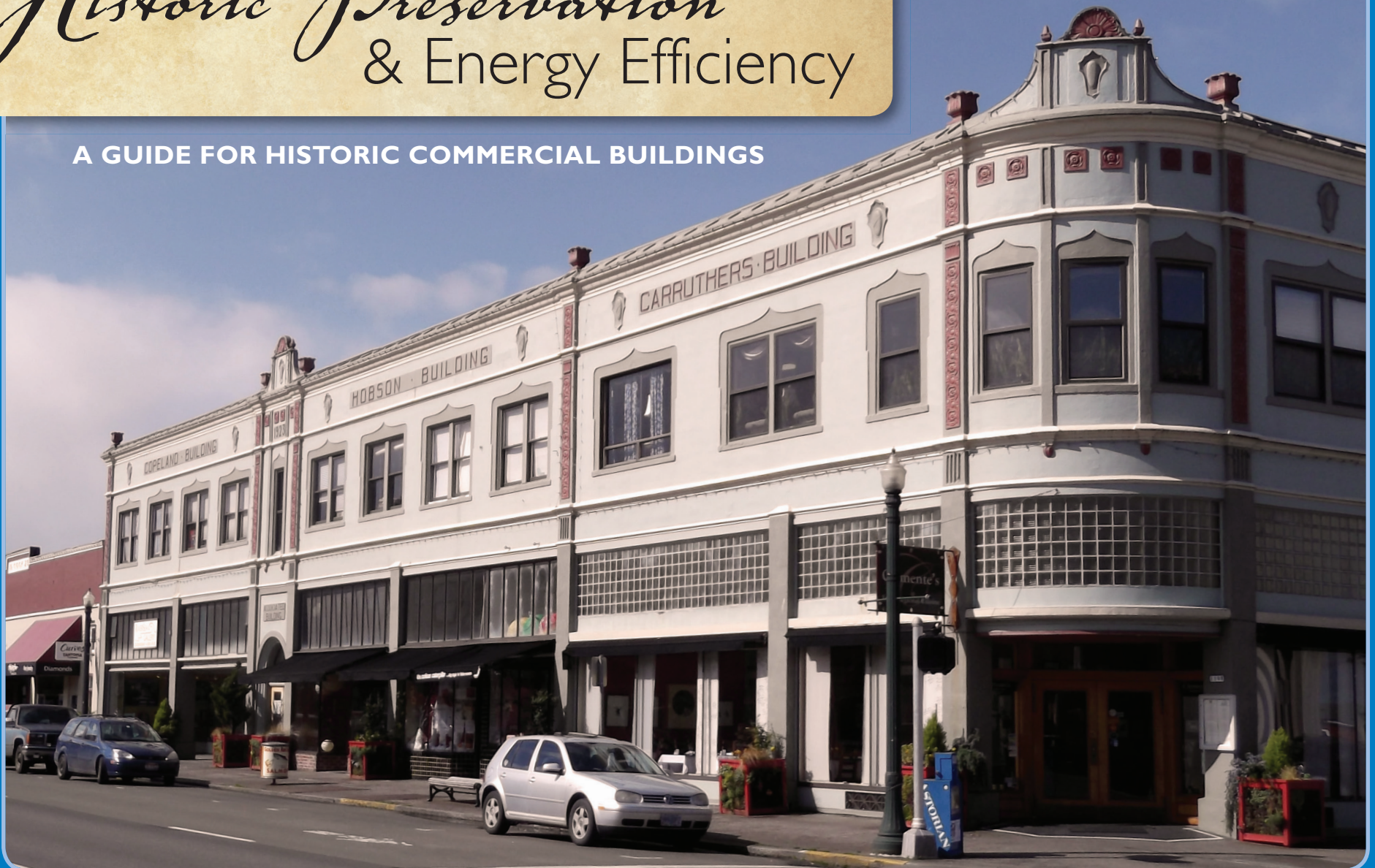


Historic Preservation & Energy Efficiency

A GUIDE FOR HISTORIC COMMERCIAL BUILDINGS



Introduction

Energy efficiency: *everyone knows the phrase, but what does it really mean?*

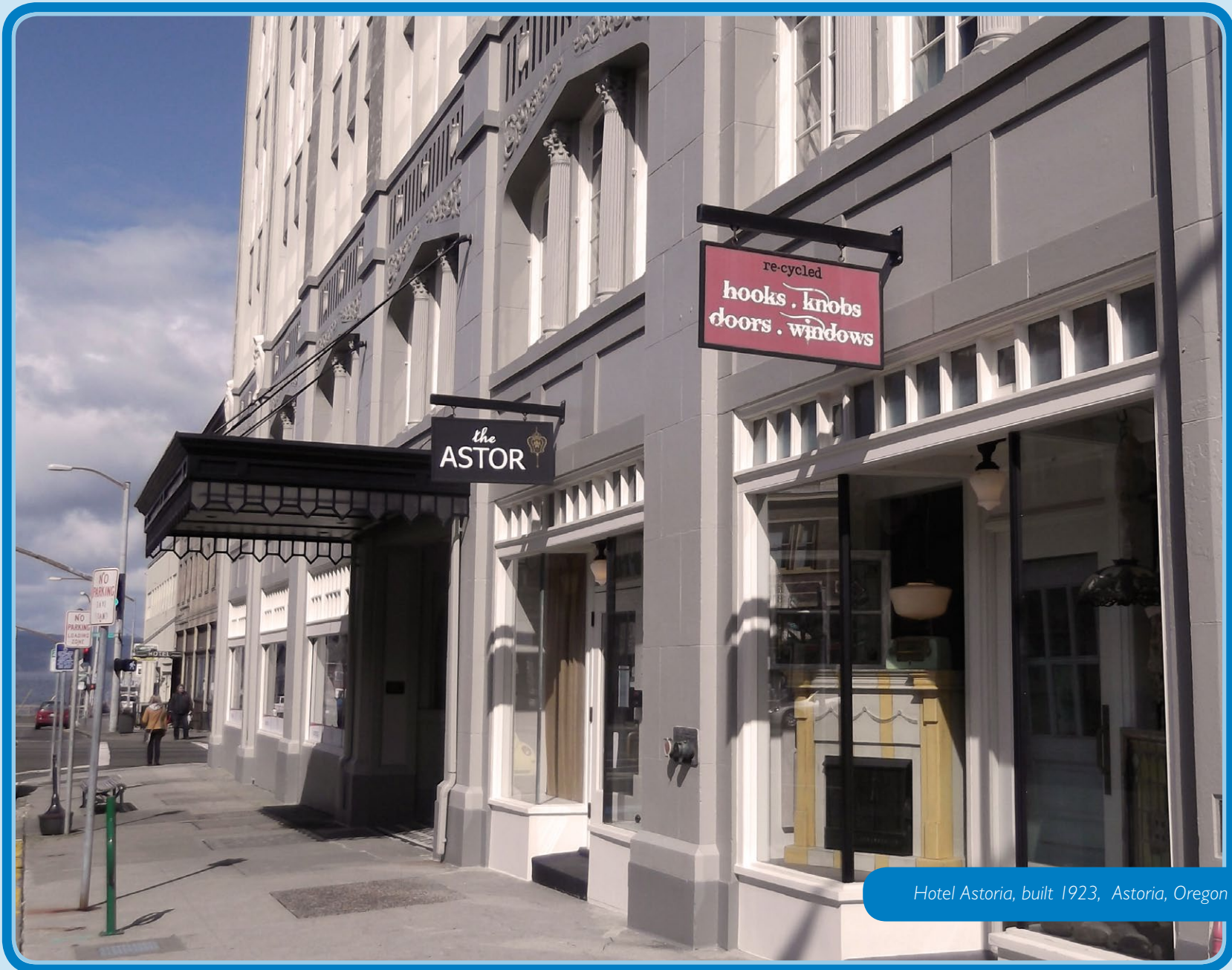
Pacific Power, in collaboration with the Oregon Main Street Program and Energy Trust of Oregon, recognized a need for a resource guide to assist small commercial property owners and businesspeople with this question. Many people do not know where to begin and are confused by the array of options. Some are uncomfortable speaking with professional contractors and need background before developing a project. Others need concrete examples of success before they spend their money.

This booklet will help answer those questions, but does so with a relevant twist: through historic preservation. When allowed to function as originally intended, historic buildings can be – with simple upgrades – nearly as energy efficient as newly constructed “green” buildings. The following chapters will help you navigate the upgrade and restoration of your building.

Information for this booklet was compiled by the students and faculty of Clatsop Community College in Astoria, Oregon. The college offers a degree in Historic Preservation and Restoration that integrates green building practices. The program reflects the National Trust for Historic Preservation’s motto, “the greenest building is the one already built.”

This booklet was developed under the guidance of Pacific Power. Its creation would not have been possible without the following individuals: Erik Andersson, Tom Bowerman, Bob Chandler, Coast River Business Journal, Nora Cronin, Leslye Dahlen, Richard De Wolf, John Goodenberger, Kari Greer, Kathy Henderson, Susan Jowaiszas, Rachel Klinnert, Kevin Leahy, Barb Modey, Thad Olivetti, Ted Osborn, Ed Overbay, Linda Poris, Larry Preston, Jay Raskin, Carol Schirmer, Tom Scott, Joy Sears, Sheri Stuart, Lucien Swerdloff, George “Skip” Throop, Gary Trenner II and Makayla Watson.





Hotel Astoria, built 1923, Astoria, Oregon

Chapter 1

HOW HISTORIC COMMERCIAL BUILDINGS WERE MEANT TO FUNCTION

Older commercial buildings were constructed during a time when it was expected that their energy needs would be met passively. Basic lighting, heating, cooling and ventilation were accomplished through simple, practical building details. Alterations to the buildings frequently mute or destroy their ability to function as originally intended.



BUILDING ENVELOPE

A building's skin is called its "envelope." Historic commercial buildings are most commonly made of masonry or wood. Each material responds differently to heat and ventilation. Depending upon the climate, neither type may need extensive modification to meet energy efficiency requirements.

MASONRY STRUCTURES

Brick buildings are known for their thick walls – called a thermal mass – which prevent large temperature swings inside the building. These walls reduce heat loss in the winter and heat penetration in the summer.

Brick is also known for its ability to absorb heat from the sun. However, it takes several hours for that heat to reach the building's interior. During the summer, that slow transfer of heat makes masonry buildings feel cool during the day. Much of the midday heat does not reach the interior until late afternoon or evening when the building is unoccupied.

Masonry buildings do have a drawback. Without proper ventilation, moisture can collect on the interior and cause damage to the structure.

WOOD STRUCTURES

Although wood structures can have higher temperature swings than masonry structures, they can be quite comfortable in mild climates. Their virtue is their ability to breathe and to allow moisture to escape from their interiors.

This natural ventilation helps reduce or eliminate the growth of interior mildew.

SHARED WALLS

Urban commercial districts include entire blocks where individual commercial buildings share side, if not back, walls. Neighboring buildings act as a thermal wall for each other. Potential heat loss is reduced to those elevations facing the street or alley.



WINDOWS AND SKYLIGHTS

These elements combine the ability to provide light, ventilation, heating and cooling.

SKYLIGHTS AND LIGHT WELLS

Skylights add natural light to those spaces not reached by the storefront or transom windows. When found on second or upper story spaces, skylights are frequently used in hallways. Historically, skylights were equipped with vents to pull hot air from ceiling levels.



Light wells are open, unroofed areas found between the wings of U-shaped buildings or the centers of donut-shaped buildings. Their operable windows bring both natural light and ventilation into rooms not accessible from the primary elevations.

