operations gallons.
- Jobs data from North American Industry Classification System (NAICS) and the Quarterly Census of Employment Wages (QCEW) - <http://mn.gov/deed/data/data-tools/qcew/index.jsp> Use "Total of All Ownerships" and "Total, All Industries" and Quarter 2 data (tends to be least affected by seasonal fluctuation).

CALCULATION AND PUBLIC REPORTING

- **Annual measurement and reporting** for these Elements is for the calendar year before the reporting year. (Elements 10.1-10.8)
- **If a city purchases all of its water**, do not report percent losses, MMBtu and dollars, or trends. For a city that produces some of its water and purchases some water, report these numbers based on the city utility data only. (Elements 10.5-10.8)
- **Residential and businesses gallons** use the past year of data to average out variation in the data due to seasonal change. Business gallons are normalized by jobs so as to identify whether in aggregate businesses are high or low water users. Exclude wholesale gallons sold to users outside the city. (Elements 10.1 and 10.2)
- **City operations' gallons** – one number for summer use (June-October) and one for non-summer use (mostly by buildings: November – May) – can be tracked on the water tab of a city's B3 database. Cities should feel free to use more precise data: gallons/year for non-building uses and gallons/year for internal water use in city buildings. Exclude wholesale gallons. (Element 10.3)
- **Use 10 years of data (or fewer) to calculate ratio of maximum day use to average daily use.** For December 31st of a given reporting year: (1) add up the highest number of gallons distributed during each of the past 10 years; (2) divide that number by 10, and divide that number (the average peak demand day averaged over 10 years) by (3) total gallons distributed over the past 10 years, divided by 10 and then divided by 365. Exclude wholesale gallons. (Element 10.4)
- **MMBtu** = millions of British Thermal Units of energy. Water systems using electricity (tracked in kilowatt-hours: kWh) and liquid fuels (generally tracked in BTUs) should convert all energy use to the common unit MMBtus. Include wholesale gallons. For energy conversions use http://www.eia.gov/Energyexplained/index.cfm?page=about_energy_conversion_calculator (Element 10.5)
- **Annual cost in dollars spent per million gallons of water distributed:** total energy (dollars), divide by total gallons distributed over the past 12 months, and divide by 1,000,000. (Element 10.6)
- **Dollars per million gallons** = the operating cost to distribute each one million gallons. Use dollars and gallons for the most recent one year period, or set a protocol to use cumulative data from a rolling 3 or 5 year (or greater) time period. Include wholesale gallons. Include depreciation costs but exclude one-time capital costs. Note that the State Auditor's Infrastructure Tools reports 3 data points for a city's drinking water enterprise fund: very useful for fiscal sustainability but different than this GreenStep data element. (Element 10.6)
- **Percent losses** (percent unaccounted for) = gallons of water produced (withdrawals from all sources) minus gallons of water sales, divided by water distributed. Include wholesale gallons. Losses are leakage on transmission and distribution mains, leakage and overflows at utility storage tanks, and leakage on service connections up to the point of customer metering. (Element 10.7)
- **The trend of all source water levels should be reported as Falling, Stable, or Rising:** a composite indicator for all production wells, observation wells, and source water intakes or reservoirs tracked and reported to the MN DNR in Table 9 (page 15) of your city's Water Supply Plan. Determine a protocol that makes sense for your unique water supply or supplies. For example, if all your water comes from one aquifer, you may decide to compare water table height changes every 3 years and report the trend as Falling or Rising if the variance is more than 2 inches. Or with multiple surface and groundwater supplies you may factor in percentage of water coming from each and annual variation and then use a 5-yr. rolling average of change to report a long-term trend in water levels. Include wholesale gallons. (Element 10.8)

RATIONALE

Potable water use is a growing concern primarily due to the large proportion of cities using groundwater, which often takes decades and centuries to replenish. About 75% of Minnesota's drinking water comes from ground water. In addition, there are increasing risks to both surface and groundwater sources posed by droughts that are exacerbated by climate change. Water use tracking allows more effective water conservation and water reuse efforts by the city, residents and businesses. Conservation efforts importantly "peak-shave:" reduce the highest water use day during each year, which effectively adds capacity to city infrastructure and potentially allows cities to reduce the amount of infrastructure that is required to meet the peak day use. This infrastructure includes new wells and new water towers, which can be costly items.

Water extraction, treatment, and distribution systems can constitute a major portion of energy consumption by city operations and can offer great opportunities for efficiency improvements. For example, the withdrawal, treatment, storage, and distribution of potable water in the City of Burnsville in 2013 resulted in 58% of the electricity consumption and 42% of the greenhouse gas emissions from city operations. Energy efficiency improvements to the city's drinking water treatment plant enabled it to increase its production of potable water in 2011 by 25% over 2009 levels, while reducing electricity consumption 46%.

Drinking water quality is a highly regulated area; under federal law, water utilities are required to routinely send community members a summary of the extensive testing for contaminants that, depending on the part of the state, report on contaminants such as arsenic, lead, chloride (salt), and nitrate. In central Minnesota, for example, up to 60% of drinking water monitoring wells sampled in 2016 were contaminated with nitrate levels well-beyond the safe drinking water standard. Such an affected GreenStep city may wish to track and report nitrates so as to highlight improvement toward lower levels. At this point in time GreenStep has not one index number that would attempt to capture the health status of drinking water that all cities would report.

For groundwater quality, however, GreenStep may add a measure that tracks the irreversible contamination of aquifers by chloride, introduced primarily from the use of road salt. As of 2015 30% of private wells in the Twin Cities metro area were considered impaired by too much chloride.

