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The Renovation and Expansion of People's Food Co-op (People's Food Co-op)

Overview

- Location: Portland, OR
- Building type(s): Retail
- 55% new construction, 45% renovation of a historic 1918 building
- 5,400 sq. feet (502 sq. meters)
- Project scope: 2-story building
- Urban setting
- Completed March 2003
  The grand opening occurred in March of 2003. The grocery store remained open throughout the renovation and addition.

In 1970, People's Food Co-op (generally called People's) set up shop in a building nearly one hundred years old that previously hosted a neighborhood grocery. The goal was to set the standard for sustainable groceries. Twenty-five years later, growing membership and an increasing customer base rendered the meager and dimly lit 2,400-square-foot space a liability to retail and office operations. To alleviate these constraints, People's renovated their existing space and grew the building to 5,400 square feet, incorporating innovative sustainable features along the way. The total project cost was approximately $900,000. From start to finish, the People's expansion demonstrates the value of viewing buildings holistically and executing integrated design processes.

Environmental Aspects

People's strategically oriented and designed the building to maximize daylighting potential and take advantage of solar heat gain. A south-facing thermal storage bottle wall fronted by deciduous street trees permits sunlight and heat gain in the winter while the mass of its cob infill actively cools the space in the summer. The building also takes advantage of temperature differentials inside and outside the building to stimulate naturally driven ventilation among other heating and cooling strategies. A geothermal system heats and cools the building.

Rainwater is deemed an asset to the building by virtue of a rainwater recovery system that stores up to 1,500 gallons at a time and meets nearly all on-site irrigation demand throughout the summer, including drip irrigation for the partially vegetated rooftops. The building is plumbed to flush toilets with rainwater but is awaiting permits. Unharvested rainwater is directed to the ground to promote groundwater recharge and reduce the volume of stormwater entering the municipal storm/sewer system.

The courtyard formed by the "L" shaped building is planted with native and drought tolerant vegetation that requires minimal watering and provides shade and evaporative cooling.

Owner & Occupancy

- Owned and occupied by People's Food Co-op, Individual(s)
- Typically occupied by 20 people, 60 hours per person per week

Depending on store hours and business operations, between three and fifteen people will be working. Anywhere from two to twenty customers at a time can be expected inside, and many more during the outdoor farmer's market.

Building Programs

Indoor Spaces:	Retail food (55%), Circulation (35%), Office (35%), Classroom (20%), Conference (20%), Restrooms (5%), Retail general
Outdoor Spaces:	Garden—productive (30%), Garden—decorative (20%), Wildlife habitat (10%)

Keywords

Integrated team, Training, Green framework, Simulation, Performance measurement and verification, Operations and maintenance, Transportation benefits, Indigenous vegetation, Stormwater management, Water harvesting, Efficient fixtures and appliances, Efficient irrigation, Drought-tolerant landscaping, Graywater, Massing and orientation, Glazing, Passive solar, HVAC, Lighting control and daylight harvesting, Efficient lighting, Benign materials, Salvaged materials, Recycled materials, Local materials, Certified wood, C&D waste management, Occupant recycling, Connection to outdoors, Daylighting, Natural ventilation, Ventilation effectiveness, Thermal comfort, Low-emitting materials

Photo credit: Miles Uchida

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Team & Process

Predesign

A mutually positive and ongoing dialogue between People's and all parties impacted by the expansion characterizes the project's predesign process.

People's was pondering expansion years before they had the financing to execute it, and during this time they formed an expansion committee that met to discuss potential issues and opportunities. The committee wrote an expansion mission statement that spelled out their goals for the project and provided a tangible reminder of the high standards that they wished to uphold. Project Designer David Wadley notes that a pervasive ethic of environmental stewardship among co-op members made integrating sustainability into the expansion process a no-brainer: "We didn't really make a big deal out of the process...sustainability was a natural and we didn't have to push it." As financing came together, the committee selected a general contractor who had a proven track record, offered a fair price, and was open to sustainable building, thus balancing People's expansion objectives.

People's met with the local neighborhood association a number of times to alleviate their concerns about potential increases in traffic, noise, and general pollution of the neighborhood. This preventative approach created a forum to address potential points of contention while they could still be compromised via dialogue, not expensive alterations or litigation. The neighborhood association was generally very supportive of the project.

Financial support for the expansion was sought in the form of grants, tax credits, loans, donations, owner equity, and contributions (see Finance).

Design

The project designer is a People's Food Co-op member and has substantial experience with green building in Portland. Other key players in the design process include a general contractor, local architect, energy-efficiency engineer, energy consultant, and expansion project manager.