TRANSOMS

Transoms are a band of windows located above the storefront window. These high windows allow daylight to reach farther into the commercial space. Often, the glass is



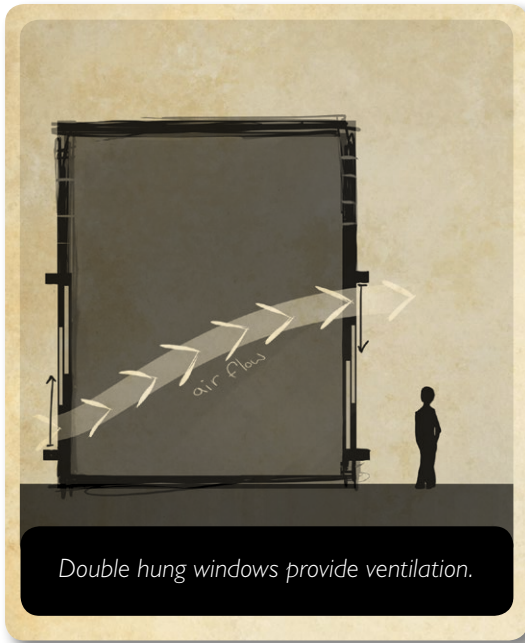
Transoms allow daylight further into building.

opaque and cut with prisms, further enhancing the amount of even light throughout the room.

Windows on either end of the band are frequently operable: opening on a lower hinge or swiveling on a center pin. These windows promote ventilation and remove hot air from the building.

TALL, OPERABLE WINDOWS

Many commercial buildings incorporate operable windows on their upper floors. The windows are usually double-hung (the upper and lower sash move up and down on a rope/pulley system).



Like transoms, the tall windows allow more daylight to reach further into the building.

Double-hung windows also offer a unique means to ventilate and cool a room. When the upper sash of a window is pulled down, hot air is ventilated outside. Additional cooling is achieved by cross ventilation – raising the lower sash of a window on the opposite side of the room.

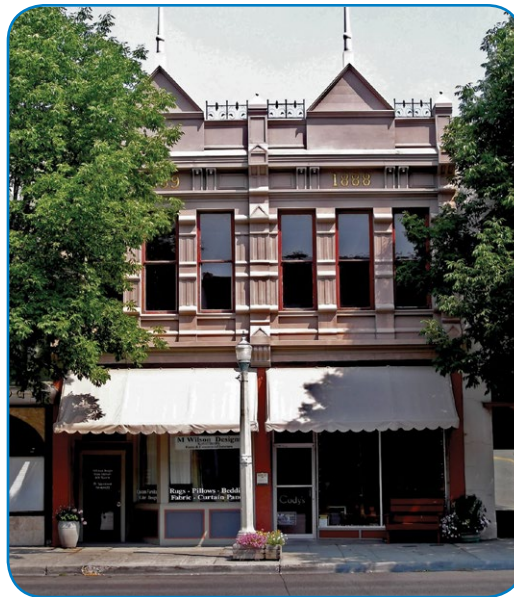
ADDITIONAL AIDS TO LIGHT, VENTILATION AND COOLING

AWNINGS

Fabric, retractable awnings serve a variety of functions. They provide a protected area for customers to stand while window-shopping. They also increase the opportunity to vary the intensity of natural light within the building. When lighting is harsh, an extended awning brings welcome relief. When the sky is overcast, a retracted awning allows every bit of light to fill the space.



Awnings can also affect the temperature of the retail space. An extended awning will provide shade, and therefore lower temperatures in the summer. A retracted awning will allow solar gain into the building and raise interior temperatures in the winter.



HIGH-REFLECTIVE CEILINGS

High ceilings enable taller windows to be installed, which in turn allows light to reach deeper into the structure. Higher ceilings also provide space for excess heat to rise before being flushed out of the building by vented skylights or transoms. When painted in light colors with a high gloss, ceilings can reflect light down to the workspace.

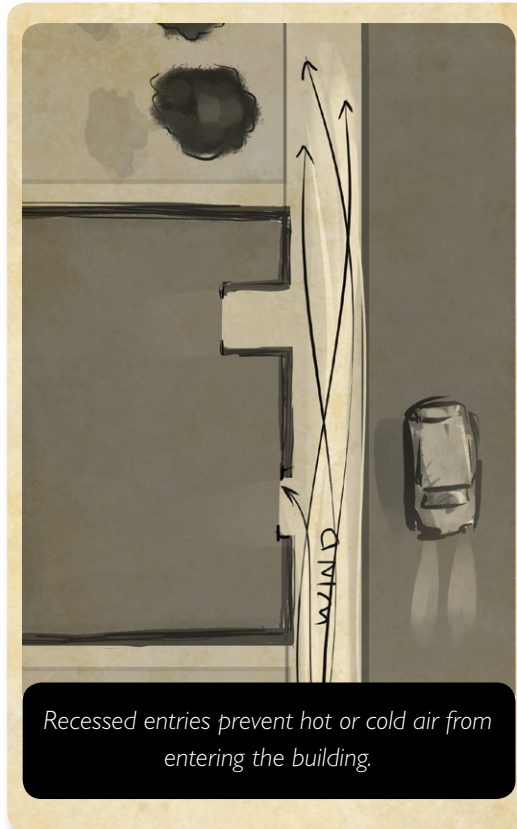


Energy Trust of Oregon can help

Besides reclaiming the passive energy plan used in historic buildings, adding newer technologies can help to save even more energy. Energy Trust of Oregon can help to identify energy-saving opportunities and offer cash incentives on the installation of qualified energy-efficient equipment.

RECESSED ENTRYWAYS

Set back from the sidewalk, these entries help prevent hot or cold air from rushing into the commercial space when the door is open.

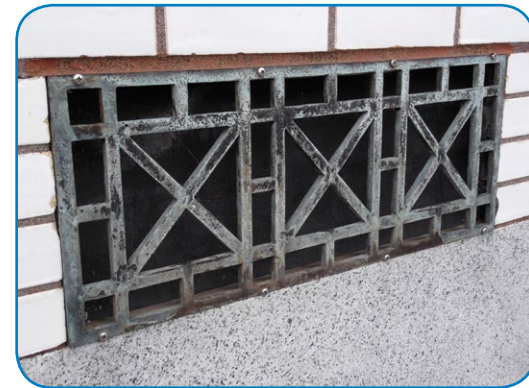


Recessed entries prevent hot or cold air from entering the building.

BULKHEAD GRATES

Often overlooked and frequently covered, these grates are located below the storefront windows. The grates provide ventilation from the basement. A ventilation duct is usually located inside the storefront, beneath the display platform.

Ventilating the basement prevents the build-up of damp air. Basements with fresh air are less likely to have an odor, and less likely to negatively affect the air quality of the building.

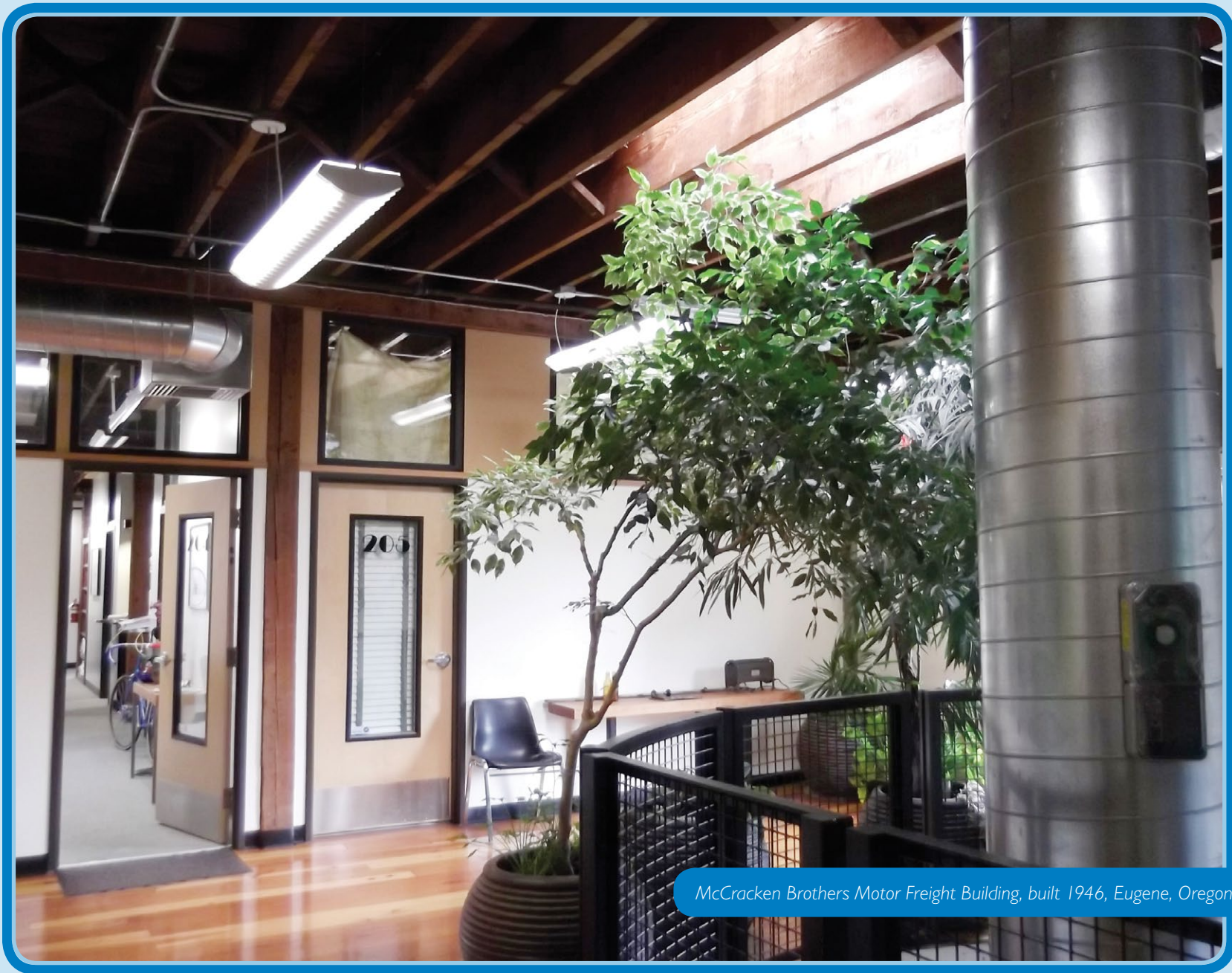


CEILING FANS

Depending which way the blades are tilted, ceiling fans can pull heat up and away from people, or push heat down to the room's occupants. The fans also provide general air circulation and can reduce mildew in large spaces.



Conn & Huston Grocery Building, built 1886, Albany, Oregon



McCracken Brothers Motor Freight Building, built 1946, Eugene, Oregon

Chapter 2

TECHNOLOGIES TO AID IN ENERGY EFFICIENCY

There are many ways to save energy or prevent the waste of energy in your commercial building. Whether it is installing lighting, sealing the building envelope, fine tuning heating and ventilation, or selecting a water heater or office equipment, this chapter will help you determine where to concentrate your efforts. It's also a good idea to contact city and county building departments when upgrading your building for energy efficiency, so you're aware of local standards and regulations.



LIGHTING

Lighting can consume 38 percent of your electric use and 20 percent of your total energy bill. Therefore, a combination of daylighting and

energy-efficient lamps is essential to lowering your energy consumption.

Many older buildings use fluorescent T12 lamps and magnetic ballasts. Simply replacing them with today's higher performance T8 or T5 lamps and electronic ballasts generates significant energy and cost savings, provides better-quality light and long lamp life.

Incandescent lamps are inherently wasteful: only 10 percent of their energy is used to create light, the rest is emitted in heat. Although tempting to consider incandescent lamps as a viable heat source, they are neither efficient nor designed to distribute heat throughout your store or office.

Replacing incandescent lamps with compact fluorescent lamps (CFL) is an easy method to reduce energy consumption. CFLs use 75 percent less energy and last 10 times longer than incandescent lamps.

