

**Summary of
Pollution Prevention
Program Centers and Examples
of Recurring Results Measures**

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I. Background on each of the Pollution Prevention Program's Seven Centers with a focus on their streams of performance results:

1) The Design for Environment (DfE) Center

<http://www.epa.gov/dfe/>

The Design for Environment Center produces a stream of results from voluntary partnerships with product manufacturers, chemical suppliers, retailers and distributors, environmental groups and trade associations. DfE projects are designed to help industry integrate health and environmental considerations into business decisions, while maintaining performance and cost-effectiveness. The DfE center draws on internal data from partner companies and market data to report results in pounds and dollars. Other outcome-based results including GHG emissions reduced and water savings may be reported in future partnerships. Sample outcomes include safer cleaning products, the removal of lead from solder, and the use of auto refinishing best practices to reduce emissions of chemicals of concern.

DfE projects:

- Evaluate and compare the hazard considerations of alternative chemicals and products that are functional and cost-effective,
- Provide this information to the entire industry sector, and
- Encourage and enable use of this information by providing mechanisms and incentives to institutionalize continuous improvement.

DfE provides information, tools, and incentives so industry can make informed decisions that integrate hazard, performance, and cost concerns. A DfE project potentially provides many benefits, including:

- Reduced risk to human health and the environment,
- Recognition for environmentally preferable products,
- Technical assistance and toxicological information,
- Improved channels of communication and collaboration among stakeholder organizations, and
- Expanded business and market opportunities.

2) The Green Chemistry Center

<http://www.epa.gov/opptintr/greenchemistry/>

The Green Chemistry Center produces a stream of results from voluntary partnerships with the chemical industry and related sectors. The primary source of results is the annual Presidential Green Chemistry Challenge Awards Program, which recognizes innovations in greener design and synthesis of chemicals. The center uses only actual results submitted in verifiable applications on implemented technologies as the basis for routine reporting of results in pounds of hazardous substances avoided, BTUs of energy savings, and gallons of water savings, and also collects some information on cost savings and greenhouse gas reductions.

Sample outcomes from this awards program include the reformulation of Windex to eliminate volatile organic compounds, the design of the first non-toxic biocide that can be used in conventional and organic farming, the creation of new zero-trans-fatty-acid food fats (as a functional replacement for trans-fatty acids, made in an enzymatic process without harsh chemicals), highly efficient green

synthesis of pharmaceutical active ingredients, commercialization of bio-based plastics, and the development of an ultra-violet curing process for auto refinishing coatings (reducing solvents and energy use significantly).

The Green Chemistry Program supports activities that promote the design, development, and implementation of greener products and processes that reduce or eliminate the use or generation of hazardous substances at all lifecycle stages. Core program concepts also include scientific innovation and economic viability. The Presidential Green Chemistry Challenge Awards, for example, recognize the most scientifically innovative, results oriented, and already implemented green chemistry technologies, and in the process not only recognize the individuals and organizations that design and develop the technologies, but also demonstrate the feasibility of their implementation and the magnitude of their benefits.

The Green Chemistry Program also sponsors related educational and international activities (including conferences, meetings, tool development, and technology transfer) through voluntary partnerships with academia, industry, other government agencies, and non-government organizations.

3) The Regional Center

The Regional Center (10 Regional offices) creates a stream of results primarily from grants and to a lesser degree from direct Regional efforts, all aimed at facilitating the adoption of P2 practices by businesses. The Regional center draws on grant reports of one-time annual outcomes and partnership results data from direct projects to report results in pounds, BTUs, gallons, and dollars saved. Matching grants, authorized by the P2 Act, support State and Tribal P2 programs that facilitate the adoption of P2 practices by businesses in their jurisdiction. Matching grants support state P2 technical assistance programs (referral-based or sector-targeted), state P2 leadership award programs, and related state training and outreach. Sample outcomes from matching grants include purchases of energy efficient industrial equipment, construction of a natural gas refueling corridor for trucking routes, and adoption of process changes for refinishing, metal plating, degreasing, printing, auto body and dry-cleaning operations. Since the inception of the grant program, EPA has awarded over \$84 million to eligible recipients.

The program also awards source reduction assistance grants to States, Tribes, and non-profit organizations. Sample outcomes include greening the manufacture of pharmaceuticals, greening the resin process in the fiberglass reinforced plastics sector, and reducing the use of hazardous chemicals in schools. Sample outcomes from direct Regional projects (e.g., on-site visits, workshops, and training manuals) include eliminating mercury from hospitals, developing green carpet specification and implementing green homes.

4) The Pollution Prevention Resource Exchange (P2Rx) Center

www.p2rx.org

The P2Rx Center produces a stream of results from state P2 program activities that are funded without EPA grants. About 30 states report their new annual P2 results into a common database, knowing that EPA will take these total results, subtract out results associated with EPA grants, and then report 10 percent of the remainder as EPA P2 Program new annual results under the P2Rx Center. This center is designed to account for the extended sphere of P2 Program influence on the State level. This sphere of influence flows from: (1) the EPA-funded Pollution Prevention Resource Exchange (P2Rx – lending its name to the center), a national web-based network of P2 information and listservs reaching state P2 technical assistance providers; (2) the infrastructure support of matching P2 grants which, beyond individual grant projects, keeps some state P2 programs surviving financially; and, (3) 17 years' worth of P2 Program investment in P2 research, information and tool development, and methodologies, which helped the state P2 program infrastructure to grow, and which continues to help state P2 programs avoid duplication of effort and maintain efficiency in their delivery of services. The P2Rx center reports results in pounds, BTUs, gallons, and dollars saved.

