# From Process to Product: A Review of Three Northwest Green Building Programs

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## ABSTRACT

The major urban regions of the Pacific Northwest are currently experiencing a ground swell of interest in sustainability. This has translated to an increase of activity in the design of green buildings: facilities that are energy and resource efficient, environmentally responsible, and offer improved indoor environmental quality. This paper presents the recent development of three Northwest green building programs: Portland General Electric's Earth Smart®[1] program for commercial buildings, the Northwest Regional Sustainable Building Action Plan, and the City of Portland's Green Building Initiative. It describes the process to create the plans, implementation status, and the lessons learned.

## Introduction

Abundant forests, rich farmland, dramatic waterfalls, and the picturesque cities of Portland and Seattle characterize the Northwest. The geographic region west of the Cascades is known for abundant rainfalls, moderate temperatures, lush green valleys, and inexpensive hydroelectric power. These attributes, combined with the natural beauty of the coast, mountain ranges, rain forests, and waterways, contribute to a high quality of life, a significant factor in the region's unprecedented economic growth. The challenge of balancing this growth with preservation of natural resources has spawned numerous initiatives and programs within the arena of sustainability in general, and of particular interest in this paper, green building.

The significance of the environmental footprint of buildings is becoming both better and more widely understood by building designers, operators, and owners. According to the Portland Chapter of the American Institute of Architect's Committee on the Environment[2], the statistics are overwhelming. The construction and operation of buildings consume 35% of total U.S. energy output. More than 60% of the electricity generated in the U.S. is consumed by buildings, accounting for at least 35% of carbon dioxide ($CO_2$) emissions. Buildings use over 35% of all materials produced in the U.S. and more than 25% of the world's harvested wood. More than 210 million tons of solid waste is generated and disposed of annually, a substantial portion of which is attributed to construction site and building use waste. In the Portland region, delicate wetland areas are being eliminated by construction at the rate of one acre per day[3]. Portland is one of the first metropolitan areas in the country to be challenged with an Endangered Species Act listing within its urban core, further challenging the building industry to reduce impacts to salmon habitats.

The three green building programs profiled in this report, Portland General Electric's Earth Smart program, the Northwest Regional Sustainable Building Action Plan, and the City of Portland's Green Building Initiative, share four fundamental goals: to 1) minimize construction resource requirements, 2) reduce the environmental impact of buildings, 3) optimize the productivity and health benefits of buildings, and 4) utilize environmental strategies to promote energy efficiency. Energy is at the heart of the green building programs profiled, primarily due to the role of the two electric utilities, Portland General Electric and

[1] Earth Smart is a registered service mark of Enron Corp.

[2] The Portland Chapter of the American Institute of Architects Committee on the Environment web site: www.aiaportland.com/cote/Energy/knowing.html; May 2000.

[3] City of Portland Sustainable Design Principles, 1996.

Seattle City Light, and one municipal energy department, the Portland Energy Office. In each case, the green building program becomes a medium to promote the design of new energy-efficient buildings.

## Portland General Electric's Earth Smart Program

Portland General Electric launched its Earth Smart commercial program in the spring of 1995. The program promotes high standards of energy efficiency and environmental design for new commercial buildings. Earth Smart has become one of Portland General Electric's most successful energy-efficiency programs for the new commercial building sector and has contributed to the electric utility emerging as a leading advocate of sustainable building design in Oregon.

### An Overview of the Earth Smart Program

Earth Smart is available for new commercial or major renovation projects located within Portland General Electric's 3,000 square miles of service territory. To meet Earth Smart standards, building designs must incorporate a basic set of measures in each of four categories: 1) Energy Efficiency, 2) Quality Indoor Environment, 3) Environmental Responsibility, and 4) Resource Efficiency. Because each commercial building project is unique in its design and construction, Earth Smart standards are flexible and can accommodate a wide variety of preferences and budgets. As shown in Table 1, owners and designers must meet specific criteria from each of the four categories, yet are not dictated on how to achieve the intended results.

