# Let's get pumped up about heat sharing

## A new water piping and storage system could transform the way Seattle uses energy

Commercial buildings give off excess heat. Residential buildings need this energy to keep people warm. What if energy from commercial spaces could be transferred to heat residences?

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—
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This, in a nutshell, explains an exciting approach that is already being utilized at several Seattle mixed-use projects and could reduce energy consumption by as much as 70 percent. And if Seattle had new underground piping and storage tanks, it could transform the way our city uses energy.

### Sharing the warmth

Here's how the concept works. Water-source heat pumps move heat to or from a body of water, depending on whether a building has too much or too little heat. The heat is stored, much like in a bank. The heat can be moved from the water to other facilities that need it — or back to the water, if other facilities need cooling.

The Puget Sound area is ideal for this novel application. Our temperate climate puts us close to a "break even" point, where the heat we produce in commercial structures can offset the heat we consume in nearby residences.

Also, Seattle has already mastered water-source heat pump technology, using them in buildings as large as our 76-story Columbia Center. What we lack is a robust, modern piping system to connect heat producers and consumers on a large scale.

### Heating condos for less

A water-source heat pump in a typical high-rise is like a residential furnace. Water flows through the heat pump when in operation. During cooling, the water warms slightly to remove excess heat. During heating, it does the opposite.

A heat pump cooling a computer room could connect with smaller pumps heating 10 condominiums, with no net change of water temperature. The system works very efficiently with water temperatures between 40 and 80 degrees. No water is wasted, as it recycles constantly.

In this balanced condition, the computer room and condos together need no external energy other than electricity to run the heat pumps and circulate the water.

This is only about 30 percent of the energy required to heat the condos conventionally. When a large volume of water is recirculated and stored, or if the water is circulated through the earth, excess heat can be saved and used for months.

**Nearby office buildings could export heat to residential buildings like the Insignia (center) if the city had the right infrastructure. The two-tower complex will have more than 1,000 heat pumps, but will still need natural gas to assist with heating.** Image courtesy of Embassy Development

### Lost opportunities

Seattle's existing hotels, office towers and high-rise condominiums already have several thousand heat pumps, with more

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# Heat sharing

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coming soon.

The Insignia, a massive LEED silver residential complex planned for Belltown will have over 1,000 heat pumps, and circulate water through a million tons of earth.

According to energy modeler Shaun Martin, its 41-story towers may be Seattle's best solar collectors, capturing winter sun and transformer heat to heat condos, domestic water and a swimming pool. Unfortunately, with a million square feet of residential space to heat, and very little commercial space to cool, the project will still need natural gas to assist with heating during cloudy spells.

A few blocks away, the Fourth and Blanchard Building often has heat to spare.

According to Clyde Jones of Martin Selig Real Estate, heat pumps in their computer-intensive office towers reject excess heat even on the coldest days. Larger buildings closer to our city core could give away even more energy.

According to Rick Mock of Washington Holdings, Two Union Square's water loop provides approximately 200 tons of cooling for computer rooms, enough to heat 250 condos. Office buildings could export heat to residential buildings — that is if we had the right infrastructure in place.

## The case for pipes

How can we make the heat-sharing vision a reality? Install a network of underground pipes, and a large-scale heat storage system to bank excess heat from office daytime activity for residential nights and weekends.

Infrastructure, of course, is always costly. And with current natural gas prices, energy savings alone will not warrant the necessary investment. But gas prices may not stay low forever. Plus, there are other potential benefits of underground piping.

One is tied to the fact that we already have stormwater problems. Our rainwater drains into undersized sewers that are nearly 100 years old, and during storms, excess rainwater causes raw sewage to overflow into Puget Sound. King County has suggested that we "add a separate system of pipes to drain stormwater directly to the lakes."

Rainwater from our roofs can be filtered and pumped into the same pipes used to share heat, reducing the load on our sewers. If we collect rainwater, why not use it for irrigation and flushing toilets rather than draining to a lake?

Millions of gallons could be economically stored under a park. The same pipes will deliver the water back to buildings in the summer.

Another benefit would come during an emergency. Our aging city water system has relatively brittle piping, which could crack in an earthquake. A durable new system would be more likely to remain operational, helping fire fighters to put out fires, and permit citizens to flush toilets, avoiding evacuation.

A well-designed multipurpose system would circulate water for heat sharing and supply stored rainwater to parks, gardens, toilets and fire department connections. The underground reservoir would only need to be "drawn down" during dry summer months.

During winter months, the reservoir would be kept full. Millions of gallons of water could store massive amounts of heat for when our heat pumps need it the most.

King County calls its new wastewater-treatment system Brightwater. Should we find the public will to build this new piping and storage system, perhaps we could call it Clearwater — a clear new water-based solution for dramatic cuts in urban energy costs and pollution.

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# Green housing

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tive Sims' White Center Enhancement Initiative, which ties in redevelopment throughout the neighborhood to create a vibrant, economically viable community.

Greenbridge is seen by many as a beginning and a model for more changes to come. To help expand efforts to build green, the GreenTools program also provides grant incentives to help with the cost of gaining LEED or Built Green certification for new projects, and gives priority to projects that incorporate affordable housing.

Additional assistance has been established at the state level within the Department of Community, Trade and Economic Development. It oversees the state's Housing Trust Fund, which provides funding to develop affordable housing. Affordable housing projects applying for financial assistance from the Housing Trust Fund must meet or exceed the state's Evergreen Sustainable Development Standard, which is closely aligned with the LEED standards.

By tying funding sources to green building standards, developers of affordable housing receive incentives and assistance to build green, which ultimately provides benefits to the community in the form of better living standards and longer-lasting infrastructure.

## Green economy

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