The network of eight regional P2Rx information centers provides resources for P2 technical assistance providers (federal/state/local, extension partnerships) businesses, and nonprofit organizations to:

- Access the largest national library of reviewed P2 resource documents
- Access nine topic hubs that offer well-organized P2 materials for popular sectors (100's use annually)
- Peer-to-peer list serves for professionals to seek each others' advice on technical P2 matters
- Roundtable, workshop, and training forums (1000's use annually)

Beyond P2Rx, the P2 Program investment in the national P2 infrastructure since 1990 has included:

- (1) supporting P2 conferences, summits, roundtables, workshops, and training for State, Tribal and local government P2 staff (e.g., in 2005, 1,000+ people attended these events nationally);
- (2) spending millions on P2 research and development, which others use to help get P2 results (e.g., in 1999 the P2 Program spent \$250,000 for fact sheets, videos, and a training presentation on P2 in auto repair and fleet maintenance. California used these materials as the main cornerstone of a successful 5-year Vehicle Service Repair project ending in 2005 – many examples like this occur across the country); and,
- (3) spending \$104+ million in grants to States and tribes, and other P2-related funding (via Innovation, CARE, energy efficiency, and sustainability grants), with estimated total funding of over \$150 million. This funding has significantly helped develop today's national infrastructure of staff, programs and informational resources and continues to help our P2 partners produce results.

5) The Environmentally Preferable Purchasing Center

<http://www.epa.gov/opptintr/epp/index.htm>

The Environmentally Preferable Purchasing (EPP) Center produces a stream of annual results that come from Federal partnership activities (purchasing, using, and disposing of green electronics) and from sales of registered green electronics to all purchasers (based on calculated life-cycle product benefits). EPP enters annual federal partnership data, and the Green Electronics Council (non-profit) enters manufacturer data, into EPP's peer-reviewed Electronics Environmental Benefits Calculator, which enables the Center to generate computed results for both the partnership-based and sales-based activities of the program. The Center provides results in pounds, BTUs, and dollars saved. Outcomes include fewer toxics used in electronics manufacturing, less electricity used during extended product lifetimes, and more reuse of product component materials upon disposal.

The EPP Center provides federal purchasers and, by extension, other purchasers, with environmental life-cycle information on various products to help them identify products that are environmentally preferable. The center plays a guiding role in implementing aspects of Executive Order 13423 that harness the purchasing power of the federal government to stimulate the national demand for greener products and services. The EO and its implementing instructions direct federal purchasers to buy green electronics and use and dispose of them on the terms laid out in EPP's Federal Electronic Challenge. This Challenge is a federal partnership that facilitates facilities' purchase of greener electronic products, helps them reduce the impact of these products during their use, and helps them manage obsolete electronics so as to increase reuse of component materials upon disposal. The Challenge provides technical assistance, implementation support, and bronze, silver, and gold awards based on the annual commitments and results of individual federal facilities. FEC outcomes contribute directly to reducing the federal environmental footprint.

In conjunction with the implementation of Executive Order 13423, the center supports the development of voluntary product standards that address environmental performance. The first standard that the center helped bring about is for computer desktops, laptops, and monitors. Manufacturers register their products as conforming to this standard (laid out in the Electronic Product Environmental Assessment Tool/EPEAT), and the center works with the Green Electronics Council tracks both federal and commercial purchases of these registered products.

6) Partners for Sustainable Healthcare (PSH) Center (previously "Hospitals for a Healthy Environment")

<http://www.hercenter.org/>

Partners for Sustainable Healthcare is a partnership that produces a stream of new annual results from partners that achieve annual awards based on meeting their commitments to eliminate mercury-containing waste from the health care waste stream, reduce the volume of regulated and non-regulated waste, and identify P2 opportunities for target chemicals. This Center uses data on actual results submitted in award applications to report results in pounds, BTUs, gallons, and dollars saved. Sample outcomes include the eliminating the use of mercury-containing products in hospitals.

After its inception in 1998, H2E became the leading partnership program for environmental sustainability in the healthcare sector. H2E developed a website of tools and resources, a peer-to-peer listserv where health care professionals seek technical advice from each other, and monthly free conference calls featuring expert environmental advice. In 2006, after H2E had enlisted 1,170 partners representing over 6400 healthcare facilities, an independent non-profit organization assumed responsibility for the partnership program. The P2 Program continues to support the partnership by providing P2 technical assistance support for healthcare partners. The P2 Program will cease counting this stream of new annual results by 2011.

7) The Green Suppliers Network (GSN) Center:

<http://www.greensuppliers.gov/gsn/home.gsn>

The Green Supplier Network Center is a partnership that produces its stream of results from the National Institute of Science and Technology (NIST) surveys distributed to participants after technical assistance training workshops with support from Technology Manufacturing Extension Partnerships (MEPs) and through the use of case studies.

The Green Suppliers Network is a collaborative venture among industry, EPA, the US Department of Commerce's Manufacturing Extension Partnership (MEP). Green Suppliers works with all levels of the manufacturing supply chain to improve processes and minimize waste generation. Through on-site Green Supplier reviews, suppliers learn ways to increase energy efficiency, identify cost-saving opportunities, and optimize resources and technologies to eliminate waste. The result has been more effective processes and products with higher profits and fewer environmental impacts.

The GSN Center:

- Conducts one-on-one technical reviews at manufacturing facilities using a team composed of lean manufacturing experts from the local National Institute of Standards and Technology Manufacturing Extension Partnership (NIST MEP) and state environmental experts. These reviews use *lean and clean* manufacturing practices, and thus combine environmental considerations and lean manufacturing techniques to enhance process efficiencies and using materials more efficiently.
- Establishes a delivery mechanism to engage manufacturers and their suppliers in continuous environmental/economic improvement.
- Forms partnerships with state, local and other federal agencies to bring the best technical, financial and research assistance to participating companies.