**Table 1. The Earth Smart Program at a Glance**

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|---|
| **Energy Efficiency**: All buildings require 1) a comprehensive building energy analysis and 2) commissioning. Earth Smart "Green" buildings require an energy-efficiency package identifying 20% minimum estimated savings over the Oregon Energy Code. Earth Smart "Gold" buildings require 1) energy-efficiency package identifying 30% minimum estimated savings over Oregon Energy Code, 2) commissioning, and 3) an integrated design process. |
| **Quality Indoor Environment**: Selection of at least two of the following: 1) a minimum of three low-toxicity building products, 2) fresh air ventilation, or 3) natural daylighting. |
| **Environmental Responsibility**: Selection of at least three of the following: 1) indoor water efficiency, 2) environmentally appropriate landscaping, 3) construction site recycling, 4) interior recycling storage area, or 5) efficient transportation measures. |
| **Resource Efficiency**: Selection of at least one of the following: 1) a minimum of four recycled-content building products, or 2) wood from certified sustainable forests. |

The goal of Earth Smart is to influence decisions made early in the design process. This involvement influences resources used during construction as well the long-term resources used by the building and its occupants over the building's useful life. The fundamental requirement of the Earth Smart program is for each project that qualifies to achieve estimated energy savings of at least 20% above Oregon Energy Code[4].

Earth Smart projects typically qualify for a suite of service incentives from Portland General Electric. These services typically include 1) a whole-building energy analysis, usually utilizing the DOE-2 energy modeling program, 2) the services of an independent environmental design consultant who is available to the design team and supports attainment

[4] According to the Oregon Office of Energy, the Oregon Energy Code is approximately 3% more stringent that ASHRAE's 90.1-99 (C. Dymond, March 2000).

of the program's non-energy goals, and 3) publicity for the owner and design team members. In addition, customized financial incentives based on integrated energy-efficiency measures and cost-effectiveness may be available for projects with aggressive energy savings.

Education is one of the key elements of the program. Earth Smart participants receive a detailed Earth Smart Resource Guide that explains the program requirements and the criteria for individual measures. The program also provides an Earth Smart Products Notebook organized in the format of the Construction Specifications Institute. Portland General Electric hosts over a dozen educational events annually to educate the design community on the benefits and strategies of designing green buildings.

**Benefits to Building Owners and Occupants**

Earth Smart standards translate into important benefits that vary with the building and participant. These benefits may include[5]:

- Lower operating costs for heating, cooling, lighting, water, and other resources.
- Improved comfort, indoor air quality, and performance of the occupants.
- Minimized construction waste and hauling costs.

Numerous anecdotal and statistically significant case studies are emerging, illustrating that energy-efficient and environmentally sound buildings can substantially increase worker productivity. While minimizing energy use can reduce a building's operating cost, improving worker comfort and productivity may be of greater benefit to company owners and building occupants. According to data provided by the Building Owners and Managers Association and the Electric Power Research Institute, and documented in the 1994 study produced by the Rocky Mountain Institute and the US Department of Energy (Romm, 1994), a typical commercial employer may spend up to 70 times as much money annually on salaries as on energy. Daylighting has been a common measure selected by Earth Smart participants. Recent studies have documented a 40% increase in gross sales in daylit retail buildings and a 20% improvement in student performance in daylit schools (Heschong, 1999). From an owner or tenant's perspective, improving the quality of the indoor environment can be a wise investment and minimize a company or building owner's legal exposure as a result of Sick Building Syndrome.

**Regulatory and Economic Rationale**

As an investor-owned utility, Portland General Electric's rationale for the Earth Smart program is the effective delivery of energy efficiency for the design of commercial structures. It is a marketing tool that successfully acquires lost-opportunity energy savings[6] in the new commercial sector.

Because of a weak economy in the Pacific Northwest and the nature of the Northwest energy market in the mid-1990s, it was difficult to garner strong interest in energy efficiency within this sector. Portland General Electric's previous programs involved time-consuming work with design professionals, an approach that was costly relative to the achieved energy savings. Designers were not always willing to recommend energy measures to their clients. Building operators and tenants who had a stake in a building's performance were often removed from the design process. The perceived benefits to designers and building owners was not sufficiently high to motivate them to invest in energy-efficiency measures that often had paybacks exceeding three years.

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[5] Because each building is unique, circumstances and results vary.

[6] This term refers to the opportunity of integrating energy-efficient measures into the design of new buildings, the cost-effectiveness of including these measures into the original design rather than retrofitting at a later date, and the significance of the total energy savings that may accrue over the life of the building.

