ECONOMIC AND ENVIRONMENTAL INDICATORS OF SUSTAINABILITY

Prepared for Mayor Piercy's SBI Task Force
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In a previous document examples of social sustainability indicators were provided to the SBI Task Force. As requested by the Task Force, this document provides examples of economic and environmental indicators of sustainability. The document closes with examples of calculating and using environmental indicators.

I. Economic Sustainability Indicators for Communities

Economic Sustainability Indicators measure economic viability over the long-term. In contrast to traditional economic indicators, sustainability indicators reflect the interconnections between the environment, society and the economy. Economic sustainability indicators demonstrate the state of economic activity and its impact on stakeholders and economic systems at the local, national and global levels. Economic impacts can be divided into:

- Direct impacts; and
- Indirect impacts

Both direct and indirect impacts can be positive or negative. Broadly speaking, economic performance encompasses all aspects of community economic interactions, including the traditional measures used in financial accounting, as well as intangible assets that do not systematically appear in financial statements. However, economic sustainability indicators have a scope and purpose that extend beyond that of traditional financial indicators. (GRI Economic Sustainability indicators)

Examples of Economic Sustainability Indicators

1. Cincinnati Region Economic Prosperity Indicators (an overview of economic indicators and the reasons behind them)

http://www.sustainablecincinnati.org/pages/indicators.html

a. Entrepreneurial spirit as measured by new business starts

An entrepreneurial spirit is considered essential for wealth creation and the long-term health of the economy. Although it is understood that many new businesses fail in the first few years, the number of failures or the net number of businesses were seen as less important measures. The key indicator is whether there is a steady stream of new ideas and new enterprises, some of which will be successful.

b. Percent of workforce between 20 and 35 years of age

This indicator measures our ability to attract new technology workers and keep our own children in the region when they graduate. Our ability to attract young people to the region is highly influenced by cultural and quality of life issues. Economic development

professionals consider the ability to attract a qualified workforce essential to keeping the region competitive. As our population ages, young workers are essential not only to meeting the needs of employers but to providing support for older and younger people who are dependent on their wages and other support. This indicator is a measure of what might be called the "vitality" of a community. Information on trends for this indicator will be most useful.

c. Cumulative percent of students who finish high school and are "work ready" or prepared for higher education

The percent would be cumulative, considering dropouts, students going directly into the workforce, and those going on to higher education. Whether students were work ready or prepared for college would be measured by the need for remedial education by employers or colleges. This indicator measures the effectiveness of our K-12 education systems. An adequate workforce is essential for the economy.

d. The percent of the eligible workforce earning enough to be self-sufficient

This indicator takes into consideration both unemployment and the working poor. It combines economic and social concerns. Self-sufficiency is the amount of income needed in the region to meet basic needs without public assistance. While it is assumed that every economy has some jobs that are low-skill and low pay, the goal is to minimize the percent of the workforce not earning enough to support themselves and their families. This indicator will help the region focus economic development efforts on attracting higher paying jobs and providing the education and skills needed to prepare people for those jobs.

2. Minneapolis Minnesota offers another example of economic sustainability indicators.

These indicators focus more on specifics:

Vision: Minneapolis becomes a national leader in community wealth creation, and reduces disparities.

Primary indicators:

1. Percentage of workers earning a livable wage (at a single job).
2. Aggregate wealth created by residents in the lowest income quartile.
3. Percentage of Minnesota corporations with headquarters in Minneapolis.

Secondary Indicators:

1 Unemployment rate
2 Percentage of local businesses owned by city residents
3 Affordability of city housing for city residents
4 Percentage of home-loan interest payments recycled into neighborhood investments
5 Ratio of earnings for highest-income households to lowest-income households
6 Poverty rate by census tract
7 Home ownership and rental occupancy rates by neighborhood

Vision: Minneapolis strengthens its business sector by clustering a strong group of locally owned, sustainable-production firms.

Primary Indicators:

1. Number of city residents employed in the Twin Cities region's manufacturing and service industry clusters (health, printing and publishing, food, computer technology, etc.).
2. Dollars invested in research and development and implementation of "three E's" sustainability by Twin Cities corporations (as percentage of gross revenue).

Secondary Indicators

1. Number of city residents employed in sustainable production firms
2. Ratio of dollars invested in business retention, expansion, and development within city limits to number of permanent living wage jobs created
3. Ratio of business start-ups to bankruptcies

Vision: Minneapolis housing is environmentally sustainable and affordable.

Primary Indicators:

1. Percentage of available housing units that are "green" (green renovation, rehabilitation, and new construction) and that are affordable to the lowest income quartile.