II. An Overview of OPPT’s Pollution Prevention Program Centers for Results

Table 1 - Overview of P2 Centers Data Sources:

P2 Program Center	Sub-Center (This feeds into the data source)	Data Source	Overall Data Collection Process	Critical Reporting Highlights	Recurring & Annual Performance Results	Outcome Measures P2 Center Contribution
Design for the Environment (DfE)	Auto refinishing Formulators Printed Wiring Board Lead Free Solder Printed Circuit Boards	Partnership facility data from industry, supply chain, & environmental group/stakeholders. Market and sector data.	Information is verified through data from market sales and is received and centrally tracked by the program. The program has developed an ICR when needed to collect data.	DfE has the ability to collect market and sector data to demonstrate performance results.	DfE tracks and reports both annual and recurring performance results.	Pounds of Hazardous Material Dollars saved Potentially BTUs and MTCE in the future
Green Chemistry (GC)	Environmental and economic benefit information within the nomination packages. There are approximately 100 nomination packages in any given year. There are five award winners chosen in any given year.	Environmental and economic benefit information within the nomination packages. There are approximately 100 nomination packages in any given year. There are five award winners chosen in any given year.	This center maintains a metrics database which stores information on environmental and economic benefits from all nominees dating back until 1996.	Only results that are currently being implemented (realized) as opposed to potential results are counted. GC does not have an ICR but has environmental and economic data from nomination packages to support performance results.	GC counts annual and recurring performance results.	Pounds of hazardous material Gallons of water reduced Dollars saved MTCE reduced Numerous other environmental benefits reported via nominees
The Regional Centers	STAG Grants Source Reduction Grants Direct Results	Grantee Final Reports Sub-grantee Final Reports (region by region basis) Facility	Grantees produce performance results demonstrated in final grant reports annually and provide this information to Regional P2 Coordinators and	The Regional P2 Centers produce significant environmental performance results for the P2 program but their ability to collect data at a sub-grantee and facility basis	Regions track and report on annual performance results and do not count recurring results	Pounds of hazardous material Dollars saved BTUs of energy saved Gallons of water saved

P2 Program Center	Sub-Center (This feeds into the data source)	Data Source	Overall Data Collection Process	Critical Reporting Highlights	Recurring & Annual Performance Results	Outcome Measures P2 Center Contribution
		Level Reports (region by region basis)	Project Officers. They review, analyze and verify the data, calculations and methodologies used.	varies from region to region and methodologies for calculating results may vary on a regional basis.		MTCE saved Pounds of non-hazardous
The Pollution Prevention Resource Exchange (P2Rx) Center	P2RX Centers- Indirect results from technical assistance and outreach	State P2 program activities that are funded without EPA grants. About 30 states report their new annual P2 results into a common database, knowing that EPA will take these total results, subtract out results associated with EPA grants, and then report 10 percent of the remainder as EPA P2 Program new annual results under the P2Rx Center.	P2Rx Centers enter data into a web based database "National Pollution Prevention Results System". EPA reviews the performance data and accounts for 10% of the total results after subtracting out EPA P2 Grant Results.	The 10 percent allocation for performance results is designed to account for the extended sphere of P2 Program influence on the State level. This sphere of influence flows from: (1) the EPA-funded Pollution Prevention Resource Exchange (P2Rx – lending its name to the center), a national web-based network of P2 information and listservs reaching state P2 technical assistance providers; (2) the infrastructure support of matching P2 grants which, beyond individual grant projects, keeps some state P2 programs surviving financially; and, (3) 17 years' worth of P2	P2Rx only tracks and reports performance results on an annual basis. However the national P2 results database has the ability to track recurring results. P2Rx and the P2 community is waiting for EPA policy direction to be issued in regard to counting recurring results.	Pounds of hazardous material BTUs of energy saved Gallons of water reduced Dollars saved MTCE reduced Additional metrics such as: CO2 reduced Vehicle miles prevented Fuel specific energy savings Pounds of pollution disaggregated into several sub-categories.

P2 Program Center	Sub-Center (This feeds into the data source)	Data Source	Overall Data Collection Process	Critical Reporting Highlights	Recurring & Annual Performance Results	Outcome Measures P2 Center Contribution
				<p>Program investment in P2 research, information and tool development, and methodologies, which helped the state P2 program infrastructure to grow, and which continues to help state P2 programs avoid duplication of effort and maintain efficiency in their delivery of services.</p>		
<p>Environmentally Preferable Purchasing (EPP)</p>	<p>Federal Electronics Challenge (FEC) Electronic Product Environmental Assessment Tool (EPEAT)</p>	<p>FEC: FEC partners EPEAT: Registered manufacturers provide reporting data through the Green Electronics Council</p>	<p>FEC: FEC partners fill out their information via on-line survey forms with built in error reporting. These raw data are used as inputs for the PEER reviewed electronics environmental benefits calculator (EEBC) to assess environmental outcomes. EPEAT-Green electronic council result run through an electronics benefits calculator</p>	<p>Electronics Environmental Benefits Calculator is PEER reviewed and verification and validation of performance results is at a high level.</p>	<p>EPP counts only annual performance results for FEC purchases in that given year. EPP also counts only annual performance results for EPEAT purchases in a given year but also includes lifecycle benefits for prior year sales. EPP does not count recurring results but has the ability to do so.</p>	<p>Pounds of Hazardous Material BTUs of energy saved MTCE reduced Dollars saved</p>

P2 Program Center	Sub-Center (This feeds into the data source)	Data Source	Overall Data Collection Process	Critical Reporting Highlights	Recurring & Annual Performance Results	Outcome Measures P2 Center Contribution
Partnership for Sustainable Healthcare (Previous: H2E)	Award winners (types): - Environmental Leaders - Making Medicine - Mercury Free - Partners for Change	Award winning program partners such as hospitals, health care facilities and nursing homes	Award winners report performance results to PSH. PSH captures information and analyzes each award winner's environmental results.	EPA management will make a decision whether or not to sunset this program.	PSH tracks and reports annual performance results. Annual results from new award winners are counted each year.	Pounds of Hazardous Material BTUs of energy saved MTCE reduced Dollars saved Gallons of water reduced
Green Supplier Network (GSN)	The National Institutes of Science and Technology (NIST) Direct Survey Results GSN Assessments Aggregate data Case Studies	National Institutes of Science and Technology Manufacturing Extension Partnerships Aggregate reports Case Studies	Results from participant surveys are given one year after technical assistance through NIST surveys. NIST surveys have a 88% response rate on qualitative data and 25% response rate on quantitative data.	GSN has been very successful in its outreach and technical assistance and some who have received training to be self-sustaining generate large environmental results over time. Multiplier effect applies to this program.	GSN tracks and reports annual performance results.	Pounds of hazardous material BTUS of energy MTCE reduced Dollars saved Gallons of water reduced

