



**Topic Hub: Environmental Measurement    Subsection : Background and Overview**

This section introduces measurement of environmental performance, with examples of measurement concepts and different types of measures.

**Introduction**

Measurement is an essential component of environmental programs, whether it is a business evaluating their environmental practices and progress, or technical assistance providers and public agencies evaluating the effectiveness of their environmental assistance and pollution prevention (P2) programs. Recent emphasis appears to be shifting from compliance metrics to P2 and sustainability metrics.

Measured environmental results help a host of different audiences to:

- Understand internal or supplier operations; what's working and what's not working
- Assess effectiveness and progress of environmental programs and initiatives
- Make sound decisions based on measured information and trends
- Correlate pollution or waste to lost opportunity or lost profit
- Prioritize and implement effective environmental improvements
- Understand the status and health of the environment and ecosystems, from local to global
- Benchmark against other companies' or agencies' environmental performance
- Translate or calculate impacts into meaningful messages

Establishing a useful, telling environmental measurement system is challenging. No single approach is suitable for all situations. Careful design and evolution of a system is required to ensure the results:

- Are meaningful yet not superfluous
- Support and drive an organization's or program's strategic objectives
- Provide the information needed to manage and grow a business or program
- Are aligned across a business or agency
- (for facilities) Are attributable to environmental efforts vs. process or material changes
- (for P2 programs/agencies) Are attributable to P2 outreach efforts vs. self-initiated efforts by clients or businesses

**What Gets Measured?**

"What gets measured gets managed" is an old Total Quality Management adage. It also often holds true that what gets measured gets changed. Measurement activities consume time and resources, so it is imperative to measure only what matters.

"What matters" may be gleaned from environmental goals and targets, a strategic plan, compliance performance, liability issues, or other business initiatives. Because drivers are different for every organization or program, the data or information needed varies greatly. For example, environmental **outreach and assistance programs** may want to measure how their activities and products have resulted in positive environmental changes among the organizations they targeted. These programs may also attempt to assess a big picture change, such as improved water or air quality in their region to which their activities have contributed. A **facility or business**, on the other hand, may want to track more quantifiable, results-oriented accomplishments, such as reductions in energy and water use, reductions in releases and discharges, reductions in material consumption and non-product output, and improved product performance and output.

"What matters" also varies by the level at which measurement is occurring, for instance, measuring at the process or project level is vastly different than measuring at a community or global level. Examples of different levels of measurement, in increasing scope, are:

Process or Project < Facility < Organization < P2 program < Community < Ecosystem  
 < Global

Following are descriptions and examples of some of the common types of performance measures as they relate to environmental issues. Note that several of the measurement types overlap in their definitions and functions.

|                                |                             |                                       |
|--------------------------------|-----------------------------|---------------------------------------|
| Type and Definition of Measure | Examples of Type of Measure | Examples of Specific Units of Measure |
|--------------------------------|-----------------------------|---------------------------------------|



