

Oregon Sustainability Center (OSC) The World's First Urban High-Rise Net Zero Living Building



Project Concept Summary

The Oregon Sustainability Center (OSC) is a highly collaborative public/private partnership between city and state government, higher education, nonprofit organizations and the business community to build a hub for the Portland and Oregon's sustainable economy. This application is sponsored by the Oregon University System.

At the core of this project is a 250,000 square foot urban, mixed-use high rise that will also be the world's first "Living Building" of its scale. Adhering to the prerequisites of the Cascadia Region Green Building Council's *Living Building Challenge*, the Center will produce 100% of its energy on site through self-sustaining energy generation and distribution systems; its design also includes water capture and reuse (for black, grey and storm water), integrating all systems to achieve net-zero energy consumption, regenerative water systems and collectively producing zero carbon footprint.



The OSC's core project team includes:

- **Oregon State Board of Higher Education** and the **Oregon University System**
- **Portland Community College**
- **Portland + Oregon Sustainability Institute**
- **City of Portland, Bureau of Planning & Sustainability**
- **Portland Development Commission**
- **Oregon Living Building Initiative**, a consortium of nonprofits working in sustainability
- A design team of 20+ Oregon-based businesses led by **Gerding Edlen Development, Inc.**

The OSC is the anchor for Portland's first EcoDistrict, a neighborhood development strategy that combines high performance buildings and infrastructure to reduce greenhouse gas emissions, energy use, and water use. Portland's first EcoDistrict is planned to include:



- District scale energy, with renewable and low carbon energy production, and an on-site "Living Machine" that treats black water using microorganisms as opposed to carbon-producing energy sources.
- Water reuse, storm water management, and park enhancements that integrates with the adjacent Montgomery Street right-of-way through an innovative green street design.

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- A confluence of alternative transportation that includes mass transit (MAX light rail and streetcar), a pedestrian way, and bike path.
- An on site resource and education center for citizens, businesses, and delegations to learn about the OSC and EcoDistrict; track the building and EcoDistrict's performance over time; and connect with clean tech and sustainable business non profit, and government leaders.

The impact of the Oregon Sustainability Center and adjacent EcoDistrict will have profound positive effects on the City and the region. The OSC meets the following Oregon Way objectives:

- **Immediate job creation for Oregonians:** Work on the OSC has already created 300 architecture, engineering, development, higher education and public sector jobs. This knowledge base will translate into over 1600 jobs through the duration of the project. After construction of the OSC, job creation will continue as work on the development and refinement of the adjacent EcoDistrict continues. Research, monitoring, management, maintenance and construction jobs will multiply with the district build-out.
- **Green Workforce Development:** The project's innovative energy delivery and waste treatment systems will provide hands-on training for students following green technology and engineering curricula at the Portland State University and Portland Community College campuses. Family wage jobs will be produced for years to come through campus programs. At the same time, the ongoing operation of the OSC's systems will provide full time, family wage jobs.
- **Use of Oregon companies and sourcing of local materials:** The Living Building Challenge requires local sourcing for all of the building's goods and materials, necessitating extensive collaboration with Oregon-based manufacturing and project-related businesses. The integration of new green technologies in the OSC, and concurrent research underway in the Oregon University System through Oregon BEST, will spur the development of new businesses in Oregon to support increasing demands for new green building construction techniques and innovations.
- **Promotes Oregon's sustainability, renewable energy, carbon reduction, energy efficiency and green development goals:** The OSC will achieve net-zero energy consumption through photo voltaic solar panels that produce over 1 MW of electricity, and it will not produce *any* carbon emissions due to its integrated optimization of thermal mass, using ground source wells for mechanical systems, and the City's domestic water infrastructure for heating/cooling transfer and recovery. The OSC will also serve as a living laboratory for new, replicable green building innovations such as: the integrated "box beam" (a structural component that incorporates seven building systems into one module); chemical-free storm water treatment for meeting potable water standards; and new "thin client" technology, through which many tenants work from centralized computer processors, greatly reducing the building's overall energy consumption. The OSC will promote the State's green development goals by serving as the anchor for Portland's first EcoDistrict, functioning as both a catalyst and resource for the subsequent projects that will follow in the district.

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- **Applies innovative approaches to technology, partnership, process and life cycle optimization:** The OSC maximizes public/private partnerships and local/state/federal partnerships in the funding, design and development phases as well as during post occupancy measurement and performance verification. The State building codes division will assist in the implementation of innovative techniques on this project, which may not be currently allowed, facilitating replication on buildings throughout the region. The proposed integration of green building technologies and collaborative tenant programming are unprecedented. The resulting technology and innovation – such as the work already begun with Oregon BEST and the Oregon Nanoscience and Microtechnologies Institute – will serve as a national model for green development.
- **Strong potential to attract additional federal money through block grants and other sources:** OSC project partners are pursuing funding opportunities for capital projects that will support the development of the adjacent EcoDistrict. Such projects include the expansion of district energy, the development of adjacent green streets and energy retrofits for older, existing buildings.

Project Funding

The preliminary budget for the project, including EcoDistrict infrastructure and renewable energy production, is \$120 million. Current match sources include \$5 million of Portland Development Commission urban renewal funds and up to \$80 million of Oregon University System bonds. Any reduction of State bonds required for total project cost, through Federal stimulus funds, will directly decrease the debt obligation and the required rental fees, allowing those dollars to be used instead for additional business growth among participating tenant partners.

Proposed federal stimulus funding sources sought for this project:

National Science Foundation: Major Research Facilities Construction (\$35m)

- Research teams will study the OSC to determine how integrated, highly technical, green building technologies perform over time. In addition to identifying areas for improvements in existing technologies, the on-site research presents the opportunity to study the psycho-social aspects of how people inhabiting the space adapt to new behavioral norms required to optimize the efficiency of the Living Building.

Department of Energy, Office of Electricity Delivery and Energy Reliability (\$10m)

- The OSC will utilize technology that monitors real time energy usage, and also provides an energy storage system, determining whether there are opportunities, when the building produces more electricity than it uses, to sell and “roll” excess energy onto the grid. The project will, through research and applied methods, work to reduce the building’s peak energy demand through the optimization of thermal mass, the incorporation of radiant slab and ceiling systems, thermal storage systems and heat transfer and recovery systems.

Department of Energy, Office of Energy Efficiency and Renewable Energy: Energy Efficiency and Conservation Block Grants (\$15m)

- The project will demonstrate advanced energy conservation and optimization strategies, and advanced energy production systems including photovoltaic, thermal mass and thermal storage, advanced lighting systems, and wind power generation.