According to John McLain, Product Development Specialist with Portland General Electric, the company's energy-efficiency team concluded that a successful demand-side management program needed more compelling benefits to those responsible for the design decisions. Members of the team had been following market research indicating that a growing number of Europeans were defining themselves as environmentalists and were willing to devote additional resources towards environmental responsibility. Recognizing that Europe had long been a bellwether in energy-efficiency and environmental programs, Portland General Electric believed similar sentiments and practices could be nurtured in the Northwest.

Portland General Electric has quantified the value of the program's energy benefits and has tracked the program's progress toward market transformation in the new commercial sector. As of February 2000, the total estimated energy savings to Portland General Electric's customers approached $300,000 annually[7]. Additional projected benefits to rate payers include reducing the need for the construction of additional energy generating facilities, avoiding cost spikes resulting from electricity purchased on the open market, and avoiding the inefficiencies associated with the long distance transmission of electricity. Evolving benefits include the customer's awareness that energy efficiency directly results in a reduction of carbon dioxide into the atmosphere.

Earth Smart provides a detailed menu for environmental stewardship, a menu that includes high standards for energy performance. The program delivers sufficient kilowatt-hour savings at a cost-effective rate for Portland General Electric to fully recover program costs through its tariff filed with the Oregon Public Utility Commission. The Earth Smart program is expected to qualify as a public purpose expenditure when partial restructuring of the electric utility industry in Oregon becomes effective in October 2001.

## Results

Earth Smart has begun to "raise the bar" of environmental and energy performance for commercial buildings within Portland General Electric's service territory. By the year end of 2001, it is projected that more than 4,705,803 square feet of commercial building space will have been built to meet the requirements of the Earth Smart program, resulting in approximately 9,427,960 kWh of energy savings and a reduction in an estimated 7.4 million pounds of carbon dioxide emissions[8].

**Table 2. Earth Smart Results, Completed and Pipeline Projects**

| Year | # of Buildings Completed | Sq. Ft. of Completed Bldgs. | Estimated kWh Saved/Year |
|---|---|---|---|
| 1996 | 0 | 0 | 0 |
| 1997 | 1 | 8,600 | 5,575 |
| 1998 | 3 | 154,000 | 621,993 |
| 1999 | 7 | 919,891 | 2,306,671 |
| 2000 (projected) | 10 | 1,189,664 | 1,446,657 |
| 2001 (projected) | 15 | 2,433,648 | 5,047,064 |
| 2002 (projected) | 8 | 1,277,000 | 2,448,000 |
| Total | 44 | 5,982,803 | 11,875,900 |

[7] Assumes an average cost per kWh of $0.05.

[8] Based upon Portland General Electric's 1998 energy generation and purchases, they estimate a savings of 0.79 lbs. of carbon dioxide reduction per 1 kWh saved (D. Boleyn, April 2000).

As more Earth Smart buildings have been completed, brand recognition has become a significant factor in attracting new customers to the program. Previous attempts at cold-calling candidates for the program have shifted into prospective Earth Smart customers initiating contact with Portland General Electric. Owners and designers of Earth Smart projects promote their own attainment of the program's goals and the designation of their buildings as Earth Smart. These factors have had a multiplicative effect on program participation, resulting in rapidly increasing numbers of Earth Smart projects for the upcoming years. Portland General Electric hopes participation will continue to grow as a means to meet their energy efficiency targets in new commercial construction.

## Northwest Regional Sustainable Building Action Plan

The Northwest Regional Sustainable Building Action Plan grew out of the City of Seattle's effort to develop a sustainable building program and the grassroots initiative of many regional green-building advocates.

### Background

Seattle developed its first Sustainable Building Plan in 1997. A key barrier identified in that plan was the lack of green building guidelines and tools for use by a wide range of parties involved in the building industry, some of whom influence project design and construction from locations beyond the city limits. A regional plan would offer strategies that could cross borders and would enable municipalities and organizations to pool their resources toward a common set of goals. A regional plan also would focus efforts on those strategies that could induce the greatest amount of change (Thung and Hurley 1999).

In October 1997, the Sustainable Northwest Conference, held in Seattle, affirmed that sustainable building was of high regional interest. Nearly 500 people attended the conference and enthusiasm was strong for mainstreaming sustainable building throughout the Northwest. Soon thereafter, Seattle was awarded a $74,000 grant by the Urban Consortium Energy Task Force to work with regional parties to develop the Northwest Regional Sustainable Building Action Plan (the Plan)[9].