Many business owners, however, appreciate the warm light generated by incandescent lamps and are reluctant to replace them. CFLs are often thought to cast cold or green light, while incandescent lamps

are known to enhance the color of display items. Fortunately, CFLs are available in a variety of colors and intensities.

Another alternative is to consider light-emitting diode (LED) lamps. LEDs last up to 50 times longer and are 75 percent more efficient than incandescent lamps. Although more expensive initially, the LED is an ideal solution for historic fixtures that are difficult to reach or that need partial disassembly for lamp replacement.

Finally, using "task lighting" to illuminate specific areas can save additional energy. It requires less overall brightness within the room and therefore requires less energy consumption.

Selecting the proper CFL

- For a more "historic" look, select a CFL in the 2,700-3,000 Kelvin range.
- For a whiter light, select a CFL in the 3,500-4,100 Kelvin range.
- For bluer white light, select a CFL in the 5,000-6,500 Kelvin range.



Post and King Building, constructed ca. 1900, Lakeview, Oregon

BUILDING ENVELOPE

Creating a building envelope, without excessive air leaks, is critical to energy efficiency. Air leaks waste more energy than any other element within a building. One of the quickest, most energy efficient and money-saving tasks you can do is to caulk, seal and weather-strip all seams, cracks and openings within the building envelope.

Adding insulation beneath the first floor and above the uppermost ceiling is another cost-effective way to make your business more comfortable and energy efficient. Be sure to follow manufacturer's instructions and wear proper clothing and a mask during installation.

Insulation is made from a variety of materials and comes in four basic types: rolls and batts, loose-fill, rigid foam and foam-in-place.

Attic level insulation should be R30: 11 inches of fiberglass or rock wool, or 8 inches of cellulose. Be careful when installing insulation near recessed light fixtures. Make sure it is insulation contact (IC) rated; otherwise, you may risk a fire hazard with flammable material.

It is also important to maintain ventilation between the insulation and the roof. Ventilation keeps moisture buildup to a minimum in the winter and heat buildup to a minimum in the summer.

Since the greatest energy savings comes by insulating below the floor and above the uppermost ceiling, the use of wall insulation should be a last resort. It should only be pursued if, after properly sealing openings, there is still draftiness within the building.

Installing wall insulation in historic buildings can be problematic. The greater the temperature difference between outside and inside air, the greater potential there is for damage to your building. As moist interior air seeks to escape, condensation occurs on the colder surface – deteriorating wooden windows, rotting wood walls and structural

members, dampening insulation and holding moisture against exterior surfaces.

Masonry buildings are not without their additional risks. Moisture, if trapped within the walls, can corrode metal anchors, nails and wire lath. It may also cause blistering of exterior paint or leave efflorescence on exterior masonry. Wall insulation, therefore, should be a last resort.

Ask a qualified contractor for recommendations.

Here are some easy ways to stop air leaks in your building:

- Apply caulk and weather-stripping around leaky doors and windows. A foam sealant may be needed around larger gaps.
- Use caulk to seal holes where plumbing, ducting or electrical wiring comes through walls, floors and ceilings.
- Insert foam gaskets behind electrical outlet and light switch plates.
- Install interior or exterior storm windows over smaller office windows.
- Seal air leaks around chimneys, furnaces, and gas-fired water heater vents with fire-resistant materials such as sheet metal or sheetrock and furnace cement caulk.



HEATING, VENTILATION AND COOLING SYSTEMS

Heating, ventilation and cooling systems (HVAC) play a major part of a building's energy consumption. Efficient, properly maintained systems can drastically reduce energy use.

Before purchasing a new furnace or boiler, or adapting your existing unit, make sure you have done everything possible to seal major air leaks within the building envelope. Once sealed, the heating needs for your building will be less and therefore the size requirement of your furnace will be smaller and less expensive. It is important to note that many older systems are over-sized; when you seal the building too tightly, you may risk causing damage to the structure.

If your building is constructed within an environment known for its cold winters, it makes sense to purchase a top-of-the-line, high-efficiency system. You will find that moving from an 80 percent efficient heat source to one that is 90-95 percent efficient will bring significant savings. On the other hand, if your building is within a milder climate, and you have lower annual heating costs, you may want to invest in a more modestly priced, less efficient system.

There are three common HVAC systems: hydronic, central air and ductless.

HYDRONIC SYSTEM

Hydronic is a water system that consists of a network of pipes used to deliver hot water or steam to floors or radiators. Boilers heat the water; older systems can be upgraded to include new boilers and circulating pumps.

Radiators are looped together, placed beneath windows or beside exterior walls. Each radiator can be individually zoned and controlled by thermostats. Historic radiators can be reconditioned to serve for many years.

Hydronic pipes are easier to install in older buildings because the pipes are smaller than ductwork. The risk, however, is hidden leaks in the wall or pipes bursting in the winter if the boiler fails.

As the owner of an older building, consider what impact the system may have on the building's historic details and aesthetics. If an experienced professional recommends the removal of an existing system, keep the following in mind:

- Select a mechanical system that requires the least intrusion into the building's walls, floors, ceilings, moldings, special finishes, etc.
- Verify the system can be updated or repaired without additional harm to these elements.
- If ductwork is installed, conceal it within the walls and floors in historically formal spaces.
- If ductwork must be exposed, place it where it will detract the least from the space. Consider painting the ductwork to blend in.



Boilers gain efficiency through:

- Electronic ignition, which eliminates the need to have the pilot light burning all the time.
- New combustion technologies that extract more heat from the same amount of fuel.
- Sealed combustion that uses outside air to fuel the burner, reducing drafts and improving safety.

CENTRAL AIR SYSTEM

Central air systems are an all-air, single zone fan driven system that is composed of compressor drivers, chillers, condensers (usually located outside) and furnace (frequently located in the basement), depending upon whether the air is heated, chilled or both.

The fresh cooled or warmed air is transported through sheet metal or flexible plastic ducts. Registers or vents are located on floors, walls or ceilings. The system is also individually zoned and controlled by thermostats.

Central air systems offer a high level of control of interior temperature, humidity and filtration. However, they risk damaging historic buildings if there is not adequate space for the ductwork. The systems need constant balancing, too, and can be noisy.

DUCTLESS HEAT PUMPS

Ductless heating and cooling systems are highly efficient products that deliver warm or cool air directly to different zones in a building and have been used for more than 30 years worldwide. Because ducts are not required, these systems can be a good option to improve comfort and energy efficiency in older buildings that do not have built-in ducting.

Instead, air moves through indoor components mounted on the wall, which improves efficiency by taking faulty ductwork out of the mix. These systems may not comply with the historical guidelines of all buildings, but ductless systems can be an excellent energy-efficient option for many older buildings.

WATER HEATERS

There are four ways to cut your water heating bills: use less hot water, turn down the thermostat on your water heater, insulate your water heater, or buy a new, more efficient model.

Although an energy-efficient water heater will cost more than a standard heater, it will pay for itself in savings. There are a variety of types of high-efficiency heaters: electric heat pump, gas non-condensing, gas condensing, gas tankless and solar.

Heat pump water heaters typically use 50 percent less electricity to generate hot water than conventional electric water heaters. If the heater is located in the basement, it will also help dehumidify the space during the summer.

Natural gas on-demand or tankless water heaters produce hot water without using a storage tank. Their energy savings

A few quick tips to save money on water heating:

- Install aerating, low-flow faucets.
- Repair leaky faucets.
- Set the thermostat on your water heater to 120°F.
- Insulate your electric hot water storage tank, but be careful not to cover the thermostat.
- Insulate your natural gas or oil hot water storage tank but be careful not to cover the heater's top, bottom, thermostat or burner compartment.
- Insulate the first 6 feet of the hot and cold water pipes connected to the water heater.
- Drain a quart of water from your tank every three months to remove sediment that impedes heat transfer and lowers the efficiency of your water heater.

can be up to 30 percent more efficient than standard natural gas water heaters with tanks, depending on usage patterns.

A solar water heating system uses energy from the sun to preheat water and typically includes a solar collector (usually mounted on the roof) and a solar storage tank that feeds into a gas or electric hot water heater.

Systems may be active (pump circulates water) or passive (convection/gravity circulates water). Often initial costs can be offset by cash incentives and tax credits.

APPLIANCES AND OFFICE EQUIPMENT

ENERGY STAR® appliances and office equipment use less energy to perform regular tasks. Refrigerators and freezers have improved insulation and compressors, and washing machines require less water and electricity. Computers, monitors, copiers and printers will automatically power-down when not in use. Without these features, many electrical devices continue to draw power, even when they are switched off. These “phantom loads” can also be avoided by unplugging the device or by turning the power off at a power strip.

RENEWABLE ENERGY SOURCES

Renewable energy sources are constantly replenished and never run out. They are clean sources of energy that have a low environmental impact and can pay for themselves over time. Following is information regarding two energy sources: geothermal and solar.



GEOTHERMAL ENERGY

Geothermal heat pumps use the earth's heat to act as an exchange medium instead of outside air temperature. No matter what the seasonal temperature swings, the earth's temperature remains constant just a few feet below the surface. (Depending upon the latitude, the temperature can range from 45°F to 75°F.) In the winter, the temperature is warmer than outside air; in the summer, it is cooler. A geothermal heat pump transfers the earth's heat through a ground heat exchanger.

Geothermal heat pumps use 25 to 50 percent less electricity than conventional heating and cooling systems. The systems have good design flexibility and require less interior space than conventional HVAC systems. This makes them ideal for historic buildings.

Although the upfront costs are steep, ground-source heat pumps will pay for

themselves within 10 years. The pumps have the advantage of using few moving parts – most of which are located inside the building – and are considered both durable and reliable. Since there is no need for an outside condensing unit (as used on typical air conditioners), there is very little noise associated with the system.

Finally, underground piping carries a warranty of 25 to 50 years and the pumps frequently last more than 20 years. These pipes, if laid horizontally, need a large amount of land. If placed vertically, the pipes need less land, but installation is substantially more expensive.

SOLAR ENERGY

A photovoltaic (PV), or solar electric system, is made by grouping PV cells together. An individual PV cell typically produces from 1 to 2 watts of power. To increase the power output, PV cells are connected, then grouped together in a unit called a module.

Modules are connected, in turn, to form an even larger unit called an array. The arrays can be sized to meet the electrical power needs of virtually any building.

The simplest PV array consists of fixed, flat-plate, PV panels. Fixed arrays have several advantages: they lack moving parts, there is



virtually no need for extra equipment, and they are relatively lightweight. These features make them suitable for many locations, including flat commercial roofs.

There are disadvantages to fixed panels, however. Their fixed orientation means that their ability to gain maximum energy is seasonal. If you are interested in units with greater solar gain, you may consider installing an array with year-round, sun-tracking capabilities. Moving parts within the tracking arrays make the units more expensive than fixed units. Nevertheless, the potential to increase solar gain may balance the initial cost of the unit.

In order to get the most solar gain from panels, seek advice from a professional installer and contact city and county building departments to be sure the project complies with local standards and regulations. It also is a good idea to work with a preservation professional before the panels are installed

to help identify the building's character defining features and to prevent negatively impacting those details.

Solar panels can be placed on historic buildings if they follow general rules of thumb:

- Place solar panels where they will be least visible from the public.
- Install the panels below or behind the parapet wall or on a rear-facing roof.
- Panels should be flush or mounted a few inches above the roof.
- Make sure all of the work is reversible.
- Avoid solutions that require the permanent alteration of historic fabric.

Contact Energy Trust of Oregon

When embarking on an historic preservation project, remember to contact Energy Trust of Oregon. Though they are not experts in preservation, they excel at identifying energy-saving opportunities and may be able to offer expertise and cash incentives to help with energy-efficient equipment upgrades and renewable energy.



Farmers' Union Co-op Building, built 1923, Eugene, Oregon



Allen Building, built 1924, Astoria, Oregon

Chapter 3

CASE STUDIES

Historic preservation can seem daunting. Placing energy-efficient technologies into old buildings can be overwhelming. However, here are several case studies of average property owners who have taken on that very challenge.