Secondary Indicators

2. Average home price and rental unit prices
3. Percentage of residents paying more than 30 percent of their income for housing costs, by race and income level

Vision: Minneapolis enhances its tax base through green taxation.

Primary Indicators:

1. Tax base for city (and each neighborhood) by use category
2. Presence of progressive taxes on fossil fuel use
3. Presence of progressive taxes on carbon use

3. San Francisco's framework for Economic sustainability indicators:

Economy and Economic Development

1. Number of San Francisco enterprises adopting ISO 14000 standards.
2. Number of San Francisco neighborhoods with unemployment rates higher than the government-defined “full employment” rate.
3. Difference between the highest neighborhood unemployment rate and the full employment rate.
4. Number of San Francisco manufacturers using recovered secondary materials as raw material.
5. Percentage of people employed in San Francisco who live in San Francisco.

Municipal Expenditures

1. Number of items of legislation adopted by the Board of Supervisors that advance sustainability goals.
2. Number of service providers and companies on the Green Vendors list.
3. Percentage of budget allocated utilizing sustainability criteria.
4. Percentage of budget that is devoted to facility maintenance.

Environmental Justice

1. Mean income level of people in historically disadvantaged communities.
2. Proportion of environmental pollution sources in historically disadvantaged communities with respect to San Francisco's other communities.
3. Participation of historically disadvantaged communities as a whole and their indigenous self-selected representatives in decision-making processes.

II. Environmental Sustainability Indicators for Communities

The environmental dimension of sustainability indicators concerns a community's impact on living and non-living natural systems, including ecosystems, land, air and water. Environmental sustainability indicators, in contrast to traditional environmental indicators reflect resource use and environmental impact as they relate to the broader ecosystems in which the community operates. For example, communities could seek to report their pollution output in terms of the ability of the environment (local, regional, or global) to absorb the pollutants (GRI Sustainability guidelines). Environmental sustainability indicators also address the sources and solutions for environmental degradation rather than just the final outcomes.

Examples of Environmental Sustainability Indicators

1. Cincinnati Region Healthy Ecosystems Indicators
An overview of environmental indicators and the reasons behind them)
http://www.sustainablecincinnati.org/pages/indicators.html

a. Percent of land in the region devoted to people habitat, car habitat, wildlife habitat, and agriculture

This indicator measures the balance of land uses. While no ideal balance was identified, it is important to monitor trends. Land is a finite resource; increased use for one purpose means a reduction for other uses. It is expected that this indicator will be shown as a pie chart. Car habitat includes roads and parking lots. It gets at flooding and water quality problems caused by impervious surfaces; loss of greenspace; air quality problems created by auto emissions; increased commuter times that impact on civic and family life.

b. Pounds of waste per capita sent to landfills or other disposal

This indicator includes residential, commercial and industrial solid waste, plus construction and demolition debris. The trend could be reduced by either producing less waste or by recycling efforts.

c. Number of days that air quality is unhealthy based on national standards
This indicator combines environmental and health concerns. An air quality index is used nationally to rate the air as "good", "moderate", "unhealthy for sensitive groups", "unhealthy" or "very unhealthy (alert)". It is defined and reported for the Cincinnati region on a daily basis on the Internet at www.hcdoes.org/airquality/webpages/aqindex. This indicator is affected by energy use, both in automobiles and in electricity generated by burning coal.

d. Percent of stream miles meeting State water quality standards
The Cincinnati region is focused on the Ohio River and its several tributaries. We are a River City. The health of our rivers is key to wildlife, drinking water, tourism, and our quality of life.

2. Minneapolis Minnesota's Environmental Sustainability Indicators.
These indicators focus more on specifics.

<u>*Vision:*</u> Minneapolis protects environmental resources and enhances environmental conditions.

Water quality (drinking water):
<u>Primary Indicator:</u>
Acres (and percentage) of permeable (absorbs rainfall) roof and soil surface.

<u>Secondary Indicators:</u>
1. Fecal coliform bacteria
2. Suspended sediments
3. Dissolved solids
4. Nitrates
5. Agricultural chemicals (pesticide residues, nitrates, etc.)
6. Radiation levels
7. Metals (lead, copper)
8. Other possible contaminants
9. Ratio of aquifer recharge capacity to withdrawals of water

Water quality (ecosystem use—rivers, streams, and lakes):
<u>Primary Indicators:</u>
1) Diversity of macro-invertebrate species (insects, etc.) in lakes, streams, and rivers.
2) Diversity of native fish populations in lakes, streams, and rivers.