### Process

Building on the momentum of the conference, Seattle invited leaders of 10 industry and government "partners" to promote involvement in developing the Plan. A letter from Seattle's mayor and the partners invited Northwest professionals involved in construction, design, codes and resource management to participate in a series of four all-day workshops held in 1998. The workshop series ultimately involved 180 participants.

The workshops addressed four primary issues: 1) identification of barriers to sustainable building in the region, 2) solutions to the barriers, 3) specific strategies for each solution, and 4) implementation workplans for each strategy.

The Plan was written primarily by core groups of volunteer participants. This hands-on relationship with the product created strong political buy-in within the end-use industry and the public bodies that set guidelines and incentive mechanisms. A senior-level task force of 23 Northwest leaders reviewed the first draft, prioritized strategies and provided feedback on the final workplans. In the end, more than 5,500 hours of consultation was donated to help move sustainable building practices forward.

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[9] The Plan is available in print by calling 206-684-3782, or on the Web at www.ci.seattle.us/light/conserve/sustainability.

## The Plan Outlines Seven Strategies

The regional nature of the Plan posed a development challenge to participants. The original objective of a comprehensive regional sustainable building action plan that transcends borders needed to be fulfilled. The "street level" reality of the Plan, however, was that various parties throughout the Northwest might want only certain sections based on local needs. The Plan became a set of strategies that require "action" to make sustainable building commonplace in the Northwest. They are organized as solutions to the major types of barriers identified in participant workshops. The set of seven strategies can be used as an integrated approach or as stand-alone areas to strengthen and complement existing efforts and programs. An overview of the strategies is listed below.

**1) Shared Vision.** Develop a vision of sustainable building for the citizens of the Northwest that includes a clear definition, goals, and is inspirational. The multiple definitions of the term "sustainable" are at best confusing and at worst divisive. Having a common definition is a necessary first step and must involve buy-in by key industry players combined with an educational and marketing effort (strategy #7).

**2) Regional Guidelines.** Develop regional guidelines for residential and commercial sustainable design and construction to serve as a benchmark and design tool for the marketplace. The guidelines will explain "what" is sustainable design (strategy #1) and "how" to design and build sustainably. Target audiences include building owners, developers, design professionals, contractors, real estate and financial institutions, insurance firms, government agencies and universities. Existing efforts such as the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) and other sustainable guidelines and programs will be reviewed as a starting point.

**3) Analytical Models.** Identify and promote the use of analytical models that will encourage, guide and assess the financial and performance comparisons of sustainable design and construction. The model will incorporate up to full costs and benefits or their satisfactory analogs, including external and public costs throughout the life cycle, and will rate the sustainability of buildings, landscapes, or materials. There is a lack of common industry-accepted analytical models that accurately quantify the internal and external costs, benefits and risks of a building or material. Credible analytical tools will help sustainable building strategies compete with current building practices using the language of commerce (money) in both the public and private sector.

**4) Financial Incentives.** Research, develop and adopt financial incentives in the public and private sectors to encourage sustainable building. Target public sector agencies to recognize and incorporate the reduced cost of protecting the public good (i.e. clean air and water) and providing infrastructure (i.e. power plants, water supply and treatment) due to sustainable building practices. These reduced public costs could be reflected through reduced building fees and permit processing time. A separate focus on financial, insurance and real estate appraisal businesses will promote improved real estate values, mortgages and insurance rates for sustainable buildings.

**5) Awards Program.** Develop an awards program that focuses on sustainable, holistic approaches to building projects. This creates a market pull for other companies and provides an opportunity for in-depth public education about the meaning and value of resource conservation and sustainable design.

**6) Industry Education.** Develop a curriculum and conduct training to educate key sectors of the building industry on sustainable building and the shared vision of the Pacific Northwest. Target the four major sectors of the public and private building industry: a) owners and

developers, b) real estate and financing organizations, c) design firms, and d) builders, contractors and suppliers.

**7) Public Education.** Develop a comprehensive public education and communication program, based on the shared vision, to build support and demand for sustainable building with the general public. This campaign will include a market assessment, direct education, media marketing, point-of-purchase information and targeted outreach to public officials, industry specialists and the general public.

**Present Status and Future of the Plan**

Currently no single organization has the time, money, or infrastructure to develop all seven strategies throughout the Northwest. A variety of entities, however, have begun to adopt some of these strategies individually. Table 3 summarizes the current status of some of the strategies and organizations taking action.