OLD SOLDIERS' HOME – 1624 WEST HARVARD AVE. ROSEBURG, OREGON

Constructed in 1917, the Old Soldiers' Home sits on the edge of a park in Roseburg. The Colonial Revival-style hospital building became Oregon's primary health care facility for volunteer veterans. It served the needs of veterans from the Civil War, Spanish-American War and World War I. In 1933, the Veteran

Administration completed a new Roseburg hospital facility. Patients were relocated to the new hospital.

Although used only for a short time as a hospital, the 8,968 sq. ft. building functioned well. The large windows provided cross-ventilation and natural light. High ceilings increased the ventilation and cooling. Its gardens, outdoor verandas and porches, considered integral to the design also enhanced the experience.

Then time caught up with the building. Maintenance was deferred. In some places, Scotch tape was the only thing holding window glass in place!

A COMMUNITY CENTER

Around 1970, the building became a community center filled with nonprofit organizations. Eventually, the Umpqua Valley Arts Association became the building's only tenant. The City of Roseburg decided to lease the building to the arts association for \$1 per year in exchange for the building's upkeep and maintenance.

REHABILITATION GRANT

Since the city retained ownership of the building, they applied for a grant to rehabilitate it. In 2010, they won a \$237,576 Energy Efficiency and Conservation Block Grant from the Oregon Department of Energy, which received its funds from federal stimulus.

The project seemed straightforward. But, it hit a bump. Since the building is individually listed on the National Register of Historic Places, and federal funds were used in its rehabilitation, Oregon's State Historic Preservation Office (SHPO) reviewed the alterations. SHPO objected to the replacement of the building's wood windows.

LED lighting saves money

By installing 128 LED Integral Lamps the Old Soldiers' Home is saving 12,106 kilowatt-hours of electricity a year. Energy Trust of Oregon provided \$2,410 in cash incentives to help pay for the new energy-efficient lighting.

WINDOW REHABILITATION

After considering options, it was decided to repair, re-glaze and weather-strip the original windows. Much of the previous energy loss was from gaps around the windows or from lack of insulation behind window casings.

In addition to basic repair, they added All Climate (AC) glass to the windows. The glass has a thin, low-emittance coating that ensures a consistent year-round thermal performance. While typically used to reflect heat in hot climates, it is equally effective in keeping heat within a building when it is cold outside.

Old Soldiers' Home accomplishments:

- Repaired 62 single-pane wood windows and added All Climate (AC) glass to windows for low emittance.
- Added R30 insulation to attic.
- Sealed and insulated around window casings.
- Weather-stripped doors.
- Replaced T12 fluorescent lighting with LEDs.
- Upgraded heating system to high-efficiency heat pump and air conditioner.

UPGRADES SAVE MONEY

Kathy Henderson, director of Umpqua Valley Arts Association, has been pleased with the building's upgrades. Not only has the building been more comfortable year-round, but the association has also saved money in utility costs. "Electrical wiring and plumbing were our biggest challenge when we started rehabilitating the structure," she said. "But with an upgraded building there has been a return on our investment that can be seen in the reduction of our monthly bills."

IMPORTANCE OF HISTORIC PRESERVATION

Henderson observed that there can be a conflict between historic preservation and business people. "Small business owners are renegades. They are risk takers and independent," Henderson said. "Sometimes they will have a problem jumping through the hoops involved in historic preservation. They have to understand that it is not a wide-open process, but worth the effort for the community and city."

She encouraged anyone with an old building to restore it. "We're all stewards of history. If we don't do it, who will?" Henderson said. "Historic preservation is a lynch pin to saving communities."



ALLEN BUILDING – 1004 COMMERCIAL ASTORIA, OREGON

A retired architect from southern California, Ted Osborn employed 75 people on large and small projects. His work included both modern design and historic preservation.

Osborn purchased the Allen Building in 2011. "I picked this building because of its location. Of the vintage buildings in Astoria, it was the most needy," claimed Osborn. "We had no idea then how much anguish the building had been put through."

Completed in 1924, the Allen Building originally housed the Charles V. Brown Shoe Store and H. Burke & Company, a men's clothing store. The building's façade endured

no less than three substantial remodeling campaigns. Very little remained of the original building fabric. The storefronts were gone, most of the transoms were missing and many of the bricks were broken or nonexistent. “Every positive profile of brick was broken off and had to be replaced,” said Osborn.

EXTERIOR RENOVATION

The storefront, removed in the 1930s, then reconfigured in the 1950s, was inadequate. It leaked, it was rotting and it was unattractive. Osborn hired Ed Overbay, president of the Columbia Pacific Preservation Craftsman Guild, to tackle the project.

Although Overbay had never constructed storefront and transom windows before, original drawings were available for him to review. Overbay poured over the drawings and analyzed what worked well and what did not. The result, he called a “hybrid.”

In a traditional approach, he used tight grained, clear fir. Overbay matched the transom windows to their original size and molding detail. He made them more efficient by installing double-pane glass. Then, he used “high-tech caulking” to bury stainless steel flashing above the windows and polyurethane where it rests on concrete below the window.

Overbay reconfigured the entry, too. He moved the display area forward, flush with the building’s façade. However, he recessed the entry to provide protection for customers and to decrease the building’s heat loss by sheltering the opening from wind.

INTERIOR RENOVATION

The interior proved to be equally challenging. When Osborn purchased the building, he looked at its interior and said, “Enough is enough. I’m not going to let it go (downhill) any farther.”

“I couldn’t leave it as tanning booths with 8-foot high ceilings,” he said as he looked around the now spacious interior. “When (prior owners) remodeled, they did it in layers. They didn’t remove anything...” Before reaching the building’s 18-foot ceiling, the crew ripped out two more ceilings: one at 12-feet and one at 14-feet.

The restored height and open plan facilitate the building’s passive energy aspects. Newly opened skylights wash the back interior with sunlight. White painted ceilings reflect light back down to the workspace and enhance its ambient light.

The additional height has increased the amount of sunlight entering through the front transoms. That light provides additional heat to the building. When it gets too warm, transom

Allen Building accomplishments:

- Added R12 and R18 insulation on exterior walls and R33 insulation below roof.
- Upgraded the heating system from a large capacity gas furnace to a ductless heat pump HVAC unit.
- Demolished poorly planned interior spaces and restored the building’s original floor plan and volume, allowing the building to better function through passive energy.
- Installed ceiling fans.
- Restored original skylight openings.
- Used compact fluorescent lights wherever possible.
- Painted ceilings white to aid light reflectivity.
- Reconstructed storefront window system included double-pane transom windows for heat retention, operable transom windows for air circulation and increased natural light for visibility and solar gain.
- Retained original fir floors to retain embodied energy.

windows can be tipped open to create airflow. Osborn installed a roof vent for added circulation.

ADDITIONAL EFFICIENCY MEASURES

He reduced heat loss potential by insulating the walls and ceiling. Then, he replaced the furnace with a ductless heat pump HVAC unit. He also installed ceiling fans to push rising heat back down to floor level.

Osborn used compact fluorescent fixtures wherever possible.

FINANCIAL INCENTIVES

Three separate financial incentives were tapped for the renovation of the Allen Building. The first was Special Assessment. Administered by Oregon's State Historic Preservation Office (SHPO), the assessed value of the building was "frozen" for 10 years in exchange for the building's restoration.

The second financial incentive was a 20 percent Federal Tax Credit, managed by both SHPO and the National Park Service. The credit was available after the market value of the building was spent in qualified rehabilitation.

The third incentive was a special, competitive grant called "Diamonds in the

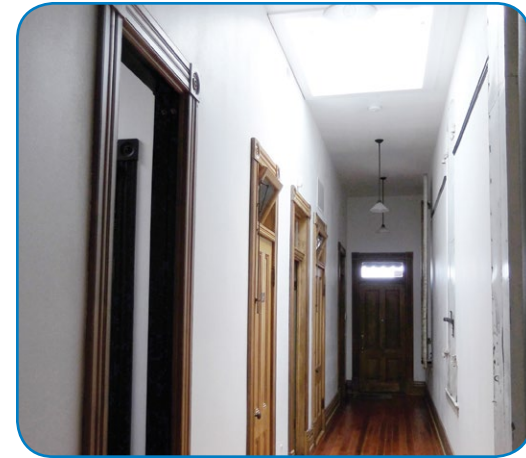
Rough." SHPO coordinated the grant and awarded it to the Allen Building, in part, because of its potential for dramatic before and after results.

NOTICEABLE IMPROVEMENT

The Allen Building is getting noticed. Prior to its renovation, many walked passed without giving the building a second thought. Now people stop by and ask Overbay, "Where did this building come from?"

"It has a sense of proportion and detail that you just can't fake," he explained.

Osborn is rightfully pleased with his on-going project. He said he is excited to see other property owners doing the same, "I'd like to think that I kick-started a desire to improve downtown Astoria."



CONN & HUSTON GROCERY BUILDING – 208 1ST AVE. ALBANY, OREGON

Bored in retirement, physician George "Skip" Throop set his sight on the restoration of the old Conn & Huston Grocery Building in downtown Albany. He did not have experience renovating structures, but the building, nevertheless, captured his imagination.

The two-story brick structure was constructed in two phases, one in 1886, the other in 1891. Its impressive façade features a cast iron cornice and pilasters. In addition to the grocery store, the structure also housed the Western Union Telegraph. By the time Throop purchased it in 2008, the building was on hard times: the front façade was buckling



Conn & Huston Grocery Building, built 1886, Albany, Oregon

and failing structurally; mortar was crumbling and in need of replacement; aluminum paneling covered transom windows; the second floor, a former rooming house, was under-utilized; windows were in need of repair.

Throop stopped long enough to seek assistance from the local building official and found an experienced contractor to guide the project.

Throop used several incentives to restore the building:

- Special Assessment, a tax incentive administered through the State Historic Preservation Office.
- Twenty percent Federal Tax Credit, administered through the State Historic Preservation Office in conjunction with the National Park Service.
- Central Albany Revitalization Area grant, administered through the city of Albany.

INSULATION

“Taking care of the roof was the number one priority,” he said. Throop placed a light colored membrane roof down to reflect heat away from the building and to protect it from the

weather. He also installed three-inch-thick rigid insulation beneath the membrane to insulate from summer heat while retaining warmth and comfort in the winter.

The masonry building shares walls with its neighbors to either side, so there was no need to add insulation to those walls. However, Throop added insulation to the outward facing walls. A crawl space beneath the building was too low to install insulation, so a vapor barrier was stretched across the dirt instead.

NATURAL LIGHT AND VENTILATION

After focusing on insulation, Throop turned his attention to windows. He repaired nearly every historic window in the building. He restored transom windows above the first floor storefront and cedar, double-hung windows on the second floor. Throop stripped the windows of paint, re-glazed them (replaced old putty), and replaced or re-hung the sash weights.

Today, the windows operate like the day they were installed, and they don’t leak air. The cost of rehabilitating the windows was a fraction of the cost to replace them and any energy efficiency lost through those single pane windows is counterbalanced by the low cost of their repair.

He’s pleased to note that only a handful of windows were beyond repair. Fortunately, they were on the back elevation. He replaced with custom-made, wood windows. The new windows are indistinguishable from the original windows.

Throop’s contractor both restored and replaced skylights upstairs. “There is no reason to turn on lights during the day,” said Throop. The apartments are flooded with natural light.