III. Summary of Literature Search Results

Table 2 – Initial Literature Search Results:

Summary of Recurring Results Calculations for Selected Firms, Programs, Regulatory Impact Analyses and Standards-Setting Guidance			
Name of Corporation, Government Program, Regulatory Analyses, or Standard	Program Description/ Intervention	Type of Data Collected and Time Frame	Ways in which Recurring Results are Calculated
<p>Corporation:</p> <p>Baxter Pharmaceuticals (also see discussion that follows this table)</p>	<p>Baxter is an international diversified healthcare and biotechnology company that develops, manufactures and markets medical devices and pharmaceutical products.</p>	<p>Collects data annually on: energy use, water use, hazardous waste generation and recycling, greenhouse gas emissions, and air pollutants.</p>	<p>Reductions have been calculated annually since 2005 based on environmental performance during the report year. Environmental savings are calculated as the difference in the current annual environmental performance from an extrapolation of historical environmental and financial performance trends over the past six years. Current environmental savings reflect current and prior actions (i.e. recurring results). Indicator reduction goals are measured as an index of annual environmental reductions per annual net revenue.</p>
<p>Corporation:</p> <p>JP Morgan Chase</p>	<p>JP Morgan is a global financial services firm, including operations in investment banking, financial services for consumers, small business and commercial banking, financial transaction processing, asset management, and private equity.</p>	<p>Collects data annually on: paper consumption (virgin and recycled), greenhouse gas emissions, energy consumption, and water consumption.</p>	<p>Reductions are reported as the physical amount generated or used during the reporting year. Recurring results are considered as the reduction made from the previous year or a baseline year of 2005. Goals for recurring results are set as the difference between 2012 and 2005 performance.</p>
<p>Corporation:</p>	<p>Alcoa produces aluminum products and components for</p>	<p>Collects data annually on: process water use, energy use, waste</p>	<p>Alcoa measures and</p>

**Summary of Recurring Results Calculations for Selected Firms, Programs,
Regulatory Impact Analyses and Standards-Setting Guidance**

Name of Corporation, Government Program, Regulatory Analyses, or Standard	Program Description/ Intervention	Type of Data Collected and Time Frame	Ways in which Recurring Results are Calculated
Alcoa	aerospace, automotive, packaging, construction, commercial transportation, and industrial markets.	generated, and emissions of several chemicals, as well as area of mining land disturbed and area of land rehabilitated.	reports physical amounts of wastes generated and water and energy used per year. Benefits are calculated as a difference in values to a base year of 2000. Recurring results are measured as progress toward percentage reduction goals, set for various years up to 2010.
Corporation: BP	BP's business primarily includes hydrocarbon exploration and production, and its refining and marketing. Additional investments include the development of alternative energy technologies such as wind or solar power.	Collects data annually on: greenhouse gas emissions, air pollutants, discharges to water and freshwater withdrawals, and hazardous waste.	Recurring results are reported as the physical amount used or generated each year, calculated as the difference of amounts from a base year of 2005. As annual results are reported graphically, results are discussed as trends in performance. Greenhouse gas emissions are also discussed as a trend normalized to the emissions quantity produced in 2001.
Government Program: Texas Commission on Environmental Quality (TCEQ)	TCEQ is the environmental agency for the state of Texas, which adopted the Waste Reduction Policy Act (WRPA) of 1991. WRPA requires large and small quantity generators of hazardous waste and Toxics Release Inventory (TRI) Form R reporters to: prepare a five year Pollution Prevention (P2) Plan; submit an Executive Summary of the P2 Plan; and report annually on their activities to prevent pollution.	Each applicable facility annually self-reports estimated source reduction in tons of hazardous waste and/or TRI chemicals.	Reductions are calculated annually based on reduction achievement during the report year. This calculation method of recurring results assumes that the reductions achieved during the prior year are still in effect during the next reporting year.

**Summary of Recurring Results Calculations for Selected Firms, Programs,
Regulatory Impact Analyses and Standards-Setting Guidance**

Name of Corporation, Government Program, Regulatory Analyses, or Standard	Program Description/ Intervention	Type of Data Collected and Time Frame	Ways in which Recurring Results are Calculated
<p>Government Program: U.S. EPA Supplemental Environmental Projects (SEPs) (OECA)</p>	<p>SEPs are environmental improvement projects that a violator voluntarily agrees to perform, in addition to actions required to correct the violations, as part of an enforcement settlement.</p>	<p>Annual pollutant reductions in year of intervention are reported, with the option to report improvement of reporting in terms of average annual value.</p>	<p>Pollutant reductions are reported only for the year of intervention. A field is available for violators to report improvement of reporting in terms of average annual value.</p>
<p>Government Program: U.S. EPA Performance Track Program (OPEI)</p>	<p>Members of industry exemplary environmental performance report annually on total performance and on progress in reaching individual reduction goals.</p>	<p>Annual performance data collected for goals set over three years.</p>	<p>Recurring results are calculated as the difference in annual indicator performance from a base year. Members are expected to follow the protocols of the Global Reporting Institute (see below).</p>
<p>Government Program: U.S. EPA Energy STAR Program (OAR)</p>	<p>Energy Star is a joint program of the U.S. EPA and the U.S. Department of Energy with the goal of accomplishing cost savings and environmental protection through energy efficient products and practices.</p>	<p>Annually collect: utility bill savings; emissions saved; products purchased; homes built; buildings rated and labeled</p>	<p>Benefits are calculated based on the difference between the Energy Star appliance specs and the National Efficiency Standard, each year for the lifetime of the appliance. For electronics with no National Efficiency Standard, Energy Star takes credit for recurring results using the start of the program (1992) as a baseline.</p>
<p>Government Program: U.S. EPA Methane to Markets Program (OAR)</p>	<p>Methane to Markets is a global voluntary, non-binding framework for international cooperation to reduce global methane emissions by promoting cost-effective, near-term methane recovery and use as a clean energy source. The partnership supports projects from four major methane</p>	<p>Annually collect data on methane volumes recovered and costs for the life of the project.</p>	<p>Recurring benefits are calculated annually over the length of the project. For landfill projects, investments use a 15 year period to calculate payback regardless of project length.</p>