The goal of the expansion and renovation was to articulate a symbiotic relationship between the building and the natural environment. Furthermore, the renovated co-op was to be a place to gather and learn. This required a design process that continually looked to the natural environment as a resource within the context of the building's unique program and objectives.

The starting point for enhancing the sustainability of the expansion was a highly efficient and environmentally responsive building envelope design. The project designer emphasizes that, "You have to tailor it [the envelope] to site conditions." To maximize thermal performance and daylighting potential, solar orientation informed decisions about what type of building materials to utilize and where. Energy modeling was employed to design an integrated three-stage HVAC system that draws upon cross and stack ventilation methods and the earth's geothermal mass to heat and cool the building.

In an effort to keep customers and community members informed about expansion plans, People's published a leaflet that spelled out project facts and features, and made it available in their store.

Construction

Originally, People's aspired for the expansion to be performed entirely by the community and co-op members. In the end, however, the board compromised by hiring both a general contractor and a member of the co-op who is a designer/builder by trade. As an experienced residential green building designer, the co-op member helped oversee the general contractor's work; deciphered plans, specs, and technical information; and worked with the project manager to make changes and mid-project decisions. The general contractor had minimal experience with green building and was responsible for the framing, roof, electrical and plumbing systems, drywall, insulation, concrete, lifting the building and new foundation excavation, and general site work. To ensure timeliness and goal attainment, the two parties met weekly and worked together for about two or three hours per day.

People's solicited volunteers to help with the cob infill and bench construction portions of the project. Construction of the infill and benches was facilitated by three and a half months of hands-on weekend training workshops and one classroom session on building with cob. The workshops were led by 15 experienced cobbers from northern Oregon and southern Washington and supplied the project with trained volunteer laborers that learned a new skill and became an integral part of the expansion effort. Construction of the cob infill and benches took two and a half months.

The tremendous interest by project volunteers (approximately 1,000) resulted in volunteer assistance overflowing into other parts of the building construction as well, which sometimes proved difficult to manage. Early in the construction phase, project manager Miles Uchida found himself writing several checks a day to compensate individual volunteers for materials such as nails. This became very time consuming and, as the project progressed, he found it more efficient to contract portions of the project to a few groups of volunteers, instead of having a free for all. Miles notes that the money saved by not hiring a contractor for portions of the project was probably lost due to an elongated construction schedule. "We did save money but organizing hundreds of volunteers took a lot of time. It's probably a wash."

The sudden speed of the construction process compared to the drawn out pre-design process resulted in missed opportunities for the building to increase its sustainability. For example, refrigeration heat recovery was not feasible because the equipment had already been ordered in an outdoor configuration and the manufacturer was unwilling to warranty the equipment if modified on-site. Canceling the units and re-ordering was not financially or logistically feasible during the construction process.

The geothermal heating and cooling system was designed and built by the engineering firm (see Energy).

Construction was scheduled for 9 months but delays extended it an additional 3 months.

Operations / Maintenance

People's is made up of a group of community members that all share the common objective of being an example of sustainability and promoting a positive relationship with the natural environment.

The project designer wrote a detailed, custom-made operations and maintenance manual that promotes the building's longevity via environmentally friendly practices and products. Operations and maintenance issues addressed range from caring for the hardwood floors to establishing a maximum wattage on light bulbs. This is part of the designer's effort to "keep tweaking [the building] over time" to maximize its performance.

Operation of the HVAC system is a combination of automated and manual controls. Stack and cross ventilation of the building are manually controlled by opening windows and louvers to initiate ventilation. A manual switch that turns on a fan within the stack to increase the rate of air exchange can augment the stack ventilation. The zone level distribution system is automated, and deadband set points are set at a wider range than is typical. This system supplements the geothermal radiant heating and cooling and natural ventilation systems during times of extreme temperatures. A visit by the engineer who designed the geothermal system is planned in the near future to install monitoring equipment and make any necessary adjustments.

Project Manager Miles Uchida notes that there needs to be some institutionalization of learning regarding operation of the stack ventilation system. He specifically points out that it is important to educate everyone in the building about when the louvers should be open and the fan turned on. Furthermore, one or two people should be designated to operate these controls to ensure that the system performs according to design intent.

Landscape maintenance is relatively simple due to the small total area that is landscaped and efficient irrigation design. A highly efficient drip system, whose operation requires nothing more than turning on a faucet, was installed to water the ecoroof and landscape. Drip systems lose substantially less water to evaporation than traditional spraying sprinkler systems because the water enters the soil immediately upon release from the hose. Harvested rainwater is used to irrigate all vegetated areas.

Commissioning

The HVAC system engineers will inspect the system that they designed and installed to ensure that it is performing according to design intent. They also plan to install monitoring equipment to measure energy savings.