STEP 5 TARGETS

Individual cities are best equipped to set realistic goals for improvement, and any improvement in the data elements is good. That said, the Minnesota Department of Natural Resources suggests the following goals:

| | |
|---|--|
| Residential gallons used per person per day | 75 or fewer |
| Business gallons used per job per day | 15% reduction within 10 years (in gallons/person/day) |
| Ratio of peak day use to average day use | 2.6 or less |
| Percent of losses | 10% or less |

(Much lower percentages are possible: the City of Hugo, for example, reported 2016 losses in their drinking water system of only 2.7%.)

NEED HELP? CONTACT

Carmelita Nelson, Water Supply Plans and Conservation Advisor, MN Dept. of Natural Resources
651-259-5034 or carmelita.nelson@state.mn.us

February 2017

Minnesota GreenStep Cities
Performance Metrics for Recognition at Steps 4 and 5

#11: WASTE WATER

CORE METRIC FOR CATEGORY A & B & C CITIES THAT HAVE A WASTE WATER COLLECTION SYSTEM

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 11.1 Residential gallons of waste water produced per person per day
- 11.2 Business gallons produced per job per day
- 11.3 Annual energy used per million gallons treated (MMBtus/million gallons) (report only if you own a treatment facility)
- 11.4 Annual operating cost in dollars per million gallons treated (report only if you own a treatment facility)
- 11.5 **Ratio of Inflow & Infiltration volume to total volume entering collection system**

DEFINITIONS

- **If your city owns or is part-owner or jointly controls a waste water treatment plant (WWTP)**, then report all the data elements in this metric. (Element 11.1-11.5)
- **Cities that do not own and operate a WWTP** (most cities in the 7-county metro area; some greater MN cities) should report residential and business gallons, I & I (inflow and infiltration) data, and only energy and cost data related to the part of a sewer system they do operate, such as lift stations. (Elements 11.1, 11.2, 11.5, and partial 11.3 and 11.4)
- **If your city is entirely served by septic systems** then this is not a Core metric for your city. If you track a metric about septic systems in your city, GreenStep would appreciate your reporting that in the notes field on the Step 4 reporting form.
- **Residential and business gallons** exclude accounts outside the city. Business gallons include waste water treated from commercial, industrial & institutional accounts. (Elements 11.1 and 11.2)
- **Energy and cost per million gallons treated** should cover total inflow to the plant, from accounts inside and outside the city. (Elements 11.3 and 11.4)
- **Report energy in MMBtu** = million British Thermal Units of energy. Electricity (tracked in kilowatt-hours: kWh) and liquid fuels (generally tracked in BTUs) should be converted to the common unit MMBtu. (Element 11.3)
- **Inflow and Infiltration (I & I) measures clear water “leakage” into the waste water system** (conveyance pipes, and possibly part of the WWTP) – typically rain water – and represents a volume of liquid that does not need to be treated at the WWTP. Minimizing I & I effectively adds treatment capacity for what needs to be treated. (Element 11.5)
- **Alternative metrics:** If you have been gathering or want to gather different data, report those and explain why they are a better fit for your city. For example:
 - The ENERGY STAR® score compares the predicted energy use of a waste water plant to its actual energy use to yield a 1 to 100 percentile ranking of performance, relative to plants across the nation.
 - System operators tend to use one of four other measurements, typically measured in less-than-yearly evaluations of the sewer system, which should also be re reported if tracked in your city:
 - Gallons/day/foot of sewer pipes
 - Gallons/day/inch-mile of pipe

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- Million gallons/day/1,000 feet of pipe
- Million gallons/day/acre of land served by sewer pipe

DATA SOURCES

- WWTP permit data submitted to the MN Pollution Control Agency
- City records
- Infrastructure Stress Transparency Tool (MN State Auditor): <https://www.auditor.state.mn.us/maps/>
- Energy Star Portfolio Manager (if the city is using this tracking system)
<https://www.energystar.gov/buildings/tools-resources/energy-star-score-wastewater-treatment-plants>
- The B3 system: <https://mn.b3benchmarking.com>
- Jobs data from North American Industry Classification System (NAICS) and the Quarterly Census of Employment Wages (QCEW) - <http://www.positivelyminnesota.com/apps/lmi/qcew/ResultsDisp.aspx> Use "Total of All Ownerships" and "Total, All Industries" and Quarter 2 data (tends to be least affected by seasonal fluctuation).

CALCULATION AND PUBLIC REPORTING

- **Annual measurement and reporting** for these elements is for the calendar year before the reporting year. If I & I has not been calculated in the last year, simply report the last I & I percent and note the calendar year during which the percent was calculated. (Elements 11.1-11.5)
- **If a city purchases some of its waste water services** from another city/entity for some residential/commercial addresses, do not average in data from that other system: report numbers based on the city utility data only. (Elements 11.1-11.-5)
- **Residential and businesses gallons** use the past year of data (usually estimated) so that an average daily waste water flow is reported for residential accounts and for business accounts. These numbers are normalized, respectively, by your latest city population number and your latest total city jobs number so as to identify whether in aggregate residences and businesses are higher or lower waste water services users. (Elements 11.1 and 11.2)
- **MMBtu /million gallons** = energy used to run the complete city waste water system (treatment plan and off-site pumps). Systems using electricity (tracked in MMWh) and liquid fuels (generally tracked in Btus) should convert all energy use to the common Element MMTus. Use data from the calendar year before the reporting year. For energy conversions use http://www.eia.gov/Energyexplained/index.cfm?page=about_energy_conversion_calculator
- **\$/million gallons** = the total operating cost (energy, labor, maintenance, depreciation) to treat each one million gallons of waste water, measured as it enters the WWTP. Use data from the calendar year before the reporting year. Include depreciation costs but exclude one-time capital costs. Note that the State Auditor's Infrastructure Tool reports three data points for a city's sewer enterprise fund: very useful for fiscal sustainability but different than this GreenStep Element. (Element 11.3)
- **Annual operating cost in dollars per million gallons treated:** total energy (dollars), divide by total gallons treated over the past 12 months, and divide by 1,000,000. (Element 11.4)
- **While % I & I highlights** the magnitude of any I & I problems, system operators tend to use one of four other metrics, which should also be reported in the notes section of the GreenStep reporting form if one or more of them is tracked in your city:
 - Gallons / day / foot of sewer pipes
 - Gallons / day / inch-mile of pipe
 - Million gallons / day / 1,000 feet of pipe