**Summary of Recurring Results Calculations for Selected Firms, Programs,
Regulatory Impact Analyses and Standards-Setting Guidance**

Name of Corporation, Government Program, Regulatory Analyses, or Standard	Program Description/ Intervention	Type of Data Collected and Time Frame	Ways in which Recurring Results are Calculated
	sources: animal waste management, coal mines, landfills, and natural gas and oil systems.		
<p>Regulatory Analyses:</p> <p>OMB's Circular A-4, Subject: Regulatory Analysis” (September 17, 2003)</p>	<p>This circular provides guidance on the preparation of economic analyses.</p> <p><i>.....“As a first step, you should present the annual time stream of benefits and costs expected to result from the rule, clearly identifying when the benefits and costs are expected to occur. The beginning point for your stream of estimates should be the year in which the final rule will begin to have effects, even if that is expected to be some time in the future. The ending point should be far enough in the future to encompass all the significant benefits and costs likely to result from the rule.”</i></p>	<p>Guidance appears to support counting benefits that extend more than one year.</p>	<p><i>“...The ending point should be far enough in the future to encompass all the significant benefits and costs likely to result...”</i></p>
<p>Regulatory Analyses:</p> <p>Hazardous Waste F019</p>	<p>Amends the RCRA F019 listing to exempt wastewater treatment sludge generated from the chemical conversion coating of aluminum in vehicle manufacturing. With this rule, wastewater treatment sludge from the industry can be disposed in other types of landfills instead of requiring the transport of waste to a RCRA Subtitle C hazardous waste landfill.</p>	<p>Annual model outputs of human health effects estimated over 30 years of exposure.</p>	<p>Recurring results are calculated as either the average concentrations or quantities consumed over the estimated time-frame. Results of heavy metal exposure are assumed to be recurring at the same rate each year over the lifetime of the rule, calculated to 30 years. Future savings from fuel consumption are the difference between a baseline case of vehicle consumption and that of vehicles with increased aluminum. Since future savings of fuel consumption from aluminum is only an</p>

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Name of Corporation, Government Program, Regulatory Analyses, or Standard	Program Description/ Intervention	Type of Data Collected and Time Frame	Ways in which Recurring Results are Calculated
			acceleration of likely future vehicle construction, results of future savings decrease to baseline predictions over 23 years.
<p>Regulatory Analyses:</p> <p>Clothes Washer Energy Conservation</p>	<p>Establishes a minimum energy efficiency standard for residential clothes washers. With this rule, consumers will save energy and water through more efficient washing and spinning of clothing.</p>	<p>Annual model outputs of baseline and regulatory scenarios for energy, water consumption and equipment age distributions over 27 years.</p>	<p>Recurring benefits are calculated as the difference between baseline scenarios of energy and water consumption and model scenarios of consumption with energy-efficient equipment purchases. These scenarios take into account differing benefits based on the age of the equipment and their likely replacement rate (the average lifetime of clothes washers is assumed as 13 years). Estimates of savings are calculated annually, but as the model used only provides baseline estimates to 2020, estimates of annual savings from 2020-2030 are the static annual modeled savings at 2020.</p>
<p>Regulatory Analyses:</p> <p>NESHAP for Plywood and Wood Composites</p>	<p>Requires major sources of hazardous air pollutants (HAP) emissions from the PCWP industry to meet pollution standards via the application of maximum achievable control technologies (MACT). These monitoring and control technologies reduce air pollutants but require additional consumption of electricity and natural gas by PCWP entities.</p>	<p>Average annual estimates over 3 years of air emissions, solid wastes and wastewater, and energy consumption for baseline and regulatory scenarios.</p>	<p>Recurring benefits are calculated as the difference between a baseline scenario of equipment with present technologies and a regulatory scenario requiring all equipment to have installed new MACT treatment controls within 3 years. Benefits occur only over the 3 years</p>

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Regulatory Impact Analyses and Standards-Setting Guidance**

Name of Corporation, Government Program, Regulatory Analyses, or Standard	Program Description/ Intervention	Type of Data Collected and Time Frame	Ways in which Recurring Results are Calculated
			before all equipment must include the control technology. Estimates are calculated annually and presented as an annual average of the three year period.
<p>Regulatory Analyses:</p> <p>Stratospheric Ozone Amendments to Leak Repair</p>	<p>Requires stricter leak repair practices for cooling and refrigeration equipment. With this rule, emissions from ozone-depleting pollutant (ODP) releases will be decreased.</p>	<p>Average estimates of emissions in one year for baseline and regulatory scenarios. Average annual estimate of cancers avoided from one year's emissions</p>	<p>Recurring benefits are calculated as the difference between the likely emissions leakage saved for probable current leak repair and regulatory leak repair requirements over one year. The lifetime of the chemicals in the atmosphere varies significantly by chemical; one year of emissions thus is modeled showing recurring benefits from ozone depletion to 2131. No indication is given whether to compound recurring annual results over the lifetime of the regulation, or whether benefits would decrease over time with newer equipment.</p>
<p>Standards:</p> <p>Global Reporting Initiative: Guidelines and Indicator Protocols</p>	<p>Provides general framework for the creation of standardized corporate sustainability reports, and provides guidance in calculating performance indicators. GRI protocols for performance indicators compile WRI, IPCC and OECD methods and definitions.</p>	<p>Calculations are created for annual performance of defined environmental indicators.</p>	<p>Recurring results are included in the total annual performance for chosen environmental performance indicators. This method includes guidance for developing estimates accounting for sector-specific processes. Indicators of savings are defined as estimates of the benefits due to equipment or process changes from the industry averages (not</p>