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| <p><b>Absolute:</b> Actual quantities, volumes, or cost total(s); useful in measuring a facility's total impact on the environment.</p>  | <p>- A total quantity or cost measured at the end of a specific time period</p>  | <p>- Annual hazardous waste generation or emission quantity<br/>         - Monthly water or electricity consumption quantities</p>   |
| <p><b>Relative:</b> An absolute measure that is compared with another absolute measure.<br/><br/>         A <b>relative</b> measure also includes <b>normalized</b> (or "production-adjusted") values in which one production parameter (e.g., waste, output, costs), is calculated per unit of production (or other unit of economic output). Normalized values are useful in benchmarking, and comparing between diverse processes, businesses or industries, and large vs. small scale.</p>   | <p><b>Relative:</b><br/>         - Measuring actual quantity changes (AQC) over a set period of time<br/>         - Measuring AQC before and after implementation of a process improvement<br/><br/> <b>Relative-normalized:</b><br/>         - Amount of environmental effect created per unit of production<br/>         - Emissions released per profit dollar<br/>         - Product output with respect to input material consumption</p> | <p><b>Relative:</b><br/>         - % reduction in water consumption<br/>         - change in chemical use for reporting period<br/><br/> <b>Relative-normalized:</b><br/>         - \$ spent on waste disposal per \$ revenue<br/>         - Pounds emissions per \$ of profit<br/>         - Pounds of product per pounds of feedstock purchased<br/>         - Pounds of greenhouse gas emissions per capita or per employee</p>   |
| <p><b>Output or Activity:</b><br/>         Quantitative or qualitative data on activities, publications or tools, or actions, that promote environmental improvement effort(s).</p>  | <p>- Environmental Training<br/>         - P2 Outreach &amp; Assistance<br/>         - Policies<br/>         - Management<br/>         - Community activities<br/>         - Compliance &amp; liability</p>  | <p>- \$ spent on staff training<br/>         - # of assistance requests received<br/>         - # of P2 assessments conducted<br/>         - % of companies in an industry sector practicing waste prevention</p>  |
| <p><b>Outcome or Impact:</b><br/>         Direct measures, such as actual quantity change (AQC) between two time periods, or behavioral changes, that result in reduced environmental impact(s).</p>   | <p>- Environmental health improvements<br/>         - Reduced waste, emissions, and effluent<br/>         - Reduced resource use<br/>         - Increased use of sustainable products</p>  | <p>- Reduced use of toxic materials and associated cost savings<br/>         - Reduced nitrogen oxide emissions<br/>         - % reduction in water consumption<br/>         - Reduced commuter miles driven<br/>         - # of facilities that installed a new P2 process<br/>         - kwh of green energy purchased</p>   |
| <p><b>Indicators:</b> Indicators help summarize segments of complex information about systems that are difficult to assess, such as a watershed, or an ecosystem, or an overall quality or management system. Individual indicators are often combined with others for an overall "view" of the system.<br/><br/>         Environmental condition indicators are direct or indirect measures used to assess the status and trends of an environmental system.<br/><br/> <b>Lagging indicators</b> are measures of end-of-process outputs or outcomes that reflect past performance.<br/><br/> <b>Leading indicators</b> are in-process or management type indicators that reflect current or future performance.</p> | <p><b>Environmental Conditions:</b><br/>         - Size and distribution of significant wetlands<br/>         - Regional surface water quality<br/>         - Soil erosion control<br/>         - Pesticide use<br/><br/> <b>Lagging:</b><br/>         - End-of-process releases of toxic chemicals to air<br/><br/> <b>Leading:</b><br/>         - Environmental operations control</p>   | <p><b>Environmental Conditions:</b><br/>         - # and acreage of natural wetlands<br/>         - % of streams meeting environmental criteria<br/>         - Pounds of soil erosion per acre of cropland<br/>         - Acres under integrated pest management<br/><br/> <b>Lagging:</b><br/>         - Pounds of Hazardous Air Pollutants (HAPs) released to air<br/><br/> <b>Leading:</b><br/>         - Percent of facilities conducting self-audits</p>  |
| <p><b>Indices and Aggregation:</b> Aggregation of several indicators or measures which collectively summarize characteristics, health, or status of a system. When aggregating metrics with different units of measure, each metric can be rated, converted (and/or weighted) to a unitless scale before aggregating into an overall score or rating.</p>  | <p>- Air Quality Index<br/>         - Water Quality Index<br/>         - Sustainable Communities Index<br/>         - Quality or Environmental Performance Index</p>   | <p>- Measure of the concentrations of the six criteria air pollutants for a region, at a given point in time, for aggregation into one unitless number which indicates air quality for the region<br/>         - Economic, environmental and social indicators aggregated to assess community health &amp; sustainability<br/>         - Performance or conformance measures that are rated on a unitless scale and then aggregated in an overall "quality" index (e.g. <a href="#">Green Zia</a>)</p> |



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[Environmental Excellence standard](#)

### **What To Do With the Information**

Many strategies, models, and tools are available for tracking, evaluating, interpreting, and using the measured information. These are discussed in the *Opportunities* section of this hub.

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The Topic Hub™ is a product of the [Pollution Prevention Resource Exchange \(P2RX™\)](#)

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