Minnesota GreenStep Cities
Performance Metrics for Recognition at Steps 4 and 5

- Million gallons / day / acre of land served by sewer pipes
(Element 11.5)

RATIONALE

Waste water treatment plants are highly regulated and must report various detailed reports and measures to the State of Minnesota. Flow volumes, however, are not regulated but affect overall pollutant loading on bodies of water receiving treated effluent from WWTPs. This GreenStep metric also includes an energy measure, often overlooked in city improvement processes, and defines key data to help improve demand-side management of a city's treatment plant and waste water system.

Conserving water in and reducing wastewater flows from homes and businesses effectively adds capacity to a city's waste water infrastructure at generally a cost cheaper than expanding a WWTP. Cities can promote such actions, which are found in several GreenStep best practices, including Existing Buildings and Green Business Development. Benefits include reducing carbon emissions from wastewater systems, which can easily make up one quarter of the city operations' carbon footprint.

I & I expenditures in the 7-county metro area cities during 2009 were an estimated \$12 million. Without annual expenditures incentivized by the metro sewer authority, the cost to add metro wastewater interceptor and treatment capacity to handle the excess flow from I & I was estimated to exceed \$900 million.

STEP 5 TARGETS

Individual cities are best equipped to set realistic goals for metric improvement, as every city's mix of businesses and residences and geography is different. Any improvement in the metrics is beneficial. That said, the Minnesota Technical Assistance Program (MnTAP) and Wisconsin's Focus on Energy have benchmarked (during 2011 and 2006, respectively) energy use for dozens of treatment plants of differing types. I & I rates under 6% are considered achievable at reasonable cost.

NEED HELP? CONTACT

Karl DeWahl, best practice advisor for WWTPs, Minnesota Technical Assistance Program
612-624-4645 or dewah001@umn.edu

February 2017

#12: SURFACE WATER

OPTIONAL METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 12.1 % of lake, river & wetland shoreline with at least a 50' vegetation buffer
- 12.2 % of water bodies showing at least good clarity readings OR number of citizen lake/river monitors
- 12.3 *One city-defined element or index number*

DEFINITIONS

- **Vegetation buffers** are 50-foot strips of land paralleling lake, river, and wetland shorelines with perennial grass, trees, or shrubs. (Element 12.1)
- **Clarity (also called transparency) readings** are taken with Secchi disks (in feet) on lakes or with Secchi tubes (in centimeters) on streams and reported in the ranges of excellent, very good, good, fair, and poor. Secchi tube data is a surrogate for total suspended solids (TSS). (Element 12.2)
- **One key Element** gives cities an opportunity to highlight a measured number or a calculated index number that has special relevance to the city. For example:
 - For some cities – especially those with multiple water bodies in poor condition that have all been researched - tracking % of water bodies that are on the state's impaired waters list and/or % of TMDLs that are met (Total Maximum Daily Limits [of pollutants]) may be very important and easily obtained from the MPCA. Impairments are measured for aquatic life, aquatic recreation, and aquatic consumption. See <https://www.pca.state.mn.us/water/maps-minnesotas-impaired-waters-and-tmdls>
 - The MPCA's **Trophic State Index (TSI)** for 3000 MN lakes combines measurement of Secchi water clarity, algae and nutrient level (phosphorus), reporting whether lakes support Aquatic Recreation Use (AQR). AQR for streams is dependent on maximum levels of bacteria (E. coli), and **Aquatic Life (AQL) for streams** is dependent on threshold measurement of fish, invertebrates and water chemistry.
 - **Pollutant levels for chemicals of concern** – chloride, mercury, a pesticide, nitrogen, sulfuric acid – may be the most relevant data elements for some cities.
 - **Minneapolis's Lake Aesthetics and User Recreation Index** (LAURI: <http://www.minneapolismn.gov/sustainability/indicators/WCMS1P-082085>) measures: 1) public health status at swimming beaches; 2) water quality including clarity; 3) aesthetics such as color, odor, and debris; 4) availability and ease of public access for recreational uses; and 5) habitat quality for plant and fish diversity. These five indices are scored on a scale of one to 10.
 - **The Wetland Health Evaluation Program** (WHEP: <http://www.mnwhep.org/index.htm>) in Dakota and Hennepin Counties has been reporting an index of biotic integrity since 1997, covering invertebrates and vegetation.
 - **Score Your Shore** (<http://www.dnr.state.mn.us/scoreyourshore/index.html>) from the MN Dept. of Natural Resources assesses habitat conditions of developed lake lots, which can be used to set and track goals for shoreland revegetation and improvement. It provides an objective and systematic method to assess the type, quantity and quality of the existing shoreland habitat, recognizing, for example, that turf grass is not as effective as native vegetation at protecting water quality.
 - **SALT** (Element 12.3)

DATA SOURCES

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- City GIS maps; Google maps; maps from local lake and river associations. (Element 12.1)
- Data collected by the city, volunteers, associations, Metropolitan Council. (Elements 12.1 and 12.2)
- Maps from <http://www.mndnr.gov/buffers>, MN Board of Water and Soil Resources, county Soil and Water Conservation Districts, Watershed Districts, Watershed Management Organizations. (Element 12.1 and 12.2)
- County water plans, city Surface Water Management Plans. (Element 12.2)
- The MPCA Citizen Lake and Citizen Stream Monitoring Programs have information on transparency for 1000 lakes and 400 or so stream sites, with an excellent/good/fair/poor breakdown for the most current data: <https://www.pca.state.mn.us/water/citizen-monitoring-program-annual-summary> (Element 12.2)