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Name of Corporation, Government Program, Regulatory Analyses, or Standard	Program Description/ Intervention	Type of Data Collected and Time Frame	Ways in which Recurring Results are Calculated
			calculated differences in estimates of likely corporate processes).
Standards: World Resources Institute: <i>Greenhouse Gas Corporate Standard</i>	Provides general framework for the standardized reporting of greenhouse gas emissions, provides toolsets for calculation, and gives guidance for developing reduction programs.	Calculations are created for annual performance in activities reducing greenhouse gas emissions.	Recurring reductions are considered as comparisons of annual performance, typically in absolute metric tons CO ₂ e, to a chosen baseline year.
Standards: International Organization for Standardization: <i>ISO 1400</i>	Provides standardized environmental management principles for companies to systematically determine environmental impacts of products/activities/services, plan environmental objectives and measurable targets, implement programs to meet objectives and targets, and provide checks and corrective action.	Calculations are created for annual performance for indicators appropriate to company activities.	Recurring reductions are considered as comparisons of annual performance, typically in absolute quantities such as metric tons CO ₂ e or volume water used, to a chosen baseline year. Certification is achieved when these quantities are confirmed by a third-party verification.

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IV. Initial Literature Search Results Discussion

The P2 Program has identified several federal and state programs as well as industries that may compare favorably to the P2 Centers in approach and the reporting of results. This section includes a discussion on the use of recurring results by other programs and places those findings into a comparative context with the P2 Program. Also provided in this section is a table that describes the P2 Centers according to their use of recurring results. Following the table is a brief discussion of the relevance of the literature findings to the P2 Program.

Other Government Programs - federal

Elements of the EPA's Energy Star Program are similar to the Federal Electronic Challenge (FEC) and Electronic Product Environmental Assessment Tool (EPEAT) activities in the "EPP Center." FEC, EPEAT, and Energy Star each pertain to the purchase and use of products with life cycle environmental benefits. Furthermore, there is a good deal of communications between these programs on electronics products and related measurement issues.

Department of Energy (DOE) product standards are similar in approach to the "EPP Center" and use modeled scenarios to calculate benefits for a product's life cycle for each year of the assumed lifetime of the product. The DOE approach is both similar to the Energy Star and EPP approaches.

Related to the "GSN Center" is EPA's National Environmental Performance Track (PT) Program. Both programs focus on company-selected environmental improvement projects. GSN provides facility "green" reviews on site to educate facilities on their greening options, whereas PT provides recognition for facilities that use an environmental management system to achieve their own beyond-compliance environmental performance goals. PT markets GSN as a beneficial service available to its members. For measurement, PT has access to actual facility performance data for three years (length of partnership agreement), and has recently moved to counting recurring results from one intervention for three years.

Similarly the DfE Formulator partnership within the "DfE Center" also has access to year-by-year data based on an ongoing "memorandum of understanding" with formulator partners. This arrangement is dissimilar to the "GSN Center," which has access only to one year of facility data from partner suppliers.

An EPA Office of Air regulation on leak repair practices for cooling and refrigeration equipment is also potentially relevant to the adoption of best practices as practiced in the "DfE Center." The OAR regulation counts one year of benefits from the adoption of best practices, and then calculates multi-year risk reductions based on the life-cycle breakdown of the ozone-depleting substances whose releases were reduced through leak repair. As further evidence of the strength of this relationship, a series of best practices developed in the DfE auto refinishing project have also been included in a recently promulgated OAR rulemaking.

Relevant to the P2 Centers is EPA's Methane to Markets program, which, like P2, also engages in voluntary partnerships. This program counts the recurring benefits of a project for 15 years.

Also, at the federal program level we have checked with the Department of Defense, which has an active P2 program within the DOD Environmental Security Program. We learned from Maureen Sullivan, Director of Environmental Management, that they count only annual results and cumulative annual results, but do not portray cumulative recurring results.

Other Government Programs - state

Investigating state P2 program measures and results, we have identified a law for the State of Texas that requires 5-year facility P2 planning and annual P2 reporting from a baseline year. In speaking with contacts within the Texas P2 program, we have learned that their guidance is to treat this on a cumulative but not recurring basis. The State of Massachusetts also has a law requiring P2 reporting and also counts results on a cumulative but not recurring basis. However, Rick Reibstein of Massachusetts sees real value in counting recurring results to convey the full impact of P2 efforts to the public, and has come to conclude that counting both ways, each for its own purpose, would be preferable.

Other state P2 programs over the past several years have shared a strong interest in counting recurring results. In particular, states have been considering options for reporting recurring results (e.g., for a three year or five year basis) in the National P2 Results System database that EPA helps maintain. The database is geared towards collecting state P2 performance results nationally. What we have observed is that some states have access to multi-year data from industry, but many do not.