Post-Occupancy

People's is making educational and technical efforts to promote awareness about optimizing the building's features and operational efficiency.

Co-op members publish a seasonal newsletter that communicates the latest happenings with People's effort to set the standard for sustainable grocery stores. This provided an avenue to keep customers and members informed about the expansion before, during, and after completion. Annual meetings are held to discuss store-related issues including building operation and practices.

People's is now collecting monthly utility data to compare real building performance to modeling projections. This effort was postponed because of a billing mix-up related to the installation of a new energy meter; however, monthly bills are now collected to ensure that the building is performing according to design intent. The HVAC system designer installed energy-performance monitoring equipment and will fine tune the system as needed.

Useful Information Resources and Software

- Expert cobbers from around the Northwest trained project volunteers on how to mix and mold cob for the benches and infill portions of the project.
- DOE2 Interactive Modeling
- eQUEST Building Energy Simulation

Primary Design Team Members

Cynthia Bankey
Architect (Project advisor and materials specialist)
Portland, OR

Dave Wadley
Architect (Project designer)
Portland, OR

City of Portland Office of Sustainable Development, G/Rated Green Building Program
Technical assistance and incentive funding
Portland, OR
http://www.green-rated.org

Brett Anderson
Hemmingson Construction, Inc.
Contractor
Beaverton, OR

Miles Uchida
People's Food Co-op
Expansion project manager
Portland, OR
http://www.peoples.coop

Portland General Electric
Lighting designer (Lighting program design)
Portland, OR

Brian Thornton
Portland General Electric
Energy consultant
Portland, OR

Gene Johnson
SOLARC Architecture and Engineering, Inc.
Mechanical engineer (HVAC designer)
Eugene, OR
http://www.solarc-ae.net

The design team also included:

- Project Manager

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Finance & Cost

HVAC System

The installed cost of the three-stage integrated HVAC system was $63,000 ($11.50 per square foot), which is about $26,000 more than a minimally code-compliant system for a similar building. The system yields an annual energy cost reduction of 16 percent and $1,700 in annual energy savings (based on $.07 per kilowatt hour). The system received $9,100 in Oregon Business Energy Tax Credits and a $10,000 Emerging Technology Grant from the City of Portland Office of Sustainable Development's G/Rated program.

Ecoroof

The installed cost of the partial ecoroof was $4,750. Due to its stormwater management benefits, People's received a $2,500 grant from the Community Watershed Stewardship Program, which reduced the cost from $19 to $9 per square foot.

Lighting

The total installed lighting cost (as proposed by the utility consultants) was $3,850. The projected annual electricity savings are 11,459 kilowatt hours, producing annual energy cost savings of $573. The payback period for installed lighting is expected to be 6.1 years including the utility rebate of $360, or 6.7 years without it.

Materials

Project Designer David Wadley qualitatively notes that the salvaged beams and framing in ready-made form were half as expensive as new materials. The cost of remilled salvaged materials was at par with the cost of new materials but more difficult to source partly due to high demand. The new wood alternatives (FSC-certified wood and local wood) never ranged more than 15% beyond the cost of typical new materials. Overall, the project only added 5-10% to its costs by specifying cheaper salvaged materials where possible and balancing that with slightly more expensive third-party certified and local new materials.

Financing Mechanisms

- Credit Enhancement: Loan guarantees-private
- Equity: Green building tax credits, Cash
- Grant: Public agency, Private (foundation)
- Loans: Private (bank, insurance)
- Procurement process: Design-build

Cost Data

Cost data in U.S. dollars as of date of completion.

- Total project cost (land excluded): $900,000

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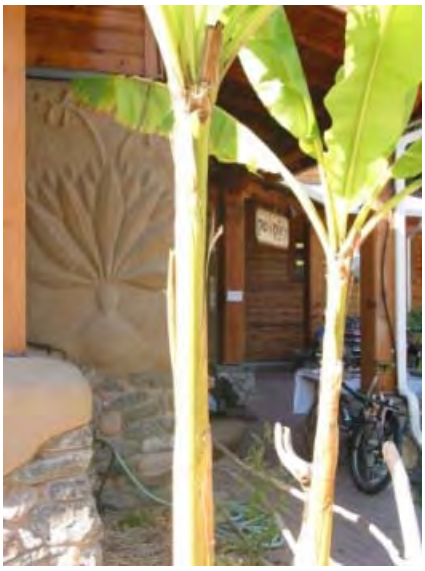
Land Use & Community



At the turn of the 20th century, the neighborhood encompassing People's was largely made up of Italians and Italian-Americans. The building at 3029 SE 21st Avenue, originally a feed store, became an Italian neighborhood grocery in 1918 that provided both physical and social nutrients for the local community through its overflowing baskets of pasta noodles. Today, People's continues that tradition by providing an engendering environment in which to purchase healthy food and mingle with fellow community members.