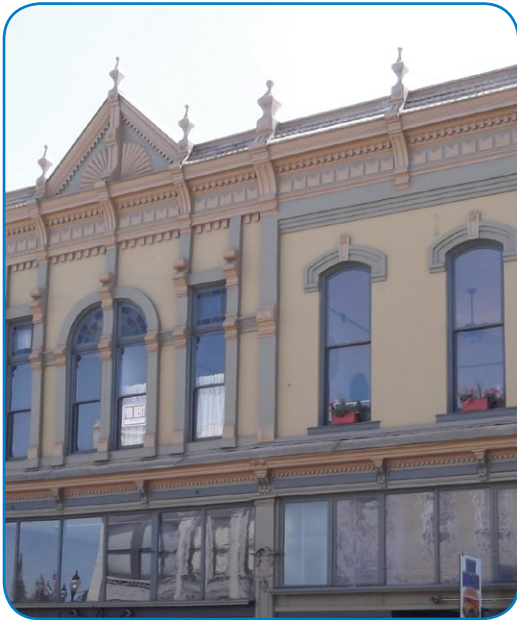
Ceiling fans are used on both levels to aid ventilation and cooling.

Conn & Huston Grocery accomplishments:

- Insulated roof and two sides of building.
- Installed new heat pump system.
- Provided daylighting and ventilation through transoms, double-hung windows and skylights.
- Increased ventilation by incorporating fans on 15-foot ceilings.
- New ENERGY STAR® refrigerators and washing machines in apartments.
- Embodied energy conserved by saving wood floors, retaining lath-and-plaster walls, re-using windows and renovating the building.

HEATING

He was pleased to note newly installed heat pumps are used to warm and cool the entire building. Throop reported that his second floor tenants find additional benefit from warm air rising and passing between floor levels.



KERN BUILDING, OMER APARTMENTS – 17 NORTH 6TH ST. COTTAGE GROVE, OREGON

A Rexall Drug Store occupied the first floor of the Kern Building for nearly 70 years. Upstairs, the Omer Apartments provided simple living for Cottage Grove’s working class. But like many aging commercial structures, the Kern building was worn down.

In 1993, St. Vincent de Paul Society of Lane County (SVdP) acquired the two-story, brick-faced building. The first floor contained commercial space and two living units. The second floor consisted of an additional 10 units. There, SVdP provided affordable housing for low-income residents.

GRANTS

“We couldn’t raise the rent to rehabilitate the building,” explained project manager Nora Cronin. “There is an extreme need for low-income housing in Cottage Grove.” Thanks to a \$348,000 grant from Oregon Housing & Community Services, Cronin was able to pursue an affordable housing upgrade in 2012.

SVdP was also awarded a \$2,000 grant from the Pacific Power Foundation, the philanthropic arm of Pacific Power, whose mission supports the growth and vitality of communities. The grant funded the removal of an unused masonry chimney that was causing water leaks and helped to repair the deteriorated brick façade.

RENOVATION BEGAN

Cronin oversaw a renovation that included replacing the roof, re-pointing (or replacing old mortar between) the bricks, adding insulation, increasing electrical outlets and renovating bathrooms.

WINDOWS

The work also included repairing the many wood windows. “We did not replace the windows because it is a designated historic

Kern Building, Omer Apartments accomplishments:

- Replaced water & sewer lines for all units.
- Replaced roof and stopped water intrusion by removing a chimney.
- Replaced broken brick and re-pointed (replaced old mortar) on the entire building.
- Repaired existing windows: removed large gaps (due to settling), repaired rotting trim, removed lead paint and re-glazed windows.
- Replaced gas heaters with electric Cadet heaters.
- Added insulation to the attic and ceiling.
- Increased electrical outlets in rooms (only 1-2 per room originally).
- Replaced sump pump in basement and repaired foundation for water intrusion.
- Renovated bathrooms with new fans, vanity sinks, shower doors, flooring and ADA bars.

building,” recalled Cronin. “That was fine. It would have been cost-prohibitive to change them in the first place.”

Prior to renovation, many windows were partially propped open as a means to get television cable into the apartments. “We gained energy efficiency just by repairing the windows and eliminating cables from coming in through the windows,” said Cronin. “We also had to educate the tenants on how to use a sash lock. Otherwise, they would leave the windows open or they wouldn’t know how to open them.”

PRESERVATION SUCCESS STORY

The renovation of the Kern building paid off. Cronin said, “Even investing in simple upgrades not only improves and preserves the building but also increases affordability for the tenants by lowering utility bills. This makes the building more sustainable over the long run and a long term asset for the entire community.”



STERNBERG BUILDING – 310 1ST AVE. WEST ALBANY, OREGON

Constructed in 1890, the Sternberg Building housed both hardware and gentlemen’s clothing. Linda Poris began rehabilitating the building in 2009. Like many buildings, the Sternberg was remodeled in the 1950s or 1960s and covered with aluminum. A storefront, once flush with the sidewalk, was recessed to provide more cover.

Poris hired Larry Preston, a contractor who serves on the Albany Landmarks Commission, to assist her on the project. “It’s important to partner with someone who knows what’s going on,” said Poris.

FINANCING

“We had to figure out financing first,” said Poris. After looking at historic photos, they discovered a full restoration was cost-prohibitive. Reconstruction of the transom windows, for instance, would “kick-in” a



Sternberg Building, built 1890, Albany, Oregon

seismic retrofit requirement, something Poris was not able to undertake. Instead, they removed aluminum paneling from the front, retained the brick façade and approached the renovation with a “no harm” approach.

The project was financed in part by a Central Albany Revitalization Area grant.

BUILDING ENVELOPE

“The most important thing to do was to begin working on the building’s shell,” recalled Preston. “That way, we avoided further water damage inside.” They replaced the roof with a light colored membrane. But before doing so, they installed a layer of foam board insulation. Both Poris and Preston laughed about the previous “insulation.” “We had pigeon droppings nearly two-feet deep above the ceiling,” joked Preston.

Sternberg Building accomplishments:

- Replaced old boiler with gas heating and cooling unit.
- Sealed moisture from basement.
- Retained ceiling fans to circulate air.
- Installed LED bulbs in historic light fixtures.

HEATING SYSTEM

Next, they focused on the heating system. The building used a gigantic, gas, steam heat system. Rather than rehabilitate it, Preston chose to install a gas heating and air conditioning unit on the rooftop.

MOISTURE

Later, Preston tackled a moisture problem in the basement. The sidewalk in front of the building consisted of “vault” construction. A passageway beneath that sidewalk can be accessed from the building’s basement. Water leaked into the vault and created standing water in the basement. Preston installed sump pumps in the basement as well as a separation wall between the vault and basement area. This resulted in less stale air rising into the commercial space above.

VENTILATION

Ceiling fans are used on ground level businesses to circulate the air. Historically accurate high ceilings further enhance that circulation.

Historic ceiling mounted fixtures were retained, but LED bulbs were installed within the globes.

FEDERAL TAX CREDITS

Not all of the renovation came together easily. Poris initially sought federal tax credits to ease the project’s financial burden. To achieve those credits, alterations had to be reviewed and approved by Oregon’s State Historic Preservation Office and the National Park Service.

Looking back on the process, Poris recalled the importance of doing research first before applying for credits. “You need to understand the difference between what you want and what is historic,” she said.

A conflict arose when Poris removed early plaster from the interior and revealed the structure’s brick. Her intent was to expose the brick because of its inherent beauty. The National Park Service differed in its review. It said the space had always had “finished” materials and that exposed brick gave it an “unfinished” appearance.

Poris decided to drop her application and keep the bricks exposed. Would she undertake a preservation project again? “Yes, preservation of these buildings is important,” she quickly asserted. “It brings pride to the downtown, the building and to your business.”



Cusick Building, built 1895, Albany, Oregon

KEY TO SUCCESS

A successful project lies in a strong, knowledgeable contractor: one who realizes preservation projects may involve working with property owners, city committees and state officials. “Most owners would get mad or step away from this, so it’s important to have a contractor with skills to guide you through the process,” Poris advised.



CUSICK BUILDING – 244 1ST AVE. WEST ALBANY, OREGON

There’s no way around it, the building was ugly: cheap-looking brick formed a veneer along the storefronts; transoms were blocked by both plywood and metal sheets; an inappropriate metal awning swept around two sides; every last second-story, double-hung window was

replaced with fixed windows; and nearly all plaster ornamentation was removed from the façade. It is difficult to imagine that the building was constructed circa 1895 for the classy, J.W. Cusick and Co. Bank.

Thad Olivetti purchased the building in 2005. He claimed the building was worth more for its materials than as a functioning building, “Contractors told me the building’s timber could be worth a lot of money,” said Olivetti.

FAÇADE WORK

His two-year restoration was funded in part with a grant from Central Albany Revitalization Area. Olivetti began by removing all of the exterior alterations, and then used historic photographs to replicate the original façade. “Every bit of detailing had to be re-done,” he recalled.

WINDOWS

Although the restored façade was easily the most startling change, Olivetti renovated the building to be more energy efficient in ways not noticeable to the passerby. “The building gained a lot of energy efficiency,” he claimed. “I installed all new double-pane, double-hung windows upstairs. And, now the windows are operable so people can get fresh air.”

Cusick Building accomplishments:

- Installed new, double-pane, double-hung windows.
- Added insulation below roof and floors.
- Re-wired entire building with new services.
- Replaced water heaters and appliances with ENERGY STAR® units.
- Retained skylights for natural light.

INSULATION

The biggest savings came from insulation, which he placed “anywhere we could get it.” He cut holes in the floors and blew in insulation between 18- to 24-inch joists. The ceilings upstairs were insulated, too. In fact, he re-did a section of the roof just to get access to the joists. The roof was then covered in a white membrane for reflection.

He did not feel a need to insulate the exterior walls, however. The masonry walls are two-feet thick. Olivetti did insulate interior walls, but not for energy savings. “It’s important to make people feel secure in a building. Insulation is the key to separate the sound,” he stated.

WATER HEATERS AND APPLIANCES

The entire building was re-wired and new services installed. “The water heaters were dinosaurs,” said Olivetti. He replaced them with ENERGY STAR® electric and gas units. Each upstairs tenant – including four apartments and three offices – received a unit. An old furnace was replaced by electric heat pumps. The apartments were furnished with ENERGY STAR® stoves and refrigerators.

Olivetti was quick to point out one of the passive energy aspects of his building – the four skylights in the upstairs hall.

The Vault 244 Bistro and Lounge

Located within the Cusick Building, owners of The Vault 244 Bistro and Lounge installed an ENERGY STAR® ice maker, two energy-efficient freezers and refrigerators to save 4,530 kilowatt-hours of electricity every year. They received \$800 in incentives from the Energy Trust Oregon to help pay for the new equipment.

Pacific Power teams up with Energy Trust to offer cash incentives for making homes and businesses more energy efficient.

“They bring in tons of light.” He also had the overhead lights put on a timer to ensure they are off during the day.

ADVANTAGES OF RENOVATION

For Olivetti, the process of restoring his building was worthwhile. “[Renovation] is a lot of work, but you don’t have to do it all in one day,” he said. He also didn’t mind the fact that his work had to be approved by the local landmarks commission. “You’ve got to get over the fact that someone is telling you what to do on your building. They understand period details. The city of Albany has been helpful and good to work with.”

Olivetti offered another piece of advice for renovation: “Get your kids involved to help with the work.” His children, Thad and Carlie, were able to take on a variety of tasks at their father’s side. “It’s quality time with them,” he said.



SPARTA BUILDING – 401 E. MAIN ST. MEDFORD, OREGON

Constructed in 1911, the Sparta Building housed Medford’s first Ford auto dealership. Today, the building is under renovation.

Portland developer Carl Coffman, has refurbished the upper floor for first-class office space. All original double-hung wood windows were repaired and weather-stripped to slow heat loss.

Original skylights were retained and flood interior halls with natural light. Ceiling light fixtures were equipped with light sensors. All light bulbs were replaced with compact fluorescent lamps.

Downstairs, the commercial spaces remain open. The full ceiling height was restored – allowing deeper natural light through transoms as well as creating better ventilation.

The front façade, hidden for years behind concrete, was revealed through a stunning restoration of the original colonnade entry.