CALCULATION AND PUBLIC REPORTING

- **For the vegetation buffer calculation**, use GIS data or estimates from Google maps to first total the length of shorelines around lakes and wetlands, and add in stream lengths. Include the length of ditches controlled by Ditch Authorities. Then measure/estimate the lengths of lake/wetland shorelines that have at least 50 feet of perennial vegetation, and add in the lengths of streams/ditches that have at least 50 feet of perennial vegetation on each side. Finally, divide the vegetated footage by the total shoreline footage and express the fraction as a percentage for the year immediately prior to the GreenStep reporting year. (Element 12.1)
- **For calculation of % of water bodies** within city limits showing (in the year immediately prior to the GreenStep reporting year) at least good clarity readings, first check with the appropriate MPCA contact below to see if there is data and to understand the use of it. For example, “good” for lakes might mean exceeding total suspended solids thresholds, which are different for different ecoregions in the state. And “good” for streams might refer to specific stream segments or stream stations. (Element 12.2)
 - **If there is no data**, work with the appropriate MPCA contact below to recruit community volunteers – and then **report the number of volunteers** - to join the Citizen’s Monitoring program that uses stream/lake methodologies from the MPCA Citizen Monitoring Handbook and Instruction Manual at <https://www.pca.state.mn.us/water/citizen-water-monitoring> (Wetlands use the methodologies of WHEP at <http://www.mnwhep.org>).
 - After several years of data collected by monitors, your city will be in a position to report the % of water bodies Element.
- **Since it typically takes a few years to see any change** in these numbers, water bodies need not be re-measured every year. In years when no new measurement is done, simply report the last measurement and note the calendar year during which the measurement was done. (Elements 12.1 and 12.2)

RATIONALE

Because lakes, streams and wetlands are central to Minnesota's economy and our way of life, it is imperative that private and public entities, including cities, work to maintain and improve their local water quality. Reflecting this importance, Minnesota's Management and Budget state agency includes, as one of the state's 40 key indicators, the percent of MN lakes with good water quality.

Part of working to improve water quality must include helping community members hear about and understand data elements that show whether progress is being made. Because there are so many mandated and voluntary measures of water quality, GreenStep proposes two common measures for all cities and one city-specific measure. Based upon feedback from cities and water quality experts, GreenStep anticipates some refinement of these measures over time.

Buffer studies by the Pollution Control Agency (<https://www.pca.state.mn.us/water/buffers-improve-water-quality>) and others show that a 50' strip of permanent vegetation along lakes, streams, and wetland reduces the volume of runoff and the quantity of pollutants entering those waters, helping to protect and restore water quality and healthy aquatic life, natural stream functions and aquatic habitat. Buffers do not solve every water-quality problem and can/should be narrower or wider

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

depending on specific circumstances. Increasing the number and width of buffers is a current focus of effort by Minnesota state agencies. 50 feet on lands adjacent to public waters and 16.5 feet on lands adjacent to public ditches is the target width: see <http://www.dnr.state.mn.us/buffers/index.html> and http://files.dnr.state.mn.us/publications/waters/buffer_strips.pdf

Clarity, or transparency, is a quick and easy measurement that tells us a lot about a lake or stream's water quality. First, it indicates the amount of light penetration into a lake or stream, which is important for plant growth and a healthy aquatic environment. Second, Secchi transparency provides an indirect measure of the amount of suspended material in the water. Suspended material in lakes most often consists of algae, while sediments are more common in streams.

STEP 5 TARGETS

While there are various state laws about buffers in different settings, any improvement in buffers within a city is assured of delivering benefits due to the typical hard-surface treatment of land along urban streams, lakes and wetlands. On average, streams in Minnesota that, along their length, have under 25% of their buffers intact, have poor or very poor aquatic life. Thus 25% or more is a minimum goal for buffers.

The DNR's Know Your Score approach can provide a more ecologically accurate way to track and improve the function of buffers. Increasing water clarity has recreational, economic and ecologic benefit; the MPCA uses a statistical test to determine whether the data for each lake or stream exhibits increasing or decreasing clarity trends.

NEED HELP? CONTACT

Laurie Sovell, Citizen Stream Monitoring Program, MN Pollution Control Agency
651-757-2750 or csmp.pca@state.mn.us

Shannon Martin, Citizen Lake Monitoring Program, MN Pollution Control Agency
651-757-2874 or clmp.pca@state.mn.us

February 2017

#13: SOLID WASTE

OPTIONAL METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 13.1 Residential solid waste generated per city resident per day (lbs.)
- 13.2 Commercial solid waste generated per job per day (lbs.)
- 13.3 Percent of waste recycled
- 13.4 Percent of waste composted
- 13.5 City operations solid waste generated per year (tons)
- 13.6 City operations construction & demolition waste per year (tons)
 - Percent of construction & demolition waste reused, recycled, landfilled

DEFINITIONS

- **Residential** includes collection from single-family dwellings, duplexes, triplexes and four-plexes. (Element 13.1)
- **Commercial** includes multi-unit housing larger than four-plexes, retail stores, businesses other than industries, offices (including government offices), and institutions such as hospitals. (Element 13.2)
- **City operations** includes waste from city buildings and facilities including parks and drinking water plants. (Elements 13.5 and 13.6)
- **Recycled** material includes fibers (newspaper, office paper, cardboard) and containers (glass, plastic, metal). (Element 13.3)
- **Composted** material includes organic waste (kitchen/restaurant scraps) and yard waste. It also includes food to livestock programs and food donation programs, both preferable to higher-cost, higher energy composting. (Element 13.4)
- **Construction and demolition (C&D) waste** includes soil, plant material and structural debris from lot-clearing operations. (Element 13.6)
- **Reused C&D** includes deconstructed building materials such furnishings and flooring, and fill, reused in mostly their original form. (Element 13.6)
- **Recycled C&D** includes soil, asphalt and concrete processed for another use, and does not include material used as alternative daily cover (ADC) at a landfill. Note that some C&D businesses include ADC in their calculation of percent recycled C&D. (Element 13.6)
- **Excluded in these waste amounts** are household hazardous wastes and industrial wastes. (Elements 13.1-13.6)