**Table 3. Regional Activities of the Plan's Strategies**

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| **Guidelines**: In February 2000 the City of Seattle adopted a policy that requires designers to meet or exceed USGBC's LEED silver rating for all new and renovated city-financed construction greater than 5,000 sq.ft. According to Seattle's mayor, "We are committed to sustainable building practices for our new and renovated public facilities, of which... there will be over 40 in the next five years" (Schell 2000). In May 2000 Oregon Governor John Kitzhaber signed an executive order on sustainability for internal state government operations. State government needs to establish credibility on the issues of sustainability by getting our own internal government operations in order..." (Kitzhaber 2000). Much of the momentum for these policies came from the local participants in the Plan. |
| **Incentives**: The Cascadia Chapter of USGBC was formed in 1999 by Northwest architects and designers. It will research and report on existing incentive methods and alternatives as identified in the Financial Incentives strategy. |
| **Industry Education**: Seattle area municipalities and utilities are offering a Sustainable Building Advisor Certification. The program is funded through course dues and features training by regional and national green building experts. The first courses are fully subscribed, and participants will learn how to evaluate design proposals and provide direction to design teams on how to incorporate sustainable building principles. The course curriculum will be transferred to other cities in the Northwest. A growing number of monthly presentations throughout the region on a variety of green-building topics have a high level of attendance by builders and architects, including Portland General Electric's "Green Building Resources" class. The Cascadia Chapter of the US Green Building Council is tasked with developing educational programs to serve the Pacific Northwest. The hope is to increase participation from the finance, insurance and manufacturing industries. |
| **Public Education**: The Northwest Eco-Building Guild is contracted to provide education outreach to the public sector on sustainable building starting in fall 2000 in the Seattle area. The Northwest Energy Efficiency Alliance (NEEA) has a multi-million dollar ad campaign throughout the region to build awareness of improved building environments through green building and energy efficiency. The project is called "BetterBricks" (www.betterbricks.com). |

All seven strategies are expected to be in use throughout the region within the next three years, and funding for a central coordinator and development of the entire Plan is underway.

## City of Portland's Green Building Initiative

In January 1999, the City of Portland began development of a municipal program to promote green building practices. Building on the momentum from the Northwest Regional Sustainable Building Action Plan, the Portland Energy Office (PEO) and Sustainable Portland Commission (SPC), a public body that advises the City Council on issues related to sustainability, developed a strategic plan framework and public involvement process.

With 20 years' experience in energy conservation and policy development, PEO has implemented Portland's Energy Policy, $CO_2$ Reduction Strategy, and Sustainable City Principles. The intensity of support for green building, however, distinguished this effort from previous conservation programs. A high level of involvement from the design and development community created a dynamic planning process that maximized buy-in and collaboration.

During 1999, the city convened nine public workshops attended by 200 activists, architects, engineers, builders, developers, lenders, and state and city employees — the equivalent of 1,500 hours of donated consultant work. The end product, the Green Building Initiative (Initiative) identifies a series of strategies based on the needs of developers, designers, contractors and consumers. Ten months of research, public participation, writing and peer review resulted in City Council's unanimous adoption of the Initiative in December 1999.

### Focusing Priorities

Through research and public input, the Initiative identified two fundamental priorities: 1) expanding market demand by educating building industry professionals and the public about the benefits of green building, and 2) making green building practices easier to implement by reducing regulatory and financial barriers and developing technical services and resources for building industry professionals.

Three major barriers to making green building practices standard in Portland surfaced repeatedly during public work sessions: a lack of information, regulatory disincentives and financial barriers. Strategies were developed specifically to combat these barriers with a focus on the following criteria:

- Provide an agenda of near-term actions the city could take to promote the rapid adoption of green building practices, as well as longer-term actions that lead to a significant and sustainable shift toward green building practices in new and existing buildings.
- Increase public and industry awareness by taking swift, visible and significant strides to incorporate green building in the design, construction and operation of city facilities.
- Partner with local and regional stakeholders to deliver green building technical resources, education and marketing.

### Overview of the Initiative

The Initiative is an integrated effort to promote green building and site practices throughout the city. It coordinates the expertise and resources of six city bureaus to deliver comprehensive services to the development and building community, home owners, businesses, and the city's own project and facilities managers. Existing city programs related to green building are folded into the effort.