CHOOSING TO UPGRADE

Coffman explained his philosophy for upgrading the building's energy performance, "I am a big believer in global warming. I believe we have a mandate to keep it in mind for all that we do. Insulation and heat are the number one things to consider."

The Sparta Building's exposed brick interiors forced him to make a choice: either cover the brick and lose some of the building's character, or accept some heat loss and simply invest in ceiling insulation and a high-efficiency heating system. He chose the latter.

"The wall plane is limited to what you can do with it," he explained. "You should put your money into a good heating system. I just ignored the initial cost because I knew it would pay for itself eventually." Coffman installed a ductless, heat pump system that is zoned and can be individually controlled in each space.

PRESERVING A LEGACY

"Old buildings are cool," he said. "There is a charm factor that you don't get in new buildings." Coffman described his work

on historic buildings as "a labor of love." That reverence plays into a commitment to quality work. "I figure that no one has worked on the building for 100 years. I better do it right because it may be another 100 years before someone else works on it."

Sparta Building accomplishments:

- Seismically upgraded building.
- Reconstructed front entry.
- Weather-stripped and repaired original windows.
- Restored skylights.
- Installed light sensors and compact fluorescent lamps.
- Installed low-flow fixtures in ADA-compliant restrooms.
- Placed insulation in ceiling.
- Installed high efficiency ductless heat pump system.



MCCRACKEN BROTHERS MOTOR FREIGHT BUILDING – 375 WEST 4TH AVE. EUGENE, OREGON

Bob Chandler and his partners purchased the McCracken Brothers Motor Freight Building – an empty warehouse without interior partitions. Constructed in 1946, the two-story, reinforced concrete structure was a significant player in Eugene's trucking and storage industry. Chandler's challenge was to make the building comfortable for occupancy, attractive to professional tenants and be environmentally responsible.

INSULATION

The building's concrete walls were cold to the touch in winter. Chandler and partners added R11 insulation between interior pilasters. The industrial character of the building remained visible, while the walls gained more thermal mass.



Sparta Building, built 1911, Medford, Oregon

SKYLIGHTS

When rehabilitating an existing structure, expectations should be framed around the building's historic character. For instance, tenant Carol Schirmer of Schirmer Satre Group hoped additional window openings would be cut into the exterior shell.

But, the building was listed on the National Register of Historic Places. And, when applying for a 20 percent federal tax credit, the Secretary of the Interior's Standards for Rehabilitation had to be followed. The State Historic Preservation Office, who first reviewed the renovation, required a different approach to bring additional natural light into the building.

The result was creative and effective. Skylights were cut into the roof. Exposed ceiling joists were left untouched. Light poured through the space into offices below. For added energy savings, only task lighting was needed in Schirmer's office.

WINDOWS

Historic steel frame window sashes were retained, but upgraded to double-pane glass. First floor garage door openings were replaced with high-performance glass. Roll-up doors were retained in some locations.

REPURPOSING MATERIALS

Rather than throwing away "excess" original materials, they were reused in new ways. For instance, when a hole was cut through the second story floor to create a stairwell, the old growth wood flooring was saved and reused to construct a bench seat and tabletop.

PRESERVING CHARACTER

Chandler and Schirmer enjoy working in a former industrial building. Its character, and the recycling of the building, reflects their businesses: Chandler operates a snowboard, skateboard and surfboard business, while Schirmer leads a landscape architecture firm. The efficiency is a part of their corporate culture – hip and edgy.

ADDITIONAL ENVIRONMENTAL FACETS

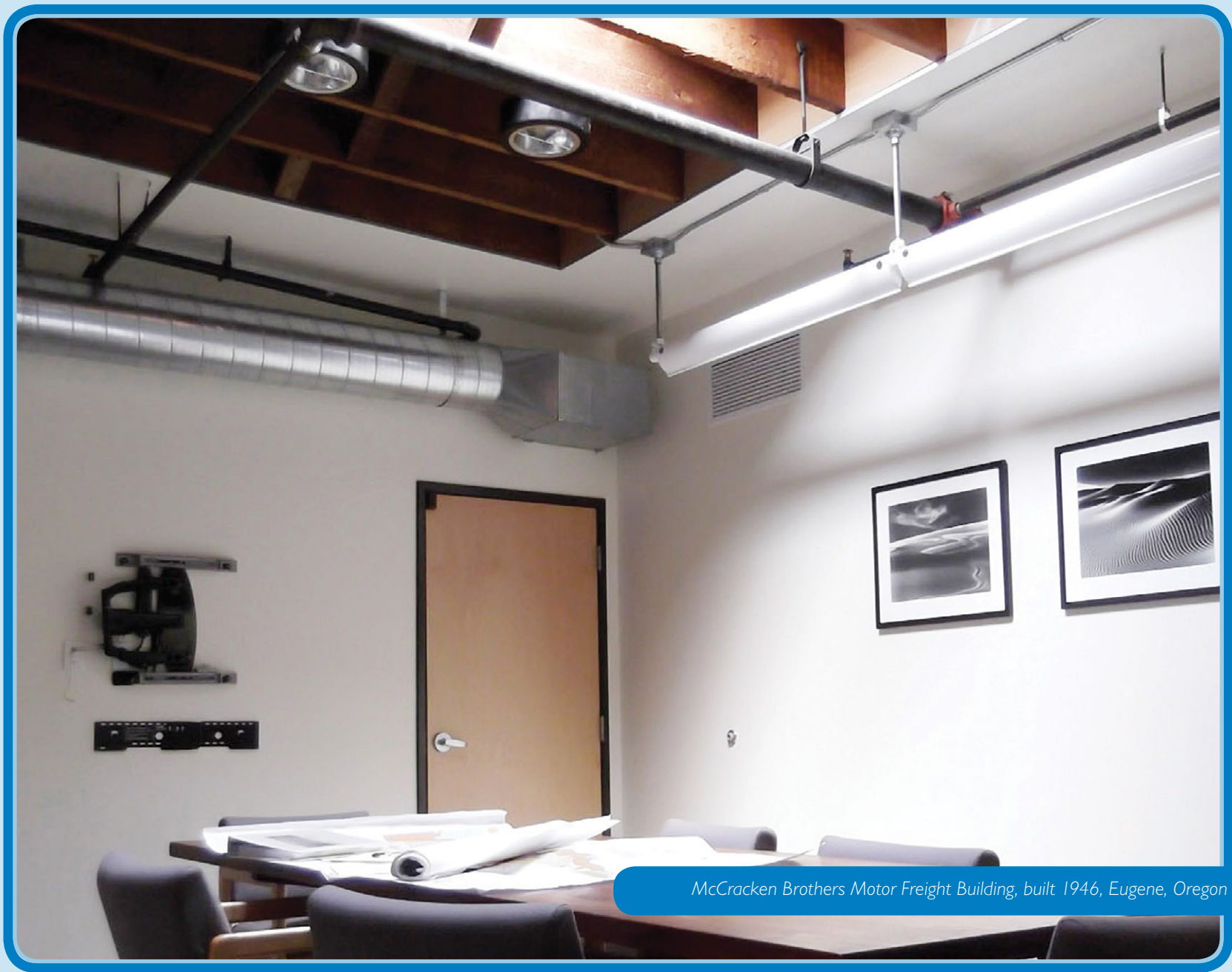
They referenced Leadership in Energy and Environmental Design (LEED) standards, looked at its checklist and did what they could incorporate into a historic building. Simple details included using low-VOC (volatile organic compounds) paints, carpet and flooring.

More impressive, they constructed a bioswale on the edge of their property next to a parking lot. In fact, the bioswale was once part of the parking lot, but they decided to

reduce the "heat island" effect while promoting on site treatment of storm water runoff from the roof and parking lot. Native grasses and forbs line the bioswale, which is surrounded by leafy shade trees.

McCracken Brothers Motor Freight Building accomplishments:

- Added (24) 4-foot x 4-foot skylights.
- Programmed rapid start electronic ballasts / high-performance T8 lamps.
- Installed occupancy sensors (mix of line and low voltage).
- Installed wall insulation (R11 on upper level wall and 2-inch expanded polystyrene on doors).
- Installed new high-performance glass in storefront and upgraded single pane windows to double-pane glazing (consistent with historic building requirements, i.e. the steel frames were retained, but the glass was replaced).
- Installed new high efficiency air conditioning rooftop units (13 SEER) with "Western Premium Economizers" (including commissioning).
- Inserted high-efficiency exterior lighting (compact fluorescent area lighting).
- Retained highly reflective membrane covering on roof.



McCracken Brothers Motor Freight Building, built 1946, Eugene, Oregon

It works well. Once during a hard downpour of rain, it nearly filled up to the top. But, shortly thereafter, the water receded and the bioswale did its job of returning the water to the earth. Their neighbors love it too and enjoy all of the birds who use it.



FARMERS' UNION COOPERATIVE BUILDING – 532 OLIVE ST., AND THE PACIFIC COOPERATIVE POULTRY PRODUCERS' EGG-TAKING STATION – 500 OLIVE STREET EUGENE, OREGON

The Farmers' Union Cooperative Building is a rare, nearly intact industrial building on the edge of Eugene's commercial district. It was once the center of one of the largest farmers' cooperatives in the southern Willamette Valley.

An adjacent building, the Pacific Cooperative Poultry Producers' Egg-Taking Station, was once used for the distribution of chicken eggs. Both buildings were in poor condition when Tom Bowerman purchased them.

The Farmers' Co-op was in such bad shape it was almost ready to be bulldozed. It took vision to imagine the building – constructed “in the old style” in a series of distinct additions – as a functioning retail space.

Some of the interior spaces were cavernous; wood trusses resting on 20-foot tall wood columns. Its walls were made from “crib construction”; 2- by 6-inch studs nailed together to form a 6-inch thick wall. When Bowerman purchased the Farmers' Co-op in 1987, it was partially heated by a wood stove in one wing and a gas heater in an office.

RETAINING CHARACTER

As the project developed, Bowerman listed the 1923 building on the National Register of Historic Places. The designation provided breaks in the enforcement of the building code. Bowerman used the State Historic Preservation Office as his ally in retaining the character that was important to him.

Farmers' Union Co-op accomplishments:

- Installed ceiling insulation.
- Repaired wood windows.
- Installed high-efficiency, gas, condensing furnace.
- Replaced lights with high-efficiency T8 ballast.