DATA SOURCES

- Waste hauler reports required by city license
- County solid waste officers for county-level data in greater Minnesota
- Regional Indicators data at <http://www.regionalindicatorsmn.com/waste-chart>
- After January 2017: county solid waste officers will have data for city-level data in the 7-county metro area

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- Jobs data from North American Industry Classification System (NAICS) and the Quarterly Census of Employment Wages (QCEW) - <http://www.positivelyminnesota.com/apps/lmi/qcew/ResultsDisp.aspx> Use "Total of All Ownerships" and "Total, All Industries" and Quarter 2 data (tends to be least affected by seasonal fluctuation)

CALCULATION AND PUBLIC REPORTING

- **Annual measurement and reporting** for these elements is based upon one calendar year's data prior to the GreenStep reporting year. It will be normalized in various ways – by person, by day, by job – and split into proportions based upon the management method used. (Elements 13.1-13.6)
- **Cities in the 7-county metro area** will begin to have this data available to them through their county solid waste officer beginning in early 2017. (Elements 13.1-13.6)
- **Cities in greater Minnesota** may choose to do what the Regional Indicators Initiative did for select cities, which is to take total county wide data and apportion waste quantities to your city based upon the city's proportion of total county population. (Elements 13.1-13.6)

RATIONALE

The dominant model for our society's use of materials is a linear "take, make, waste" one made possible by a half-century of plentiful, inexpensive energy and the assumption that throwing stuff "away" would have no ecological or financial consequences. The "waste" part, however, is larger than we think. As a rule of thumb, every ton of garbage at the consumer end of the materials management stream has also required the production of 5 tons of waste at the manufacturing stage and 20 tons of waste at the site of initial resource extraction (mining, pumping, logging, and farming).

During the 20th century the "taking and making" part (including food) increasingly happened outside city boundaries, but when accounted for in a city consumption-based inventory, city greenhouse gases can grow 40% larger.

A more energy- and resource-efficient, pollution-reducing urban metabolism model resulting in lower GHG emissions seeks first to prevent the generation of waste and then moves to a cyclical, biological approach whereby product and waste reuse and recycling is maximized and disposal (landfilling) is minimized. In this emerging model, products and wastes are designed to be reused, and either composted or recycled. The State of Minnesota's legislatively adopted waste management hierarchy mirrors this emerging model.

City measurement and reporting of solid waste generation and management method is thus essential to generating community understanding of the need and benefits of taking actions to reduce waste generation and to manage wastes higher up on the hierarchy.

STEP 5 TARGETS

Individual cities are best equipped to set realistic goals for improvement, and any improvement in the metrics is good.

That said, the 2014 Legislature set 2030 recycling goals as follows: (1) 35% (by weight of total solid waste generation) for a county outside of the Twin Cities metro area, and (2) 75% (60% recycling and 15% organics) for a metropolitan county. Each county will develop and implement or require political subdivisions within the county to develop and implement programs, practices, or methods designed to meet its recycling goal.

Owners of commercial property in the seven-county metro area need to make sure their buildings have recycling services along with garbage collection. This 2014 law applies to most commercial buildings that have service for 4 cubic yards (or more) of trash per week, and requires that a minimum of three material types be collected for recycling.

NEED HELP? CONTACT

Tim Farnan, GreenStep Best Practice Advisor for solid waste, MN Pollution Control Agency
651/757-2348 or timothy.farnan@state.mn.us

Minnesota GreenStep Cities
Performance Metrics for Recognition at Steps 4 and 5

February 2017

#14: RENEWABLE ENERGY

CORE METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 14.1 **Number of city owned and private renewable energy generation sites**
- 14.2 **Generation capacity at city and at private renewable energy generation sites (kW)**
- 14.3 Annual production at city owned renewable energy generation sites (MWhr/yr)
- 14.4 **Annual renewable energy purchases, city (MWhr/yr)**
- 14.5 Number of private entities participating in renewable energy purchasing/green power programs (count)
- 14.6 Percent of total city energy use that is generated and purchased renewable energy
- 14.7 Percent of total city energy use that is purchased from a community solar garden

DEFINITION

- **Renewable energy sources** includes power from wind and water, from the sun (powering photovoltaic panels, hot-air and hot-water panels), from biofuels, and from biomass (burning wood, and biogas produced by anaerobic digestion of organic matter such as at a waste water plant). [\(Element 14.1\)](#)
- **Ground-sourced geothermal** heating/cooling is not renewable energy (but rather the efficient use of an electric motor to move energy between a building and the subsurface). [\(Element 14.1\)](#)
- **Resource recovery** (incineration of trash) and landfill gas recovery is not considered renewable energy under some definitions, but they are defined in Minnesota as renewable and should be included in your elements. [\(Element 14.1\)](#)
- **City sites** include renewable energy generation sites inside and outside city limits, such as at a waste water treatment plant, owned or leased by city government. Include sites owned by a municipal utility. [\(Element 14.1\)](#)
- **Private sites** include private, non-profit, governmental (other than city), residential, commercial, institutional and industrial sites within city limits owned or leased by an entity other than city government. Include community solar gardens and gas stations selling ethanol or biodiesel blends above the state mandated 10%. [\(Element 14.1\)](#)
- **Generation capacity** is the rated (or "nameplate") theoretical generation capacity in kilowatts (KW) and includes generation in facilities at city (public) sites, and at private sites. [\(Element 14.2\)](#)
- **Annual production** counts megawatt hours (MWh/yr.) generated by public and by private sites in the year prior to the GreenStep reporting year. [\(Element 14.3\)](#)
- **City and private purchases** include renewable energy amounts above the amounts already in the baseline mix from the electric utilities supplying power and gas to the city, and above the mandated 10% biofuels mix from liquid fuel stations in the city. Include voluntary "green power purchases" or REC (renewable energy credit) purchases by the city, and by residents, businesses and other entities government. Among these amounts are purchases under Xcel Energy's Windsource® program and city purchase agreements from renewable energy facilities owned by another provider, such as a community-solar facility. Note that sometimes such purchases may be from renewable energy sources (e.g. community solar gardens) where the renewable energy credit has been retired by another party. [\(Elements 14.4 and 14.5\)](#)
- **Community Solar Gardens** include purchases made through a community solar garden subscription where the renewable energy credit has been retired by another party. [\(Element 14.7\)](#)