The expansion took place in a residential neighborhood and the two-story structure was intentionally designed to have the same vertical height and character as the surrounding neighborhood.

People's expressly chose to create an "L" shaped building through the expansion that would allow the center to serve as a landscaped community courtyard. Its open design invites community congregation and supports organized events such as a weekly farmer's market.

The expansion also includes greater provision of community space inside the building such as the community room, which provides a large, open, daylit, and naturally ventilated area in which to hold educational events on sustainability, nutrition, and natural health. Other expansion spaces include display areas and meeting rooms.

People's drafted a transportation demand management plan that spells out its past, current, and future efforts to promote alternative transportation to and from the store. As part of the design phase, People's surveyed customers to assess their transportation habits and found that a majority of shoppers walk, bicycle, and bus to the store (the co-op is within a quarter mile of two bus lines). The City thus exempted People's from having to build any additional parking. The store provides no off-street parking and patrons who drive to the store continue to park on the street. A portion of the existing driveway was replaced with a porous grass-pave surface to allow rainwater infiltration.

A new bicycle delivery service is one particularly progressive component of the transportation plan that exemplifies sustainability as a business strategy. Individuals can order their groceries by phone and pay a small fee to have them delivered to their homes by bike. The service is currently limited to particular areas of Portland, but it was designed to expand according to demand. Seniors and people with special needs receive the service at a substantially discounted price.

Other elements of the transportation plan include the installation of nearly twice the required number of covered and uncovered bicycle parking spaces; incentives such as raffles and discounts for biking, walking, or using public transit; marketing; selling transit tickets; and displaying bus schedules and bike maps.

In an effort to promote accessibility, People's installed a wheelchair elevator behind the store. This renders the entire building wheelchair friendly including store entrances, grocery aisles, and interior rooms. Ironically, Portland building codes did not require the elevator but did require that People's install paved (instead of pervious) ramps to service a back door.

Green Strategies

- **Responsible Planning**
  - Ensure that development fits within a responsible local and regional planning framework
- **Properties with Excessive Impacts**
  - Avoid contributing to sprawl
  - Avoid developing prime agricultural land
- **Support for Appropriate Transportation**
  - Design development to have pedestrian emphasis rather than automobile emphasis
  - Provide safe access for bicyclers and pedestrians
  - Provide showers and changing areas for bicycle and pedestrian commuters
  - Provide storage area for bicycles

- Provide access to public transportation
- Provide incentives for non-automobile commuting options

- **Property Selection Opportunities**
  - Select already-developed sites for new development

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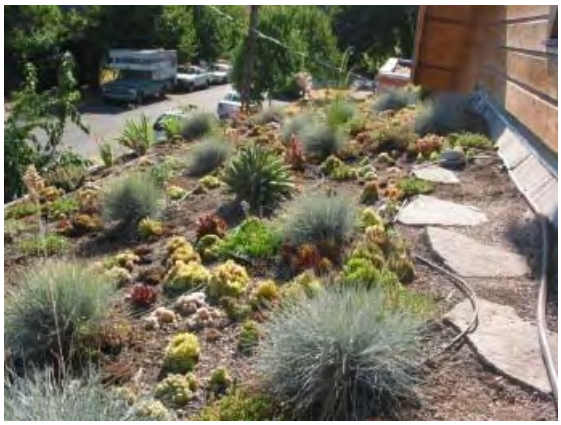
Site Description



In 1851, Giddeon Tibbets donated a land claim in southeast Portland that he referred to as "Brookland" because of the many lakes, streams, and rivers that ornamented his property. Since then, many of the area's lakes and streams have been filled in the name of development, but the neighborhood is called Brooklyn as if in memory of the interred water bodies. People's lies directly adjacent to Brooklyn, within the Hosford-Abernathy neighborhood. It is located on Tibbets Avenue, named after Giddeon Tibbets. Prior to People's occupation, the building housed a feed store and then a grocery store.

The original portion of the existing structure runs from east to north, and the expansion runs from west to south, thus creating a central courtyard. People's had to obtain a variance from the local zoning ordinance to proceed with expansion plans, because the site's original zoning designation was changed from commercial to residential.

All rainwater will be either harvested or infiltrated on site via a number of innovative management strategies that were integrated into the design. Starting at the top, two sections (totaling 246 square feet) of the roof are "ecoroof," planted with a large variety of drought-tolerant, colorful plant species that are watered via a highly efficient drip system. The sedum species, especially sedum divergens and delosperma, are surviving very well, but the licorice fern has had a notably difficult time in becoming established. The vegetated portion of the roof handles roughly 5,000 gallons of rainwater per year via infiltration, evaporation, vegetative uptake, and evapotranspiration. All rainwater landing on the roof is directed to a 1,500-gallon underground cistern buried in the courtyard, and overflow is directed to landscaped areas. This water is projected to meet almost all of the landscape irrigation needs (including the ecoroof) after the plants have been established for a three-year period.