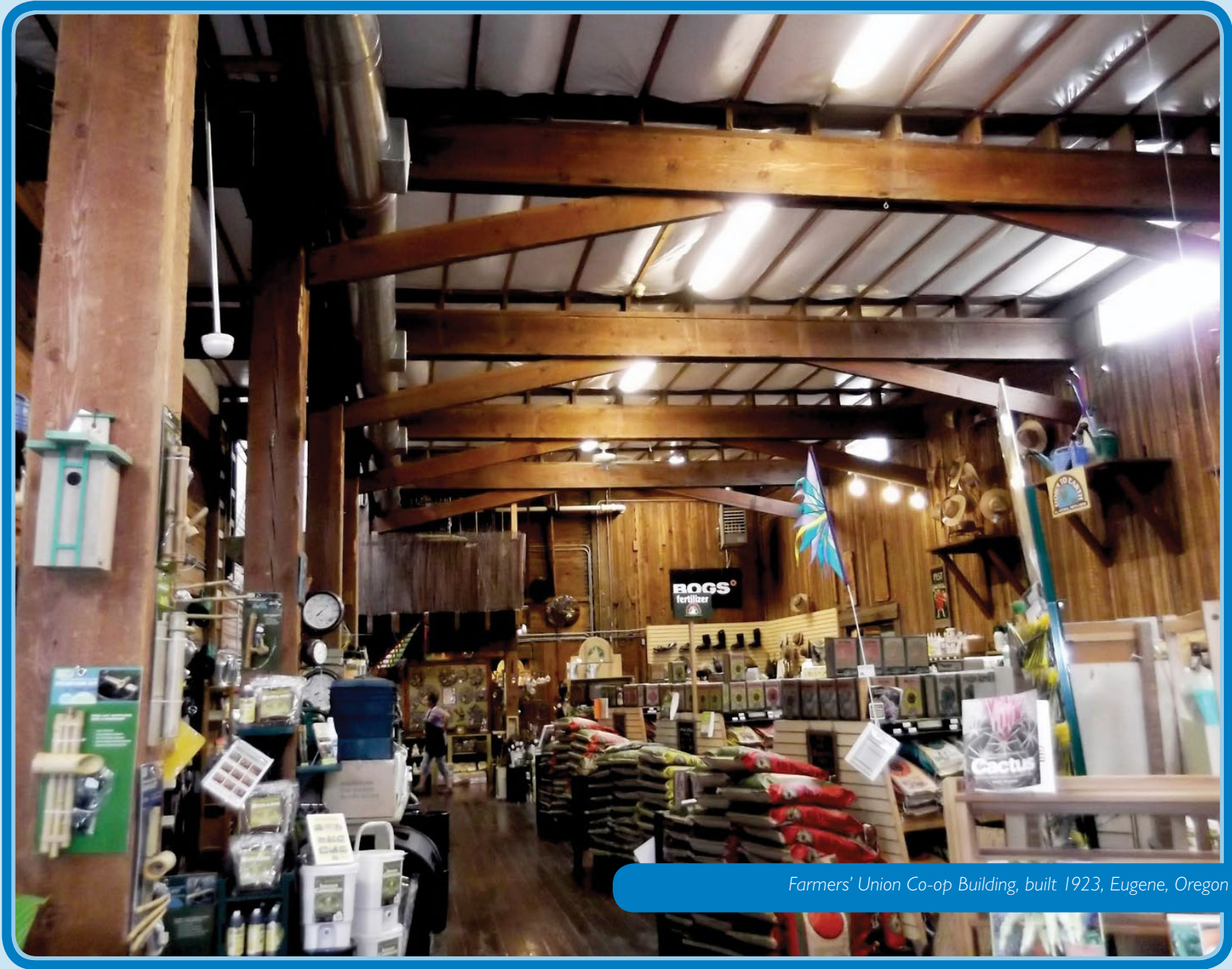
The result turned out to be a building that reflects both its roots and its current tenant, Down To Earth.

Customers can purchase organic farm supplies tucked beneath an original feed sorter or grain shoot; or walk beneath a motor drive and belt to purchase hemp products.

The opportunity to live and work around history is not lost on Rachel Klinnert, general manager of Down to Earth. “It all lends to the charm of the building, I feel lucky to work around an aesthetic place,” she said.

HEATING

Comfort was improved with the installation of a gas, high-efficiency condensing furnace. Although there was no room for insulation in the crib constructed walls, insulation was added above the ceiling.



Farmers' Union Co-op Building, built 1923, Eugene, Oregon

Even though historic wood windows can be a source of concern, “leaking warm air to the outside,” Bowerman found no need to replace his. He simply repaired the windows rather than exchange them for thermal windows. “We figured that even with incentives, it would still take 30 to 40 years to pay back the investment,” he said.

Ventilation was handled naturally. “When it gets warm, we open the doors for cross-ventilation,” said Klinnert.

The Pacific Cooperative Poultry Producers’ Egg-Taking Station was constructed in 1928 from concrete and hollow tile. Clerestory windows stretched the building’s entire length and dominated its interior spaces.



The building’s daylighting and ventilation functioned beautifully.

Its simplicity attracted a tenant called the Green Store, an all solar distribution and installation firm. Although they could have rented anywhere, the building’s passive energy use matched the business’ goal to reduce their carbon footprint.

SOLAR PANELS

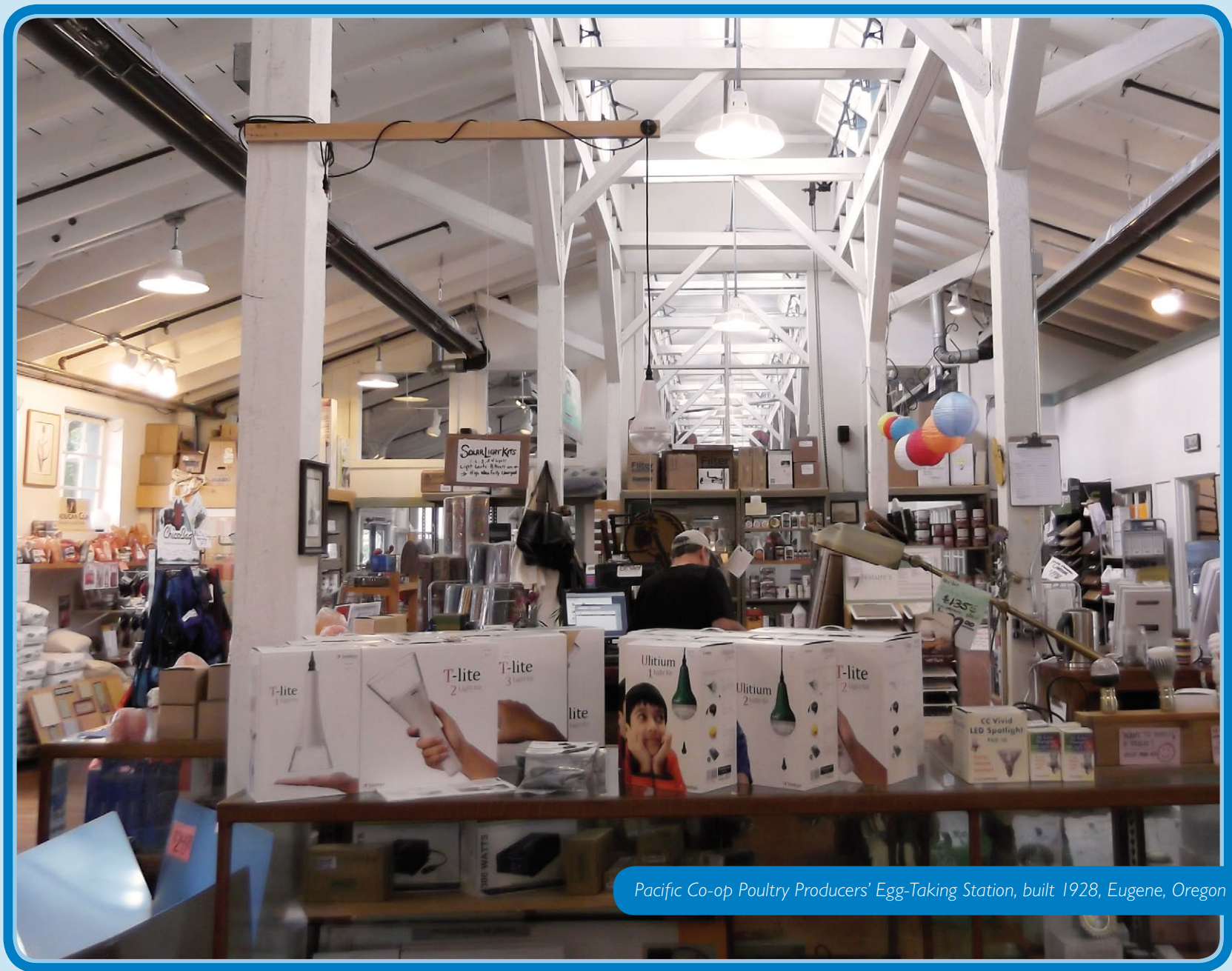
Photovoltaic solar panels were installed on the building’s lower, south roof. Unlike older versions, the small (3 ½-foot by 5 ½-foot) panels weigh only 40 pounds. The panels are mounted on rails four inches above the delta-rib-style corrugated roofing. The rails are supported on feet – that are affixed to the face of the roof – and fasteners penetrate the roof membrane.

The solar system is not net-metered, but instead is a “net power producer,” meaning the output from the panels is sent directly to the electric grid as industrial grade three-phase power. The utility pays Tom Bowerman, the owner of the system and the building, for the energy it produces. Bowerman estimates that the solar system generates about \$5,000 a year in revenue.

Both the Farmers’ Co-op and the Egg-Taking Station are success stories in giving old buildings new life through energy-efficient upgrades and preservation.

Pacific Co-op Poultry Producers’ Egg-Taking Station accomplishments:

- Furred out the walls and placed insulation behind.
- Installed photovoltaic solar panels on roof.
- Inserted compact fluorescent light bulbs in historic light fixtures.
- Retained existing daylighting.



Pacific Co-op Poultry Producers' Egg-Taking Station, built 1928, Eugene, Oregon



Astoria National Bank building, built 1923, Astoria, Oregon

Resources

There are a variety of informational and funding sources available for building and business owners, including private grants and government financial incentives. Here are a few to get you started.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

www.achp.gov

The Advisory Council on Historic Preservation (ACHP) is an independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy. It contains information on federal, state and tribal, local and nonprofit programs, and funding sources.

BUSINESS OREGON

www.oregon4biz.com

Business Oregon, an Oregon state agency, has a team of professionals to assist businesses with their financing needs by packaging loan programs or by matching a partner service provider with a business.

CLATSOP COMMUNITY COLLEGE HISTORIC PRESERVATION PROGRAM

www.clatsopcc.edu

The Historic Preservation and Restoration program offers both practical hands-on techniques and historic preservation theory. Classes and workshops train students in a variety of traditional and modern materials and techniques for restoring historic buildings and improving energy efficiency.

COLUMBIA-PACIFIC PRESERVATION GUILD

www.columbiapacificpreservation.org

The Columbia-Pacific Preservation Guild is a group of craftspeople who – whether creating products or providing services – subscribe to a set of common business practices and respect the principles of historic preservation in their work, and practice sustainable building techniques.

CLEAN ENERGY AUTHORITY

www.cleanenergyauthority.com

Clean Energy Authority provides information about solar energy, including basic facts, news, resources, rebates and incentives.

ENERGY TRUST OF OREGON

www.energytrust.org

Energy Trust of Oregon is an independent nonprofit organization dedicated to helping customers of Pacific Power, Portland General Electric, Northwest Natural and Cascade Natural Gas benefit from saving energy. Energy Trust of Oregon offers cash incentives on the installation of qualified energy-efficient equipment that can help reduce energy use and lower operating costs. Incentives are available for equipment upgrades, remodels, new construction, major renovations, tenant improvements and additions, multifamily properties and renewable energy.

EPA GREEN BUILDING

www.epa.gov/greenbuilding

The Environmental Protection Agency (EPA) Green Building website is a source for creating and using healthier and more resource-efficient modes of construction, renovation, operation, maintenance and demolition. Definitions, history, components and types of green building, and funding opportunities are available.

GREEN BUILDING ADVISOR

www.greenbuildingadvisor.com

A source for building, remodeling and designing green homes, including basics of green building, product guides, strategies and details.

NATIONAL PARK SERVICE

www.nps.gov/tps

As part of the U.S. Department of the Interior, the National Park Service operates a Technical Preservation Services division to develop historic preservation policy and guide the preservation and rehabilitation of historic buildings. The NPS administers the Federal Historic Preservation Tax Incentive Program for rehabilitating historic buildings.

NATIONAL TRUST FOR HISTORIC PRESERVATION

www.preservationnation.org

The National Trust for Historic Preservation is a privately funded nonprofit organization working to save America's historic places. They provide information on preservation practices, sustainable communities, case studies, training, funding and preservation awards.

OREGON STATE HISTORIC PRESERVATION OFFICE

www.oregon.gov/OPRD/HCD/SHPO

The Oregon State Historic Preservation Office (SHPO) manages and administers programs for the protection of the state's historic and cultural resources. SHPO staff assists city

planners and other officials, property owners and preservation groups in finding forward-thinking solutions to protect and preserve our past. Programs include federal and state tax incentives, Main Street, Certified Local Governments, technical assistance and grants.