DATA SOURCES

- Utility and city records for permitted sites and capacities, and for green power purchases (Elements 14.1-14.7)
- City records and Minnesota Department of Commerce for energy production and biofuels data (Element 14.3)

CALCULATION AND PUBLIC REPORTING

- **Number of sites and generation capacity** is measured on December 31st before the reporting year. Use a multi-year average of production to estimate the capacity of a landfill gas facility, incinerator, digester, and biofuels outlet. (Elements 14.1 and 14.2)
- **For energy conversions**
use: http://www.eia.gov/Energyexplained/index.cfm?page=about_energy_conversion_calculator
- **Annual production** amounts are for the calendar year before the reporting year. If the city owns or leases a portion of a renewable energy facility it should count the percentage share of that facility's generation allocated for use by government operations. (Element 14.3)
- **Annual renewable energy purchases** by city operations, and by residents and businesses, should ideally be documented with renewable energy credits (RECs) and be Green-E certified. (Element 14.4)
- **Report the ratio** of renewable energy generated and purchased by city government to total energy used by city government, using data for the calendar year prior to the GreenStep reporting year. (Element 14.6)

RATIONALE

Minnesota is almost completely dependent on energy sources outside state borders. Annually we spend over \$13 billion on coal, natural gas, uranium, petroleum, and electricity produced from a variety of these non-renewable (and a small proportion of renewable) sources. Adding renewable energy generation capacity that is owned by local government, residents, businesses and educational institutions:

- Develops underused local energy resources, keeping dollars available for re-spending in the community
- Increases a community's resilience to energy supply and price shocks
- Cuts greenhouse gas emissions in support of the state's Next Generation Energy Act goals
- Decreases health care costs to individuals and the state by eliminating coal air emissions

Annual tracking of renewable energy generated/purchased within the city provides a moving baseline measure, facilitating city decisions on what actions to take to increase these amounts. While city government generation and purchasing of renewable energy will always be a small portion of total energy used within city limits, the example and experience of these city actions helps propel residents and businesses to invest in renewable energy.

STEP 5 TARGETS

The State of Minnesota, as part of the Next Generation Energy Act, has a goal of generating 25% of electricity used in 2025 from renewable sources. In addition, the state has set a solar standard for achieving an additional 1.5% of electric energy generation from solar energy systems by 2020 and 10% by 2030.

NEED HELP? CONTACT

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Minnesota GreenStep Cities
Performance Metrics for Recognition at Steps 4 and 5

February 2017

#15: LOCAL FOOD

OPTIONAL METRIC FOR CATEGORY A & B & C CITIES

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 15.1 **Number of local food venues**
- 15.2 **Percent of housing** within 1 mile of a local food venue
- 15.3 **Percent of housing** within 1 mile of fresh fruits and vegetables

DEFINITIONS

- **Local food venues include:** farmer's markets; community gardens; CSA (community-supported agriculture) drop-sites; institutions focused on serving local food; grocery stores (including food cooperatives) selling local foods; restaurants serving local food. (Elements 15.1 and 15.2)
- **Local food is a broad term** with multiple attributes, defined differently in different cities. Attributes typically include one or more of: sourced within Minnesota; fresh; healthy; produced using more ecologically sustainable practices. Sustainable can include raised organically or using IPM (integrated pest management), humanely raised animals, fairly compensated farm workers. (Elements 15.1 and 15.2)
- **Local food venues typically have some standards.** Often farmer's markets will accept vendors with food grown within Minnesota, or perhaps the Upper Midwest, but not food from Arizona, or Argentina. (Elements 15.1 and 15.2)
- **In counting local food venues** cities should settle on a rough definition that fits the community culture and sense of what is local and healthy food. (Elements 15.1 and 15.2)
- **Institutions and restaurants serving, and stores selling** local food is a judgement call. An elementary school or restaurant that routinely buys Minnesota fruits and vegetables for cooking/serving should be included, just as a grocery that always buys Minnesota foods in season would be included. But a city may use a different/stricter threshold that might include minimum procurement percentage requirements at hospitals, prisons, colleges and other institutions. (Elements 15.1 and 15.2)
- **Housing** includes residential dwelling units that are within one mile of one or more local food venues. (Elements 15.2 and 15.3)
- **Stores selling fresh fruits and vegetables** have a NAICS (North American Industry Classification System) code of 445110 (supermarket/other grocery) or 445230 (fruit/vegetable market). (Element 15.3)
- **Alternative data elements:** if you have been gathering slightly different data, report those and explain how they differ from these GreenStep metrics.