The building is plumbed to flush all of its toilets with harvested rainwater, but currently does not because City plumbing inspectors required additional inspections that would have held up the project. Other such systems have been approved in Portland, but People's opted to seek approval at a later date when it would not interfere with their construction schedule.

People's symbolically replaced a portion of the existing driveway with a new, covered bicycle parking facility that is underlain by a porous paving surface. The additional grass-covered surface will reduce runoff, promote groundwater recharge, and reduce the need for curbs and other drainage features. Mud is not anticipated to be a problem despite bike and pedestrian traffic, because the space is protected from direct rainfall.

- Previously developed land, Preexisting structure(s)

Green Strategies

- **Runoff Reduction**
  - Reduce driveway pavement
  - Design a green roof system
- **Landscape Plantings**
  - Landscape with indigenous vegetation
- **Rainwater Collection**
  - Collect and store rainwater for uses in building
  - Collect and store rainwater for landscape irrigation
- **Demand for Irrigation**
  - Select plants for drought tolerance
- **Irrigation Systems**
  - Use water-efficient irrigation fixtures
- **Siting Analysis**
  - Investigate microclimate (specific variations from regional climatic conditions)
  - Research past human uses of the site
- **Site Planning**
  - Provide for solar access

Photo credit: Miles Uchida

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Energy

An integrated design approach enables People's to consume 16% less energy than mandated by the strict Oregon Energy Code and save roughly $1,700 each year in energy costs. These features include daylighting, low-emissivity windows, insulation values above commercial and residential requirements (average R-22 in walls, R-44 in ceilings), integrated space heating and cooling, efficient lighting, and energy monitoring.

Building Envelope

An efficient envelope was the starting point for a sustainable building and resulted in eschewing traditional building design and construction practices that result in what the project designer refers to as "weak links." For example, the front-door masonry slab continues from the outside to the inside of the store but is intentionally separated by an underground thermal break. This barrier inhibits the conductance of heat either into or out of the building, thus reducing the energy demand for heating and air-conditioning.

This technique in isolation is relatively insignificant but represents the level of detail taken by the designer when addressing the complexity of the building envelope. "Blanket solutions are easy because you don't have to think. But there are microbits of building that are performing differently and that all needs to be considered part of the efficiency equation. R-30 everywhere isn't going to cut it, it's not the whole story," he said. Such micro-climatically responsive design is also present in People's business operations. Produce-receiving and backstock-storage space is strategically located on the northern end of the building where solar exposure is at a minimum. This slightly reduces energy demand for keeping produce cool and is representative of the level of the integrated "zoning" approach that the designer employed to match the building program with envelope and space conditions.

People's was without heat until Christmas of 2002, and the project designer indicates that the focussed attention on the envelope paid off: "The energy (HVAC) engineer came for a visit and was really surprised by the heat load in the winter." The prioritization of passive heating and cooling measures substantially reduced the building's dependence on mechanically driven systems.

Integrated Space Heating and Cooling

Heating and cooling are provided in the building using a combination of passive ventilation, direct solar gain, night flushing, ground-source heat pumping, and highly efficient natural gas combustion. A radiant tubing-in-slab system on the first floor and a conventional ducted system on the second floor deliver heating. In both cases, the primary heating energy source is ground-source heat pumps.

To cool the building, a series of design elements are used in sequence, beginning with passive strategies. First, a vertical shaft in the center of the building extends from the first floor ceiling through the roof, allowing a "stack effect" to cause warm air to flow up and out of the building, which in turn is replaced by cool night air entering the space through perimeter openings on the ground level. In this manner, the building is passively cooled when wind or outdoor air temperatures permit. Next, when conditions require it, a fan installed in the ventilation shaft can be activated to assist in establishing desired airflow. During the following day, the building openings are closed as outdoor temperatures rise. Finally, if indoor temperatures rise beyond the thermostat setpoint, cool water is circulated through the radiant tubing-in-slab, providing highly efficient mechanical heat removal. Water temperature is monitored and controlled to prevent over-cooling of the slab, which could result in condensation. The strategy employed on the second floor is similar, except that cross-ventilation between operable second-floor windows provides the passive stage of cooling, and a water-to-air heat pump provides mechanical cooling.