PACIFIC POWER

www.pacificpower.net

Based in Portland, Oregon, Pacific Power is one of the lowest-cost electricity producers in the United States, providing customers in the Northwest with safe and dependable electric service. Pacific Power partners with Energy Trust of Oregon to help customers be wattsmart by managing energy use and offering cash incentives for energy efficiency improvements.

PRESERVE AMERICA

www.preserveamerica.gov

Preserve America is a federal initiative that encourages and supports community efforts to preserve and enjoy our priceless cultural and natural heritage. Components of the program include awards, community support and grants.

PRESERVATION DIRECTORY

www.preservationdirectory.com

Preservation Directory is a comprehensive resource for historic preservation, building restoration and cultural resource management in the United States and Canada. Includes funding, educational and business resources.

SOLAR OREGON

www.solaroregon.org

Solar Oregon provides outreach and education on solar technology and its applications, and methods for improving energy efficiency. They provide general information, workshops and business/professional listings.

TECHNICAL PRESERVATION SERVICES

www.nps.gov/tps

Technical Preservation Services of the National Park Service has a wealth of information about historic preservation, energy efficiency/weatherization for historic buildings, the Secretary of the Interior's Standards for the treatment of historic properties, grant programs and tax incentives.

UNITED STATES DEPARTMENT OF AGRICULTURE

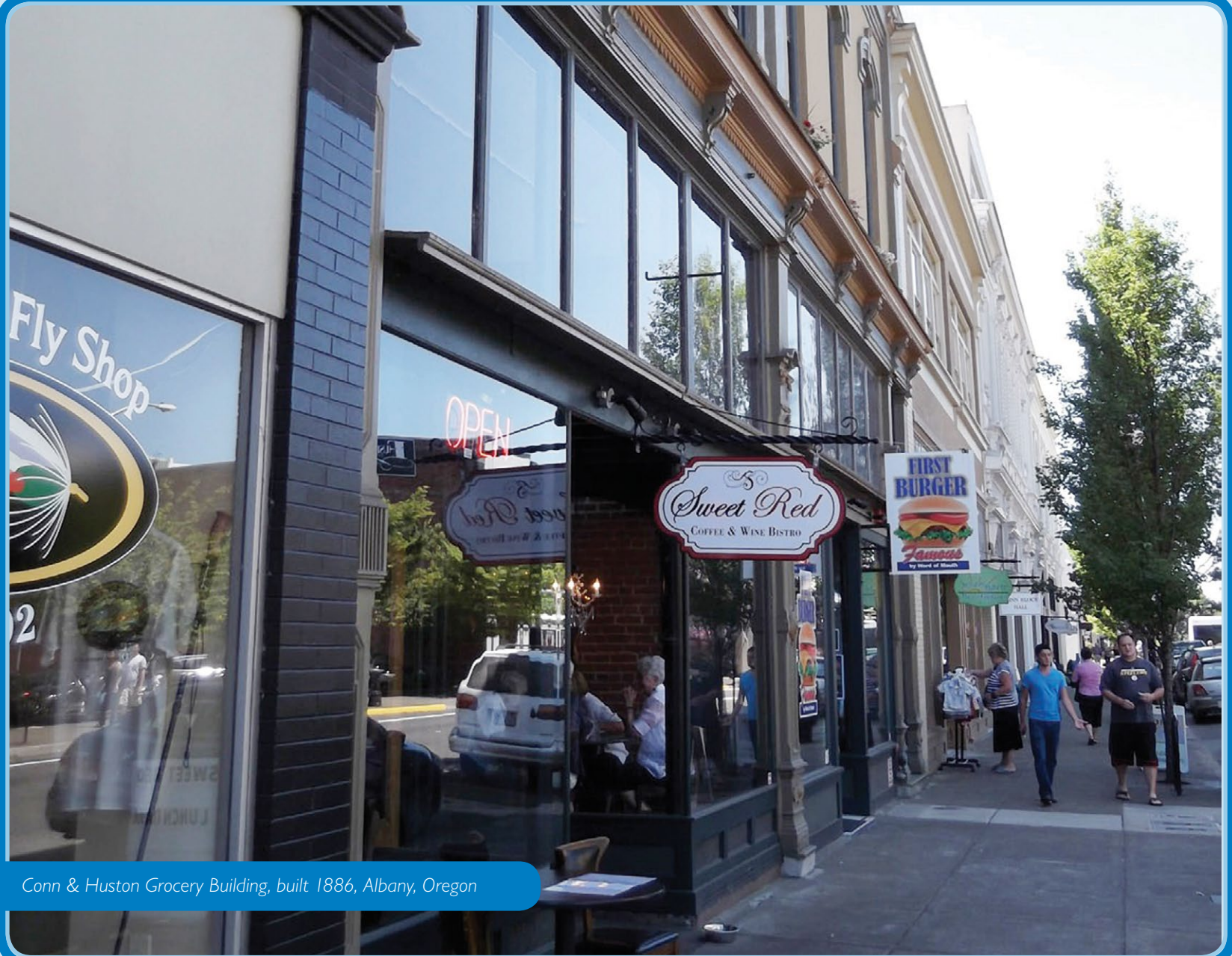
www.usda.gov

The USDA administers programs for rural and community development including grants, loans and educational materials to improve energy efficiency and install renewable energy systems.

U.S. SMALL BUSINESS ADMINISTRATION

www.sba.gov

The SBA offers a variety of programs and services to support small businesses, including loans and grants to start or expand businesses.



Conn & Huston Grocery Building, built 1886, Albany, Oregon

Glossary

Active solar Systems utilizing mechanical or electrical devices to transform solar radiation into usable energy or transport that energy within a building.

Adaptive reuse The renovation of a space for a purpose different from the original.

Baseline building performance The annual energy cost or energy performance for a building. This measure is used as a starting point for rating above standard design or other building energy targets.

Biodiesel A derivative of oils or fats that is used as transportation fuel. It is biodegradable and can be used as a replacement for or as a component of diesel fuel.

Biomass Plant or animal byproduct material converted to produce energy (electricity, fuel, etc.). The biomass is usually burned or chemically processed to produce energy.

Bioswale Bioswales are landscape elements designed to remove silt and pollution from surface runoff water. The shallow ditch has gently sloped sides filled with vegetation, compost and/or riprap, which aids the trapping of pollutants and silt. Bioswales are commonly used near parking lots.

Black water Wastewater from toilets and urinals. Some state and local codes define black water to include wastewater from kitchen, showers or bathtubs.

British Thermal Unit (BTU) A unit of energy measurement. It is the heat needed to raise the temperature of one pound of water by one degree Fahrenheit.

Building footprint The area of a site plan occupied by an actual building. Parking lots, landscapes and other non-building facilities are not included in the building footprint.

Carbon footprint The related carbon generated from any given activity. For example: one mile of driving an average compact vehicle generates .6 pounds of carbon from the burning of gas. This does not count the embodied energy of the manufacture, maintenance and disposal of the car nor the construction of the road and its maintenance.

Compact Fluorescent Lamp An alternative to traditional incandescent light bulbs. CFLs use about 75 percent less energy than incandescent bulbs and have a longer lifespan.

Composting toilet Contains and treats human waste via microbiological processes on site rather than sending it to an offsite treatment facility.

Conditioned space The part of a building that is heated or cooled or both, for the comfort of occupants.

Cooling tower It uses water to absorb heat from air conditioning systems and to regulate air temperature in a facility.

Daylight-responsive lighting controls Includes photo sensors, used in conjunction with other switching and dimming devices, to coordinate the amount and quality of artificial lighting with that of natural daylight.

Daylighting To bring natural light into a space in order to reduce or eliminate artificial lighting.

Embodied energy The energy used during the entire life cycle of a product, including its manufacture, transportation and disposal, as well as the inherent energy captured within the product itself.

Energy audit Identifies how much energy a building uses and the purposes for which it is used and identifies efficiency and cost-reduction opportunities.

Energy conservation Involves the reduction in, or elimination of, the use of natural and other energy resources. It also includes installation or modification of equipment intended to reduce energy use and costs.

Energy efficiency Energy efficiency is the process of using less energy to produce the same or increased functions. Often used mistakenly as a synonym for energy conservation.

ENERGY STAR® A measure of a building's or product's energy performance compared with that of similar buildings or products, as determined by the U.S. Environmental Protection Agency / U.S. Department of Energy's ENERGY STAR® Portfolio Manager.

First-hour rating The amount of hot water, in gallons, a water heater can supply per hour (when starting from a full tank of hot water).

Foam in place A liquid foam insulation which is sprayed, poured or injected into almost any cavity. Once in place, the foam expands to completely fill the space.

Footcandle (fc) The amount of light generated by one candle from one-foot away.

Fossil fuels Fuel formed from geological processes acting on the remains of living organisms. Typically refers to oil, coal, natural gas or their byproducts.

Fuel cell Combines hydrogen and oxygen to produce electricity. Water and heat are its byproducts. The process is clean, quiet and at least twice as efficient as fossil fuel burning.

Gallons Per Minute Gallons per Minute is the amount of hot water in gallons a tankless water heater can supply per minute.

Geothermal energy Geothermal is energy produced from the natural heat contained within the earth's crust. Pipes are used to access the heat, which in turn is used to drive turbines, heat water or create steam to warm buildings.

Geothermal heating systems Systems that use pipes to transfer heat to or from the earth for heating or cooling. The system retrieves heat from below ground during cool months and returns heat underground in summer months.

Gray water Untreated household wastewater that has not come into contact with toilet waste. Some state and local codes define gray water to also include wastewater from kitchen, showers or bathtubs.

Hydropower Electricity produced from the downward flow of water from rivers or lakes.

Kelvin Range A unit of measurement used to describe the hue of a specific light source. This is not necessarily related to the heat output of the light source but rather the color of the light output. The higher the Kelvin value of the light source, the closer the light's color output will be to actual sunlight.

LEED Leadership in Energy and Environmental Design (LEED) is a building rating system developed by the U.S. Green Building Council (USGBC) to measure energy efficiency. It provides a standard for environmentally sustainable construction.

Loose fill insulation Consists of small fibers – fiberglass, cellulose or mineral fibers – that are poured or sprayed into a wall cavity or other enclosed space.

Lumen The amount of light generated by one candle, falling on a one-square-foot area, from one-foot away. Bulb brightness is measured in lumens – more lumens mean brighter light; fewer lumens mean dimmer light.

Passive solar A system that uses building and site features to absorb and store energy from the sun during the day and slowly release it during the cooler evening.

Phantom load Power consumed by electronic devices while they are switched off or in a standby mode.

Photovoltaic (PV) energy Sunlight that is converted directly into electricity.

Renewable energy Energy that comes from sources that are not depleted by use. Examples include energy from the sun, wind, hydropower, waves, tides and geothermal energy.

Retrofit Any change to an existing facility, such as the adjustment, connection or disconnection of equipment.

Rigid foam A polystyrene or polyurethane pressed board that can be applied to walls, floors or ceilings. The insulation covers the entire face of the surface rather than just a cavity space.

Roll, batt or blanket insulation Made of fiberglass, plastic or natural fibers, batts are made in standard sizes designed to fit between wall studs or floor and ceiling joists. Also called blanket insulation.

Tankless water heater Heats water only when it is needed and applies only the amount of heat required to satisfy the immediate need.

Thermal mass The measurement of a material's ability to store and retain energy.

Wave and tidal power The energy from waves and the daily movement of ocean tides, respectively. The captured energy is commonly used for water pumping and electricity generation.

Weatherization To protect a building and its interior from sunlight, precipitation and wind damage. Helps reduce energy consumption and optimize energy efficiency through modification of a building's exterior. Also known as weatherproofing.

Wind energy Electricity generated by wind turbines.

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