The Initiative sets aggressive goals and recommends a set of strategies to leverage local expertise and develop cost-effective solutions for builders, developers, building owners and users. In its first two years, the Initiative targets adoption of green building practices in 600 housing units and 3 million sq.ft. of government, commercial and mixed-use space.

Program elements include: 1) Organization & Policy Development, 2) Demonstration Projects, 3) Technical Resources & Outreach, and 4) Incentives.

**Organizational & Policy Development.** The Initiative's first priority is to develop a resource-efficient and non-polluting building policy for the city based on life-cycle costing and assessment. Currently, the city has no policy specifically promoting green building. Leveraging existing resources and working within current bureaucratic parameters, a model policy is being created to provide a road map for all green building efforts.

In conjunction, an organizational structure to implement the policy and provide green building services is in development. The Initiative calls for leveraging resources and human capital to develop a model program that reduces service fragmentation by pooling existing internal resources related to green building.

**Demonstration Projects.** The Initiative identifies four innovative demonstration projects in Portland to be completed over the next two years: two city fire stations, a large private development and an affordable housing project. Each project's design and construction process will be documented, providing much needed data on regulatory and financing obstacles as well as technical resource gaps. Each project will be evaluated for innovative features and practices; natural resource, energy, water and waste savings; construction, operations and maintenance costs; regulatory and codes conflicts; and other research needs. By promoting these projects, the city will significantly raise the profile of green building in Portland.

In addition, the city has commissioned a study to determine how "green" three existing city facilities are based on the USGBC's LEED rating system. The study provides a list of possible green building strategies that could have been employed, evaluated on their first and life-cycle costs. The results provide valuable data that will help shape the development of the city's green building standards.

**Technical Resources & Outreach.** This strategy calls for providing green building-related technical resources and outreach activities to facilitate green building practices throughout the community. Although there are numerous organizations and individuals with expertise in green building practices, there is no central source for comprehensive information on green building in Portland. By developing strategic partnerships, the city will improve access to technical information and expertise.

A major component of this strategy is development of green building guidelines and a rating system. This includes creating city facilities guidelines that phase in requirements for new construction and remodels over time, criteria for city-funded affordable housing development projects, and voluntary guidelines for commercial and residential development. Guidelines will cover all components of design and construction, including predesign, site design, building design, construction process, operations and maintenance, reuse and deconstruction. By developing a green building standard for commercial and residential construction, the city creates a mechanism to institutionalize such practices and promote them to the design, development, and construction communities.

Marketing and outreach activities will be developed to promote the Initiative. This includes distributing case studies, marketing packets, fact sheets, and point-of-sale materials to developers, builders, real estate agents, lenders, insurers, appraisers and consumers.

**Incentives.** A series of incentives will be created to offset financial and regulatory barriers to implementing green building practices and accelerate market transformation. To be eligible for incentives, developers and builders must meet the city's rating criteria. Incentives currently being studied include a performance-based grant program to fund innovative solid waste, stormwater, water and wastewater practices; zoning code incentives for green building practices (e.g. height and floor area ratio bonuses that allow increased building densities and heights beyond code); and bundled below-market loans and rebates currently offered by local

lenders, Fannie Mae, Pacific Power, Portland General Electric and the Oregon Office of Energy.

## Measuring Results

Comprehensive benchmarks were developed to help track the Initiative's progress. They include gains in employee productivity, water conservation, energy conservation, conservation and waste reduction, habitat and bio-diversity, transportation, market impact and capacity building. Tracking specific measures within these benchmarks will give a clear indication of the success of the Action Plan and help quantify resource and economic savings.

Based on the target of adopting green practices in 600 housing units and 3 million sq.ft. of government, commercial, and mixed-use space, the expected annual resource savings from achieving this goal are listed in Table 4.

**Table 4. Expected Annual Resource Savings**

| Benchmark | Expected Result | Notes |
|---|---|---|
| Productivity | $4 million in increased employee productivity | Assuming a productivity gain of 2%. |
| Water Conservation | 8 million gallons of water saved | Assuming a 10% reduction in water consumption over standard practice. |
| Energy Conservation | 5 million kWh of electricity saved | Based on a 10% reduction in energy consumption over Oregon Energy Code for residential construction and commercial renovations and a 15% reduction in new commercial construction. |
| | 170,000 therms of natural gas saved | Based on a 10% reduction in energy consumption over Oregon Energy Code for residential construction and commercial renovations and a 15% reduction in new commercial construction. |
| Cost Saving | $450,000 in utility bill savings | Based on current electric, natural gas, and water rates. |
| Stormwater Conservation | 30 million gallons of stormwater managed better than required by the city's Stormwater Manual | Innovative stormwater treatment techniques not only keep water out of the Combined Sewer Overflow (CSO) (in some areas), but recharge groundwater, allow more evapo-transpiration, lead to cleaner, cooler water, and are often more aesthetically appealing than conventional alternatives. |
| Global Warming | 3400 tons of $CO_2$ reduced | Based on energy savings alone. |