Heat rejection and extraction from the earth is accomplished using a closed-loop piping circuit installed in a series of deep vertical bores located in the building's front courtyard. When winter heating requirements necessitate additional heat, or in the event of a heat-pump failure, the system is supplemented or backed up by an extremely efficient condensing natural-gas water heater. The water heater also provides for the domestic hot-water requirements of the building.

Deadband setpoints are set at a wider-than-typical range of 62-75 degrees. These relaxed environmental criteria significantly reduce the amount of time the system will run and consume energy.

Project Engineer Gene Johnson notes: "When aiming for exceptional energy efficiency, we have found that it is essential to dispense with the traditional all-in-one-box HVAC unit. The best results are achieved by first designing the building to reduce heating and cooling loads as far as possible, then designing the heating, cooling, and ventilating system intelligently to make use of passive strategies first, and finally applying the most efficient mechanical equipment and controls that the project can support."

Passive Solar Heating

People's designed a south-facing community sunspace designated as a heat absorber and distribution system. The space is designed to maximize solar exposure during the winter and minimize it during the summer via a significant roof overhang and a strategically placed deciduous tree located on the south side of the building. During the winter, sunlight passes through the window on the south facade, directly and indirectly hitting the thermal mass of the masonry floors and cob walls. The heat is absorbed and slowly re-radiated, assisting in creating a comfortable temperature within the space. As an aesthetic feature, colored glass bottles are built into the cob walls that refract the sunlight into the space during the winter when the sun is low. In the summer, the tree's foliage and the roof overhang shade the space from the hot afternoon sun.

Lighting

People's worked with the local utility (Portland General Electric) to sponsor a lighting analysis exploring the most energy-efficient lighting strategies for the building. Earlier energy modeling by the HVAC designer indicated that the building would consume 45,983 kilowatt hours without lighting enhancements, and the utility's analysis outlined a strategy that would provide an estimated 11,459 kilowatt hours in energy savings. The system is estimated to yield $573 in annual energy cost savings and an estimated 6.1-year payback, including the rebate (or 6.7 years without the rebate).

Active lighting consists of compact T-8 fluorescent tubes and zoned controls for specific tasks to minimize the number of lights in use. Daylighting comes from several south-facing windows and an open floor plan that promotes daylight penetration deep into the building. Windows are low-emissivity, thus permitting beneficial daylight to enter the building while reducing the amount thermal heat gain.

Photovoltaics

People's is currently exploring funding opportunities for a two-kilowatt photovoltaic array that is planned for the building's roof. A statewide nonprofit organization may fund a majority of the installation because the building is an exemplary demonstration of sustainable design.

Annual Purchased Energy Use

Fuel	Quantity	Cost($)	MMBtu	kBtu/ft2	$/ft2
Electricity	116,000 kWh		396	73.4	
Natural Gas	4,250 kWh		14.5	2.69	
Fuel Oil (No. 2, diesel)	0 kWh		0	0	
Biomass (wood or other)	0 kWh		0	0	
Other	0 kWh		0	0	

Total Annual Building Energy Consumption

Fuel	Cost	MMBtu	kBtu/ft2	$/ft2
Total Purchased		411	76.1	
Grand Total		**411**	**76.1**	

Annual End-Use Breakdown

End Use	Quantity	MMBtu	kBtu/ft2
Heating	20,200 kWh	68.9	12.8
Cooling	2,000 kWh	6.83	1.27
Lighting	34,500 kWh	118	21.8
Fans/Pumps	24,300 kWh	82.9	15.4
Plug Loads and Equipment	35,200 kWh	120	22.2
Domestic Hot Water	4,250 kWh	14.5	2.69
Other			

Data Sources & Reliability

Simulation software

DOE2 & eQUEST Building Energy Simulation Program

Reliability

The analysis is based upon a simplified DOE2 model of the building in its newly renovated configuration, with the HVAC measures modeled as a single package. The baseline and EEM models do not include any lighting system or envelope enhancements. The energy analysis of the building was performed using the eQUEST Building Energy Simulation Program. Statistical weather data was input from typical meteorological weather data for Portland, Oregon.

Green Strategies

- **Wall Insulation**
  - Achieve a whole-wall R-value greater than 25
- **Ground-coupled Systems**
  - Use ground-source heat pumps as a source for heating and cooling
- **Solar Cooling Loads**
  - Shade south windows with overhangs
  - Shade building walls and roofs with trees
- **Non-Solar Cooling Loads**
  - Provide high-low openings to remove unwanted heat by stack ventilation
- **Water Heaters**
  - Use water heaters with energy efficiency ratings in the top 20%
- **Cooling Systems**
  - Use a gas-fired absorption chiller/heater
- **Light Sources**
  - Use high-efficacy T8 fluorescent lamps
- **Heating Systems**
  - Use mass-wall passive solar heating
  - Use sunspace passive solar heating
  - Use high-efficiency, condensing oil or gas boilers and furnaces
  - Use hot water heat distribution
  - Replace existing heating system
- **HVAC Controls and Zoning**
  - Provide sufficient sensors and control logic
  - Create zones that unite spaces with similar thermal requirements