DATA SOURCES

- City licenses, records, and common knowledge of city staff (Element 15.1)
- <http://minnesotagrown.com/member-directory/> (for farmers markets and CSAs) (Element 15.1)
 - GIS maps and/or city plat maps and census tract data (Elements 15.2 and 15.3)

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- Local chamber of commerce; U.S. Census data (for example, NAICS business count by zip code at <http://censtats.census.gov/cbpnaic/cbpnaic.shtml>)
- The USDA Food Access Research Atlas at <http://www.ers.usda.gov/data-products/food-access-research-atlas> has compiled data regarding access to grocery stores by census tract for the entire United States. (Element 15.3)

CALCULATION AND PUBLIC REPORTING

- **Annual measurement and reporting** for these data elements is based upon the cumulative numbers as of December 31st before the reporting year. (Elements 15.1-15.3)
- **The number of local food venues will be normalized** and reported on the GreenStep web site as number of venues per 1000 population. (Element 15.1)
- **Using a mapping (GIS) system**, map zones within which street walking (or, as the crow flies) is within one mile of one or more local food venues. Then calculate the number of residential dwelling units within the zones. Finally compare the number of units to total units in the city and express the ratio as a percent. (Element 15.2)
- **For smaller cities**, dwelling units in census tracts within a mile of one or more local food venue can provide rough estimations. Or estimation from a city plat map may work fine. (Element 15.2)
- **Counting groceries selling fresh fruit and vegetables** provides a more limited view of local food access, and is easy to do in a small/medium size city. For a larger city it can be done using the two NAICS codes and web data from the U.S. Census. (Element 15.3)

RATIONALE

The benefits of greater community access to and consumption of local foods include increased food security for residents, more healthful food and improved human health, enhanced soil and water quality, reductions in energy use and CO₂ emissions (in general), improved wildlife habitat, enhanced community livability and vitality, creation of green jobs, and stronger local economies.

Depending on what's included as a local food – fresh fruits and vegetables is one limited definition used in this GreenStep metric - the evidence base for these benefits ranges from very strong to somewhat weak. (See extensive studies and reports under the Local Foods Best Practice at <http://www.MnGreenStep.org>) On the strong side, for example, for Minnesota farmers markets, of each \$100 spent by community members, \$62 stays in the local economy and \$99 stays in Minnesota's economy.

The 1-mile accessibility threshold comes from work in 2007 by Design for Health (<http://designforhealth.net/food-access>), a collaboration between the University of Minnesota and Blue Cross and Blue Shield of Minnesota that serves to bridge the gap between the emerging research base on community design and healthy living with the every-day realities of local government planning. Walking/biking/busing within one mile of healthy foods is a key issue, particularly for people without cars and people of limited means.

Local food is like local beer, walking, biking and outdoor dining: important to attracting and retaining a mix of city residents – especially younger residents - in most any city in Minnesota. Thus annual measurement to track improvement in the metric is important to many cities.

Minnesota GreenStep Cities
Performance Metrics for Recognition at Steps 4 and 5

STEP 5 GOALS

There are no state-wide goals for these data elements nor any guidance useful at this point in time for all cities in Minnesota. Therefore individual cities are best equipped to set realistic goals for improvement, and any improvement in the elements – higher numbers, higher percentages – is desirable.

NEED HELP? CONTACT

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February 2017

#16: Jobs & Employment

OPTIONAL METRIC FOR CATEGORY A & B & C CITIES

DATA ELEMENT TOPICS

Pick at least one city-defined measure for:

- 16.1 **Jobs**
- 16.2 **Employment**
- 16.3 **Income**
- 16.4 **Poverty**

DEFINITIONS

- **Jobs** are a fundamental and reinforcing part of an individual's identity, social networks and sense of purpose. A good local economy is one that creates and sustains meaningful jobs and businesses, including jobs in the "green" economy. Much data from national, state, regional and city organizations attempt to provide a snapshot each year on the number, type, location, and quality of jobs and businesses in each city. "Living wage" jobs are variously defined by federal, state and local entities and are one way of characterizing the quality of jobs in the city. (Element 16.1)
- **Employment** numbers reflect the percent of a city's population working, not working, and underemployed. Data comparisons can include unemployment rates of city-determined subsets of community members; for example, the unemployment rate of workers aged 18-26 compared to the overall unemployment rate. (Element 16.2)
- **Income** reports dollars earned by the average, or median city resident, or by household. Comparisons can be made to income relative to rents, mortgages and living wages. Income distribution data can be used to look at income inequality, as this affects the wellbeing of community members. Typically, this inequality is reported as the Gini coefficient (the gap between rich and poor), reported on a scale from 0 to 1, but calculated Ginis exist only for counties, not cities in the U.S. (Element 16.3)
- **Poverty** has many definitions and measures. While a federal poverty income level is defined, cities may use a state, county or city dollar level to better reflect, for the local context, what range of income significantly challenges community members from fulfilling their minimal potential as active participants in society. (Element 16.4)

DATA SOURCES

- Census data (American Community Survey)
- City and county data
- % labor force in green jobs methodology, based upon NAICS codes for businesses, is from the Green Goods and Services page of the Bureau of Labor Statistics (<http://www.bls.gov/ggs/home.htm>)
- Social income inequality and jobs per worker data at <http://livabilityindex.aarp.org/categories/opportunity>

CALCULATION AND PUBLIC REPORTING

- **Jobs** – suggested data points are:
 - Jobs per worker

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

- Jobs per acre in mixed-use commercial and neighborhood districts
- % of jobs that pay a living wage
- % of labor force working the green jobs sector
- % of business start-ups that survive 5 years
- **Employment** - depending on the size of your city, issues of concern, and availability of data, different data points might be:
 - % of residents employed
 - % of residents unemployment
 - Unemployment disparity: ratio of unemployment rates between a subset of residents and the city-wide unemployment rate
- **Income** – overall city data points and disparity calculations include:
 - Median household income
 - Personal income per capita
 - Income disparity: % of total personal income going to top 20% vs. bottom 80% of earners
- **Poverty** – many data points may be available; common ones are:
 - % individuals living at or below a poverty line (defined locally)
 - % of households living below the federal poverty line

RATIONALE

The GreenStep Cities program challenges cities to “achieve their sustainability and quality-of-life goals.” While the 29 GreenStep best practices are focused on environmental issues, with a strong city-wide economic thread, jobs and employment for individuals are inherent in building greater sustainability in a city. Hence this one GreenStep Element focuses on these issues of individual work, employment and jobs.