## Program Status

The Initiative has recently secured full funding for two years. Work has begun on developing a strategic plan and hiring additional staff. Research on rating systems, incentive

programs, and criteria for affordable housing is also under way. Project staff are working with six bureaus to develop coordinated workplans and identify strategic private and non-profit partners. In addition, staff is researching green building technologies for the city's two demonstration fire stations. Technologies being considered include building-integrated photovoltaics and ecoroofs. The Initiative is expected to be fully staffed and operational by October 2000.

## Lessons Learned from the Three Green Building Programs

Each of the lead organizations has almost two decades of experience to draw from in developing energy efficiency programs. They found several common reasons and lessons for development and design of green building programs.

- Energy efficiency can be packaged and sold more effectively, resulting in greater program participation, when bundled with non-energy measures and benefits.
- Green building programs can create significant energy savings in the challenging area of new commercial and provide a fresh approach to residential construction.
- A high level of involvement from the design and development community is key to creating a dynamic planning process that maximizes buy-in and collaboration. Respect contributor's time by keeping the development process focused and fast by leveraging existing program designs and utilizing expert facilitation.
- Green building programs can leverage costs and resources by presenting business opportunities for entities involved with the assessment and management of non-energy resource arenas such as water, materials and waste efficiency.
- Program designs must provide economic rationale for owners or developers, specifications and tools for designers, product availability and incentives for builders, and simplified code review for officials.
- Centralized entities (utilities, cities, counties, development associations) have the ability to influence building practices and should be leaders in green building programs to achieve organizational and public benefit/societal goals.

Portland General Electric's Earth Smart program is the only one of the three that has been in implementation for a substantial time. As the program enters its fifth year it reports the following qualitative findings:

- The motivating factor for adopting Earth Smart standards varies by participant. North Clackamas School District was drawn to the program partially out of parental concern for indoor air quality. The University of Portland opted to participate in the Earth Smart program for their new science building to reduce global climate volatility through energy efficiency. Nike, who is constructing six Earth Smart buildings totaling 1.2 million square feet, views Earth Smart as a means to follow the company's corporate environmental policy.
- Earth Smart buildings do not necessarily cost more to construct. In fact, the low bids for the construction of the North Clackamas High School, the Marion County Office and Transit Center, and Chemeketa Community College's new library each came in approximately $1 million under their allotted construction budgets. Other completed Earth Smart projects, Norm Thompson Outfitters and the University of Portland's science building, were both constructed for less than conventional buildings.
- Not all commercial project types are well suited to meet the requirements of the Earth Smart program. Projects that lend themselves most readily include buildings owned and operated by a single organization over an extended period of time, like educational, municipal, and corporate entities. Project types that face the greatest challenges in meeting the Earth Smart program requirements include retail stores, speculatively developed low-rise office buildings, and hospitality facilities.
- Current challenges include introducing Earth Smart to project teams early in the design process, reducing the amount of time it takes to produce a whole-building energy

analysis utilizing the DOE.2 software program, and educating the client, design team, contractor, and occupants about the potential benefits that green buildings may provide.

- The projects that tend to be the most successful at obtaining significant energy-efficiency savings have a strong advocate for environmental stewardship at the senior management level.

## Conclusion

The Northwest's urban areas are experiencing a great deal of momentum regarding green building practices. Regional power forecasts and the public purpose requirements of electric industry restructuring in Oregon and Montana all demand an ongoing level of energy-efficiency activity. The green building programs profiled — Portland General Electric's Earth Smart program, the Northwest Regional Sustainable Building Action Plan, and the City of Portland's Green Building Initiative — are making significant contributions to the advancement of green building practices from which they will harvest environmental and energy-efficiency benefits. The trend toward public and professional interest in sustainability and green building is clearly increasing, and the reward will be an environment in the Northwest that remains green.

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