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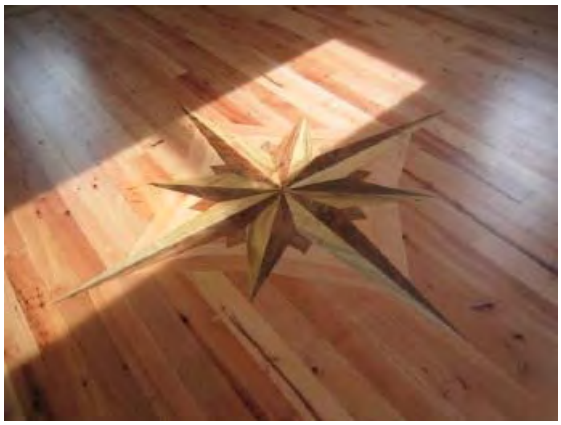
Materials & Resources



People's made a commitment to using building materials that have the lowest impact on the environment and support the local economy. All of the wood used for the expansion was either salvaged or certified by the Forest Stewardship Council (FSC) and purchased from local suppliers. The timing of the expansion fruitfully coincided with the deconstruction of the project designer's own home, and sufficient market availability of certified woods thus diminished any potential major sourcing issues. Metal studs with high recycled content were used in the walls, and the siding is made of re-milled cedar telephone poles from a local supplier of recycled building materials.

Cob (a mixture of straw, earth, and sand) was used as an infill material on a portion of the wooden frame, and cob benches were constructed in the courtyard. Reused, colored glass bottles were integrated into the exposed portion of the cob as a design feature. Recycled exterior paint and low-VOC interior paint cover the inside and outside of the building, and formaldehyde-free sheathing was specified. People's had to compromise when choosing roofing material and decided to go with a composite material instead of metal because it was less expensive.

Drought-tolerant plants were selected for the landscape and ecoroof to reduce irrigation demand.

Diversion of Construction & Demolition Waste

Over 90% of construction waste was recycled or reused. A majority of these materials were taken to a local nonprofit building-material recovery operation that supplies the local economy with structurally sound, used building materials.

The project designer noted that it was somewhat difficult at times to coordinate materials recycling: "In general, people are more apt to recycle the big materials that they perceive as having a great impact...but there are substantially more smaller materials that really add up."

Green Strategies

- **Building Deconstruction**
  - Reuse existing structure
  - Recycle materials to be discarded from existing structure
- **Design for Materials Use Reduction**
  - Consider exposing structural materials as finished surfaces
- **Recyclable Materials**
  - Use biodegradable materials
- **Post-Consumer Recycled Materials**
  - Specify recycled paint
- **Salvaged Materials**
  - Use salvaged wood for finish carpentry
- **Materials and Wildlife Habitat**
  - Specify wood flooring from independently certified forestry operations
  - Use wood products from independently certified, well-managed forests for finish carpentry
- **Transportation of Materials**
  - Prefer materials that are sourced and manufactured within the local area

Photo credit: Miles Uchida

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People's Food Co-op

Indoor Environment

People's open floor plan and large number of manually operated windows facilitate fresh-air ventilation. A neighborhood setting provides access to clean air while stack and cross ventilation strategies facilitate flushing of the space (see Energy). No carpeting was installed during the expansion, and low-VOC finishes and paints were specified throughout the building. Cleaning and maintenance is performed using low or no-toxic materials so as to avoid causing irritating odors and unhealthy working and shopping conditions.

A very pleasant passive-solar sunspace is located at the south end of the store that is distinguished by a change in floor and wall materials and a noticeable increase in window coverage. Customers and community members can relax on the naturally crafted cob benches while enjoying a view of the outside garden. The space is cool in the summer and warmed by the low sun in the winter (see Energy).

The entire building is wheelchair-accessible and easily navigable due to the wider-than-typical aisles and doorways and hard-surfaced ramps.