<u>Secondary Indicators</u>
1. Diversity of native fish populations
2. Nitrates (largest cause of dead zone in Gulf of Mexico)
3. Phosphorus (largest cause of algal and weed growth)
4. Fecal coliform bacteria
5. Dissolved oxygen
6. Turbidity

7. Number and volume of combined sewer overflows
8. Health of five trophic levels (levels of the food chain) Water quality (recreational use):
9. Trophic state index (includes chlorophyll, phosphorus)
10. Fecal coliform bacteria
11. Percentage of rivers, streams, and lakes supporting designated uses (recreation, fishing, drinking water, etc.)

Air quality:

Primary Indicator:

Acres (and geographic balance) of leaf canopy in Minneapolis.

Secondary Indicators:

1. Nitrogen oxides (NOx) levels
2. Sulfur oxides (SOx) levels
3. carbon monoxide (CO) levels
4. Total particulate matter (PM 10)
5. Volatile organic compounds (VOC)
6. Ozone released
7. Carbon dioxide equivalents (eCO2) released 75
8. Amounts of airplane fuel residue found at sampling sites on airport flight paths
9. Number of days per year with "good" USEPA Air Quality Index Noise levels (residential):
10. Number of complaints of excess noise Noise levels (airport):
11. Decibel levels near runway approaches
12. Percentage of homes within 65 DNL (decibel noise level) zone that have been sound-insulated

Ecological integrity:

Primary Indicators:

1) Acres of natural space in city that sustain natural ecological communities.
2) Percentage of Mississippi River gorge acreage with adequate understory vegetation.

Secondary Indicators:

1. Number and extent of invasive species (plants, insects, birds, fish, mammals, mollusks, etc.)
2. Balance of species found in annual Audubon Society bird counts
3. Ratio of acres of brownfield sites created to acres remediated/reused
4. Toxic emissions recorded in Toxic Release Inventory (TRI)
5. Contaminants found in local biota (DDT, DDD, DDE, PCBs, metals, etc.)
6. Acres of major terrestrial ecosystems intact in Minnesota, eastern Dakotas, western Wisconsin Soil quality (residential):
7. Lead contamination levels in residential neighborhoods Soil quality (agricultural):

8. Percentage of acres required to feed Twin Cities residents that are protected permanently as agricultural land
9. Percentage of these acres that are certified as sustainably or organically farmed
10. Soil contaminant levels (metals, salts, etc.)
11. Tons of soil eroded in Minnesota per year as a result of agricultural use Waste and recycling:
12. Percentage of city solid waste stream recycled
13. Amount of waste that is burned or landfilled.
14. Tons and value of former "waste" products used as manufacturing inputs

Energy use:

Primary Indicators:

1) Percentage of renewable energy used in city (municipality, private sector, households). Note: source of this energy should be clearly identified. Pursuing green energy goals should not be used to justify developing or purchasing, for example, hydropower on Cree lands against the will of the tribe or to the detriment of the environment.

Secondary Indicators:

1. Reductions of energy consumed by city residents and businesses
2. Potential emissions of carbon dioxide equvalents (eCO2) prevented through public and private action
3. City has clear set of requirements for product suppliers and service providers to meet sustainability requirements
4. Percentage of city office equipment that meets USEPA Energy Star criteria
5. BTUs of energy produced through distributed co-generation facilities

Transportation mix:

Primary Indicators:

1) Transportation mode split (walking, bicycle, bus, light rail, car pool, single-occupancy vehicle) by percent.
2) Average time and distance of commute for (a) residents and (b) commuters into city.

Secondary Indicators:

1. Percentage of employees in city working at USEPA "best workplaces for commuters"

Energy-efficient buildings:

Primary Indicator:

Percentage of housing units that meet or exceed USEPA Energy Star criteria.

Secondary Indicators:

1. Dollars of living costs reduced for city residents through new housing construction or improvements that reduce long-term costs (e.g., energy, transportation, public safety)

2. Percentage of commercial/industrial/institutional buildings square footage that meets or exceeds USEPA Energy Star criteria

3. San Francisco Environmental Indicators

Assessed on a simple scale of increasing or decreasing.