Industry Programs

Upon initial examination, we have also identified several – Baxter Pharmaceuticals, JP Morgan Chase, Alcoa, BP, SC Johnson, and Colgate that appear to set environmental goals and report progress from a base year. Based on our review of corporate performance measurement systems, we have found some precedents for measuring a recurring benefit over time as part of a performance measurement system. Many companies track their attainment of a cumulative goal. For example, a company might set a goal to “reduce waste by 20 percent over 5 years from a 2008 baseline.” In the first year, they might reduce waste by 4 percent from the 2008 baseline. In the second year, the waste reduction might total 6 percent of the 2008 baseline. The second year environmental report from that company would report a 10 percent reduction. That is, the two percent reductions are added together. This approach implicitly counts the first year reduction as a recurring benefit. Some examples that typify this approach include:

The S.C. Johnson company’s 2007 annual environmental report http://www.scjohnson.com/environment/2008_Public_Report.asp tracks cumulative waste reduction from a 2000 baseline. This is done in response to S.C. Johnson’s goal of reducing waste by 50 percent by 2011.

The Colgate Sustainability report reports on the amount of water use reduced in making products between 1998 and 2003. <http://investor.colgate.com/downloads/sustainability.pdf>.

Baxter Pharmaceutical Inc. includes an environmental financial statement in its sustainability report, noting it counts up to six years' worth of recurring financial results (savings and cost-avoidances) associated with its environmental improvements.

This industry trend of reporting is likely due to well-established methodologies for presenting financial information and the unifying force of monetary value, factors noted below by the World Business Council on Sustainable Development. The WBCSD also notes that gathering and presenting eco-efficiency data is currently less straightforward than for financial information, and spans a complex mix of parameters which relate to different impacts and for which measurement methodologies are often still new and subject to debate.

Company-level practices may be the most relevant to the “Green Chemistry Center”, and the Formulator partnership program in the “DfE Center”. The majority of the Presidential Green Chemistry Challenge Award winners are companies that have redesigned chemicals and chemical production processes to be environmentally superior in process and/or for use in products. The Presidential Green Chemistry Challenge Award winners, as well as all nominees, are typically identifying the alternative synthesis of chemicals and chemical processes on a scale that has significant market-level impacts for the company as a whole.

Global Measurement Principles

We have recently discovered a series of global measurement principles that address corporate and organizational reporting on sustainability or environmental performance. These principles may relate to our overall program because the data sources for our reporting are also corporate and organizational reporting, and because we are ourselves an organization.

The Global Reporting Initiative's (GRI) vision is that reporting on economic, environmental, and social performance by all organizations is as routine and comparable as financial reporting. The GRI is a large international multi-stakeholder network of thousands of experts, in dozens of countries worldwide, who participate in GRI's working groups and governance bodies, use the GRI Guidelines to report, access information in GRI-based reports, or contribute to develop the Reporting Framework in other ways – both formally and informally. The GRI lays out reporting principles for corporate sustainability reports. Among these are transparency, comparability, neutrality, and completeness. The transparency principle calls for full disclosure of the processes, procedures, and assumptions used in preparing the report that are essential to its credibility, and for explicit declarations of boundaries, scope, and time period of the report. Comparability calls for data to be presented in a way that allows performance to be compared to past periods, discloses any changes in calculations of indicators, and presents time series data. Neutrality calls for boundaries, scope and time period to be chosen so as to give a balanced account of, and avoid distortion of performance. Completeness calls for presenting all information that is material to users for assessing environmental performance.

The World Business Council on Sustainable Development also has a guide to reporting company eco-efficiency performance. The guidance notes that aggregation of data should be done

carefully, and with transparency to the end-user, so that the limitations of the information can be well understood.

Related to global measurement principles is the 1999 National Academy of Engineering book, "Industrial Environmental Performance Metrics: Challenges and Opportunities." NAE puts forward the argument that attention must now shift to such life-cycle areas as the development of metrics within the manufacturer's supply chain. While recognizing limits to how deeply life-cycle attributes (and the supply chain) can reasonably be investigated, NAE nonetheless concludes that the potential environmental benefits of viewing the product life cycle more holistically demand that the corporate boundaries of environmental performance metrics be enlarged. NAE finds that a systems approach will be required, if suppliers, manufacturers, consumers, and those responsible for the final disposition of a product can reasonably assess their roles in lessening the overall environmental impact of their activities.

Provided below is a table that compares P2 Centers' data sources with the data sources inferred for the analogous models identified in the preliminary literature search. The table also identifies data gaps.

Table 3 – Comparison of P2 Program and Literature Search Data Sources:

P2 Center Data Sources	Relevant Literature Search Data Sources	Initial Comparison of Data Sources & Gaps
Green Chemistry – one year's worth of non-proprietary data on company annual results (in award nominations) reviewed by panel of experts. This Center has experience and knowledge on market share and capital equipment depreciation used to support of calculating recurring results.	Industry examples (BP, Alcoa, SC Johnson, Colgate etc.) – have access to corporate proprietary data on company annual results year-after-year.	The difference may be in the actual number of years that results data are available.
Design for Environment – Formulator partners report one year's worth of proprietary annual production volume of improved formulations (reporting is a condition of participation); for other partnership efforts, a combination of technical studies plus market/sales data from sector-based associations is typically required from partners to calculate one year's worth of results data and may be used as a basis to calculate multiple years' worth of results data or, new results data may be reported annually depending on the continued relationship with partners.	See above discussion on Industry examples. Also, EPA's OAR ozone regulation on leak repair practices may be a reasonable comparative program to infer wherein OAR uses technical studies plus market data to calculate probable outcomes.	The difference with industry data is in the actual number of years of data available.
Regions – Grant reports provide one year of either disaggregated facility annual results data or aggregated facility annual results data from State P2 leadership programs. Most grantees are states or other governmental entities.	States (TX, MA, etc.) have disaggregated results from their P2 programs. In most cases, only one year's worth of annual data is available.	The Regions currently have some results reported in aggregated form, whereas States typically do not. There may be a need to develop an alternative means, other than market and sales data, to calculate out-year