Green Strategies

- **Thermal Comfort**
  - Provide occupants with the means to control temperature in their area
- **Visual Comfort and Interior Design**
  - Design open floor plans to allow exterior daylight to penetrate to the interior
  - Install large interior windows to allow for the transmission of daylight
- **Ventilation and Filtration Systems**
  - Design for optimum cross-ventilation through window placement
- **Above Grade Rainwater and Groundwater**
  - Use rooftop rainwater collection system to divert water from the building
- **Elimination of Indoor Pollutants**
  - Avoid urea-formaldehyde-based underlayment
- **Reduction of Indoor Pollutants**
  - Use only very low or no-VOC paints
  - Avoid carpet in areas that are susceptible to moisture intrusion
- **Maintenance for IEQ**
  - Specify routine maintenance for HVAC system and check performance of system
- **Facility Policies for IEQ**
  - Recommend a non-smoking policy for the building

Photo credit: Miles Uchida

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Images

Please click on image thumbnails to view full-size photographs in a new window:

This photo shows the inside of the thermal storage wall. Reused bottles create a unique atmosphere.
Miles Uchida

The south-facing sunspace in this photo includes a bench made of cob.
Miles Uchida

Stones and cob combine in this photo to make a sun design on the building's exterior.
Miles Uchida

This photo shows the exterior side of the thermal storage wall. Bottles set into sculpted cob create a unique appearance.
Miles Uchida

The common room floor, shown in this photograph, is made of certified wood.
Miles Uchida

Drip irrigation is used on the ecoroof shown in this photograph.
Miles Uchida

The co-op has a second, smaller ecoroof, shown here.
Miles Uchida

The building's front wall, shown here, is vegetated.
Miles Uchida

A patron is shown enjoying the co-op's courtyard in this photograph.
Miles Uchida

Organic produce is displayed inside the co-op, shown here.
Miles Uchida

A southern orientation, an ecoroof, a sunroom, a cob and bottle wall, certified wood, and drought-resistant landscaping are some of the green features of People's co-op, shown in this photograph.
Miles Uchida

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Awards

- **BEST (Businesses for an Environmentally Sustainable Tomorrow)** in 2003; Category/title: Energy Efficiency
- **Southeast Portland Uplift Community Award** in 2003

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Lessons Learned

The rainwater harvesting system was originally designed to have an additional 1,000 gallons of capacity, which would have been more than adequate for landscape irrigation and probably toilet flushing. When the 2,500-gallon cistern was delivered, however, it was too large to get off of the truck without hitting the power lines overhead. This compromised the storage capacity, reducing it to 1,500 gallons.

The expansion project manager notes that coordinating a growing group of volunteers was a challenge. Volunteer help was solicited and encouraged, but an overwhelming response required the manager to spend an unanticipated amount of time overseeing, compensating, and coordinating the volunteers. The manager alleviated the problem by drawing up contracts with volunteers.

Night flushing of the first floor utilizing the stack ventilation system has been inhibited due to security issues. The system's function is dependent on the ground-level windows being left open overnight to serve as the inlet for cooler air. People's plans to purchase an alarm system to resolve this issue.

If on-site augmentation of equipment such as appliances is planned, be sure to contact the manufacturer beforehand to discuss implications for the warranty. For example, heat recovery from the refrigeration units was explored as an option after the refrigeration equipment had already been ordered and designed for an outdoor configuration. The manufacturer refused to warranty the equipment if altered on-site and this eliminated the potential to harvest this wasted source of heat. Prioritize passive heating and cooling strategies before resorting to conventional mechanically driven methods. Mass, orientation, configuration, materials, exposure, landscaping, and other factors, en masse, play a very significant role in establishing the microclimate that will determine the building's heating and cooling loads. This has substantial implications for energy demand, capital and operational expenses, worker productivity and production-related emissions.

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People's Food Co-op

Learn More

Visiting

It is possible to visit this project. People's Food Co-op is located at 3029 SE 21st Avenue in Portland, Oregon. Store hours are 9:00 AM to 9:00 PM daily. An outdoor farmer's market is held in the courtyard every Wednesday from 2:00 to 7:00 PM.

A detailed and referenced tour of the Co-op's green features is available on the People's Web site.

Miles Uchida (Tour Contact)
People's Food Co-op
3029 SE 21st Avenue
Portland, OR 97202
503-232-9051
http://www.peoples.coop

Information Resources

- Magazines
  - *People's: A Landmark Example of Sustainability and Service* by Brandt, Jill
    Publication: Alternatives: Resources for Cultural Creativity No.26 (Summer 2003)
    This article describes People's green features and role in its community.
    http://www.alternativesmagazine.com/26/brandt.html
  - *Portland Co-op Sustains Environment, Community*
    Publication: Natural Foods Merchandiser (June 2003)
    This article tells the story of People's renovation.
    http://www.newhope.com/nfm-online/nfm_backs/jun_03/som.cfm
- Web sites
  - People's Food Co-op Web site
    This Web site offers information about People's to patrons and others interested in the co-op.

Contacts

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City of Portland Office of Sustainable Development, G/Rated Green Building Program
Technical assistance and incentive funding
Portland, OR
503-823-7725
http://www.green-rated.org