Two disparity measures are included as options in this GreenStep metric. For unemployment, some Minnesota cities are very concerned about disproportionately high unemployment in certain subsets of community residents. And related to income, studies, including by the American Community Survey (U.S. Census: 2014) show that Americans are happier when income inequality is low. While cities have very limited ability to affect these numbers, a review of city policies and programs that incentivize certain types of businesses and jobs may identify actions a city can take to address the disparities. For example, does the city subsidize small businesses, start-ups, existing businesses, home-based businesses, big-box stores, warehouses, manufacturers?

GreenStep suggests measures but is not specifying a specific data element for each topic and leaves it to each city to choose relevant measures and report that data.

STEP 5 TARGETS

While there is no shortage of public and private organizations urging communities to hit specific targets in this jobs/employment area, and while there are funding streams related to specific targets, each city is unique and can best set realistic targets that are finely tuned to the community's history, current capabilities, and aspirations.

At a state level, the MN Dashboard (<https://mn.gov/mmb/mn-dashboard>), prepared by the state agency MN Management and Budget, calculates one number statewide, which cities may find of use for comparison purposes, for these indicators (data from 2016):

- % business start-ups that survive 5 years: 55%

Minnesota GreenStep Cities
Performance Metrics for Recognition at Steps 4 and 5

- % of residents unemployed: 3.8%
- median household income: \$61,000
- % living at or below the Federal poverty line: 11.5%

Under the national Star Community Rating System, the target for employment density in compact, mixed-use, human-scaled, walkable centers and neighborhoods is at least 25 jobs per acre.

[NEED HELP? CONTACT](#)

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#17: CLIMATE

2017 CORE METRIC FOR REGIONAL INDICATOR CITIES (17.1-17.4)

Bold, green font indicates data elements that are eligible to be recognized at Step 5 if improvement is demonstrated.

DATA ELEMENTS

- 17.1 Greenhouse gas (GHG) emissions from travel, Tonnes CO_{2e}
- 17.2 GHG emissions from waste, Tonnes CO_{2e}
- 17.3 GHG emissions from (non-transportation) energy, Tonnes CO_{2e}
- 17.4 Total citywide GHG emissions, Tonnes CO_{2e}
- 17.5 Total city operations GHG emissions, Tonnes CO_{2e}

DEFINITIONS

- Data is for the latest calendar year, for community-wide emissions. (Elements 17.1-17.4)
- GHG emissions are calculated and denoted in metric tons of CO₂-equivalent gases (Tonnes CO_{2e}) using nationally accepted greenhouse gas accounting standards. (Elements 17.1-17.5)
- Greenhouse gas emissions from travel include vehicle travel within city boundaries. The Regional Indicators measure was determined by gathering vehicle miles traveled data compiled annually by the Minnesota Department of Transportation. Greenhouse gas emissions are calculated based on an estimated mix of vehicle types. (Element 17.1)
- Counties are the lowest level of government that currently and consistently collect solid waste data. As such, the most appropriate method is to assume city waste management data is comparable to countywide data on a per-capita basis. Greenhouse gas emissions are calculated for different management methods. After January 2017 city-level data in the 7-county metro area will become available and worked into the Regional Indicators data display. (Element 17.2)
- GHG from energy include emissions associated with electricity, natural gas, fuel oil, coal, biomass, and district energy used within city boundaries, as collected from energy utilities. Water emissions (energy used to clean and distribute water) are accounted for under this Element. (Element 17.3)
- Total citywide greenhouse gas emissions include the sum of all sources of emissions. (Element 17.4)

DATA SOURCES

- Regional Indicators Initiative: <http://www.regionalindicatorsmn.com/> (Elements 17.1-17.5)
- Cities that have completed their own greenhouse gas emissions inventory are encouraged to submit their data elements and include an explanation in the justification box. Examples include any cities that have used:
 - o ClearPath form ICLEI, using the software platform at <http://icleiusa.org/clearpath/>
 - o EPA's calculator at <https://www.epa.gov/statelocalclimate/local-greenhouse-gas-inventory-tool>
 - o A consultant

RATIONALE

Greenhouse gas inventories offer a valuable way to compare over time the effectiveness of multiple energy and sustainability best practice actions. Greenhouse gas emissions (and energy) serve as common denominators for the comparison of many of the environmental effects associated with the use of electricity, natural gas, liquid fuels, solid fuels (wood and coal), solid waste management methods, and potable water.

Minnesota GreenStep Cities Performance Metrics for Recognition at Steps 4 and 5

GHG inventories support planning for sustainability by defining a baseline, tracking a trajectory, and measuring outcomes of actions taken by a city that are aimed at meeting energy and climate goals. They can also track progress toward meeting the State's goals regarding energy efficiency and greenhouse gas reduction, as defined by the Next Generation Energy Act of 2007.

The calculation of an annual city operations GHG number is as fundamental to the environmental management and health of a city as its annual budget is to its financial management and health. Like an annual community (city-wide) GHG calculation, the data-gathering and calculation process for a city operations GHG element brings disparate city staff together and has value in interdepartmental data sharing and discussion. Most data elements that a city would use for a city operations calculation are now collected under other GreenStep metrics: buildings, lighting, vehicle fleets, employee commuting, drinking water, and waste water plants.

STEP 5 GOALS

Individual cities are best equipped to set realistic goals for improvement, and any improvement of this metric is good. That said, the State of Minnesota, as part of the Next Generation Energy Act, set targets for greenhouse gas emission reductions of 30% by 2025 and 80% by 2050, below 2005 levels ([M.S. § 216H.02](#))

NEED HELP? CONTACT

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