P2 Center Data Sources	Relevant Literature Search Data Sources	Initial Comparison of Data Sources & Gaps
		<p>results.</p> <p>Many results are not achieved on a sector-wide basis, so market and sales data may be of limited use for extrapolating out-year results.</p>
<p>P2Rx – uses aggregated results from State P2 programs. Only one year’s worth of annual data is available.</p>	<p>States (TX, MA, etc.) have the disaggregated version of results from their P2 programs. In most cases, only one year’s worth of annual data is available.</p>	<p>The difference is that the P2Rx Center currently reports results in a form more aggregated than the States.</p> <p>There may be a need to develop an alternative means, other than market and sales data, to calculate out-year results.</p> <p>Many results are not achieved on a sector-wide basis, so market and sales data may be of limited use for extrapolating out-year results.</p>
<p>Environmentally Preferable Products – technical electronics specifications and life-cycle calculations used in the peer-reviewed Electronics Environmental Benefits Calculator, plus reported annual market sales data as well as reported best practices.</p>	<p>Energy Star (computers) uses technical product specifications plus sales data.</p>	<p>EPP Center’s data sources seem similar to Energy Star’s, currently under review. No obvious gaps identified.</p>
<p>Green Suppliers Network – overall, limited to non-proprietary data on facility annual results. Reporting results is not a condition for participation.</p>	<p>EPA’s Performance Track Program has annual facility/company results year-after-year. Reporting results is a condition for participation.</p>	<p>The difference between GSN and Performance Track is a significantly lower reporting percentage from GSN participants.</p> <p>There may be a need to develop an alternate means to market and sales data to calculate out-year results.</p>
<p>PSH – one year’s worth of annual results data from partners applying for awards (found in award applications). Market data could be used to help calculate recurring results.</p>	<p>The OAR ozone rule (see also DfE best practice partnerships) may be the most analogous.</p>	<p>The difference is a lower reporting percentage from PSH participants.</p>

Preliminary conclusions are provided below describing which P2 Centers are the easier and the more challenging cases to address vis-à-vis recurring results.

The Regions, P2Rx, and the Green Suppliers Network may represent the more uncharted issues in terms of how to substantiate recurring results. We have not identified any model in the preliminary literature review on how to handle this situation. However, as a preliminary approach to counting recurring results for these Centers, the P2 Program would welcome

feedback on two trend factors that may be relevant for establishing a conservative basis for counting of recurring results – length of time innovation is retained, and the length of time firms stay in business. We are hoping to turn to national averages for small businesses, and national averages for medium-size businesses. We are interested in identifying other trend factors that could be relevant for determining a conservative estimate of how long to count recurring results when neither facility-specific nor sector-specific results data are available for multiple years on a single P2 improvement.

Innovation rate. It may be possible to develop a surrogate measure of innovation from input-output data or productivity data from a range of sectors. The U.S. Census Bureau, which has an entire center that studies innovation, may be a viable resource. If a program is mainly speeding up the rate at which a new technology is being adopted, then it should only be counting recurring results for the increment of time until the firm/facility would normally make the change anyway. Our understanding of this question is that EPA needs to know if there is an accepted value or method for estimating the life cycle or life span of pollution prevention technologies. Having this information would allow OPPT to determine how long a specific benefit could be claimed within its set of performance metrics.

Based on an initial review, the P2 Programs were unable to identify any accepted values or methods for estimating the typical life cycle or life span of pollution prevention technologies. The primary reason is that the life cycle/span of a technology is highly variable and will depend on the industry and on the technology itself. A key consideration in the life cycle of a technology will be its economic viability which will depend on the availability of alternative lower cost/higher return technologies.

The P2 Programs have also reviewed IRS guidance on the depreciation methods to determine if the IRS has guidelines for businesses to use.¹ The IRS guidance also did not provide any definitive time frames over which to depreciate, but does provide general guidelines to use in determining an appropriate time-frame.

Birth and death rates of firms. The U.S. Census Bureau and its statistics of U.S. businesses may be a good resource. Data available include the number of establishments and corresponding employment change for births, deaths, expansions, and contractions by employment size of enterprise, industry, and state. The industry and state are determined by the initial year data for establishment deaths and continuing establishments and by the subsequent year data for establishment births. For establishment deaths and continuing establishments, determining the enterprise size is necessary, and there are several ways to do it. There are also ways to establish the existence of a firm in a given year.

Other Considerations. In addition to the above, we are also mindful of some other considerations. For the GSN Center, the observations of the National Academy of Engineering on the advantages of developing a systems approach to counting life cycle benefits seem relevant. Also for GSN, we may need to consider means to increase the confidence of participants in EPA's ability to handle proprietary data appropriately (aggregating or using

¹ <http://www.irs.gov/pub/irs-pdf/p946.pdf>.

expert review or some other means), to in turn increase the percentage of participants who report results data? The DfE Center routinely handles proprietary data.

The Centers for Green Chemistry, Design for Environment, Environmentally Preferable Purchasing, and Partners for Sustainable Healthcare seem to offer more certainty in support of mechanisms to provide recurring performance results. Also, the global measurement principles suggest that we can also work in these areas to build transparency, comparability, neutrality, and completeness in how we communicate recurring results in these areas.

Initial Draft List of Guidelines. We have developed an initial draft list of guidelines for making a determination on how long to count recurring results. Are their additional guiding factors we should consider? If the P2 Program as a whole ever decides to count only annual and not recurring results, then it may need to consider what to do with product life cycle benefits when product life is multiple years. The initial guidelines include:

- Maintain credibility by being conservative in the use of assumptions; however further explore the application of assumption by Centers where data is limited.
- Avoid counting recurring results beyond total market penetration.
- Avoid counting years of recurring results for longer than a known cycle of innovation adoption.
- If the program impacted a technical innovation, or significantly contributed to a voluntary product standard, take credit for the length of that innovation or standards (while considering other factors on the list).
- Consider the impact of events beyond our control in out-years, such as business decline, further business P2 innovation and adoption, and so on.
- The ability to continue to satisfy global measurement principles such as transparency, neutrality, completeness, and comparability for the recurring results in out-years.
- Take credit for direct evidence of continuing results.