Air Quality

1. Number of existing buildings that join the Building Air Quality Alliance Program (or similar voluntary programs). (Increase)
2. Number of people going to clinics for respiratory problems. (Decrease)
3. Percentage of new cars registered in San Francisco which are alternatively fueled (e.g., California Air Resources Board-certified, low emission vehicles, ultra-low emission vehicles, or electric vehicles). (Increase)

Biodiversity

1. Number of volunteer hours dedicated towards managing, monitoring, and conserving San Francisco's biodiversity. (Increase)
2. Number of square feet of the worst invasive species removed from natural areas. (Increase)
3. Number of surviving indigenous native plant species planted in developed parks, private landscapes and natural areas. (increase)
4. Abundance and species diversity of birds, as indicated by the Golden Gate Audubon Society's Christmas bird counts. (increase)

Energy, Climate Change and Ozone Depletion

1. Ratio of renewable to non-renewable energy consumption.
2. Energy cost per tax dollar.

Food and Agriculture

1. Number of public agricultural gardens.
2. Quantity of food and agricultural residuals recycled.
3. Number of school, vocational and community education and training programs about sustainable agriculture and nutrition.

Hazardous Materials

1. Difference between motor oil purchased in the City and the amount that is properly recycled or disposed.
2. Equitable distribution of the hazardous material/waste exposure "load" throughout the City.
3. Number of contaminated sites within City borders.
4. Public awareness of hazardous materials/waste issues (especially proper use and disposal and knowledge of alternatives) as measured by annual survey (to measure effectiveness of outreach).

Parks, Open Spaces and Streetscapes

1. Percentage of the population with a recreational facility and a natural setting within a ten-minute walk.
2. Number of neighborhood green street corridors created annually.
3. Number of volunteer hours spent annually on maintenance of open space.
4. Annual municipal expenditures on parks, open space, and streetscapes.

Solid Waste

1. Tons of waste landfilled annually.
2. Recycling rate as a percentage of material generated.
3. Percentage of residents, businesses, and institutions that participate in recycling programs.

Transportation

1. Auto registration.
2. Parking-spot inventory.
3. Muni ridership.
4. Muni route running time on key routes.

Water and Wastewater

1. Per capita water consumption measured by the San Francisco Water Department.
2. Mass of pollutants in wastewater
3. Mass and frequency of combined sewer overflows.
4. Recycled water use.
5. Acres of habitat restored.

Examples of Calculating and Use of Environmental Indicators

The following is an example from Silicon Valley for how to calculate environmental indicators. For a complete index for how to calculate given environmental indicators go to: http://www.svep.org/2003_index/2003%20SVEP%20How-To%20Manual.html

Water Use

Contact Info: Your local Water District Office
Our Contact: Barbara Judd, Santa Clara Valley Water District, Phone: 408-265-2607, x2269email: BarbJudd@scvwd.dst.ca.us
Methodology/Calculations: Ask for data on the amount of water use in the region under study. Also, ask for the breakdown of how much of the water used is recycled. For our index the data was given to us in Acre-Feet (1 acre-feet = 325,851 US gallons).
Additional Information: Information about the annual average growth rate in per-capita and total water use from 1991 to 1998 was calculated via linear regression analysis over that time period.

The following is an example of how one municipality (Silicon Valley) used sustainability indicators to gauge progress. For more information on the analysis of a complete set of indicators go to:

http://www.mapcruzin.com/svep/

Water Use, After Trending Downward, Increases to Near Pre-Drought Levels
Why Is This Important?

Water sustains life. Humans use it in a myriad of ways - for drinking, home use, landscaping, business, agriculture, recreation, and wildlife. A limited resource, more than half of Santa Clara County's water is imported from other parts of the state. As our region's population grows and the economy expands, there will be increased demands on limited water supplies. Long-term sustainability will entail using and reusing water efficiently so that water supplies are not depleted faster than they can be restored by nature.

How Are We Doing?

The drought and the economic downturn during the early 1990s drove a 27% decrease in Santa Clara County's water use from 1987 to 1991. However, once drought conditions and the economic recession eased, the County began a general upward trend in water consumption, with a 34% increase from 1991 to 1997. Water use dropped 8% in 1998 due in part to unusually wet weather early in the year, which helped reduce demand for water used in agriculture and landscaping.

Per-capita water use (growing at an average of 1.90% per year since 1991) is increasing more slowly than total County-wide water use (which is growing at an average of 3.45% per year since 1991). This suggests that population growth and/or economic activity are driving the trend toward increased water consumption in the County. Per-capita water use was 188 gallons per day in 1998.

Currently less than 1% of water use is recycled water. Recycled water is mainly used for irrigation and construction purposes.

In Santa Clara County, residents account for more than half of water use, the majority of which is used to water lawns and gardens and for toilets. Almost one-third of the County's water use is for businesses and industry, with agriculture and public uses accounting for less than 10% each.

http://www.mapcruzin.com/svep/resource.htm#water