

Seattle Daily Journal of Commerce

ENVIRONMENTAL OUTLOOK



March 28, 2024

BURIED TREASURE: HARNESSING WASTE HEAT FOR A CLEANER FUTURE

A wealth of energy vented into the air or flushed down the drain could be used for low-carbon, energy-efficient heating and cooling.

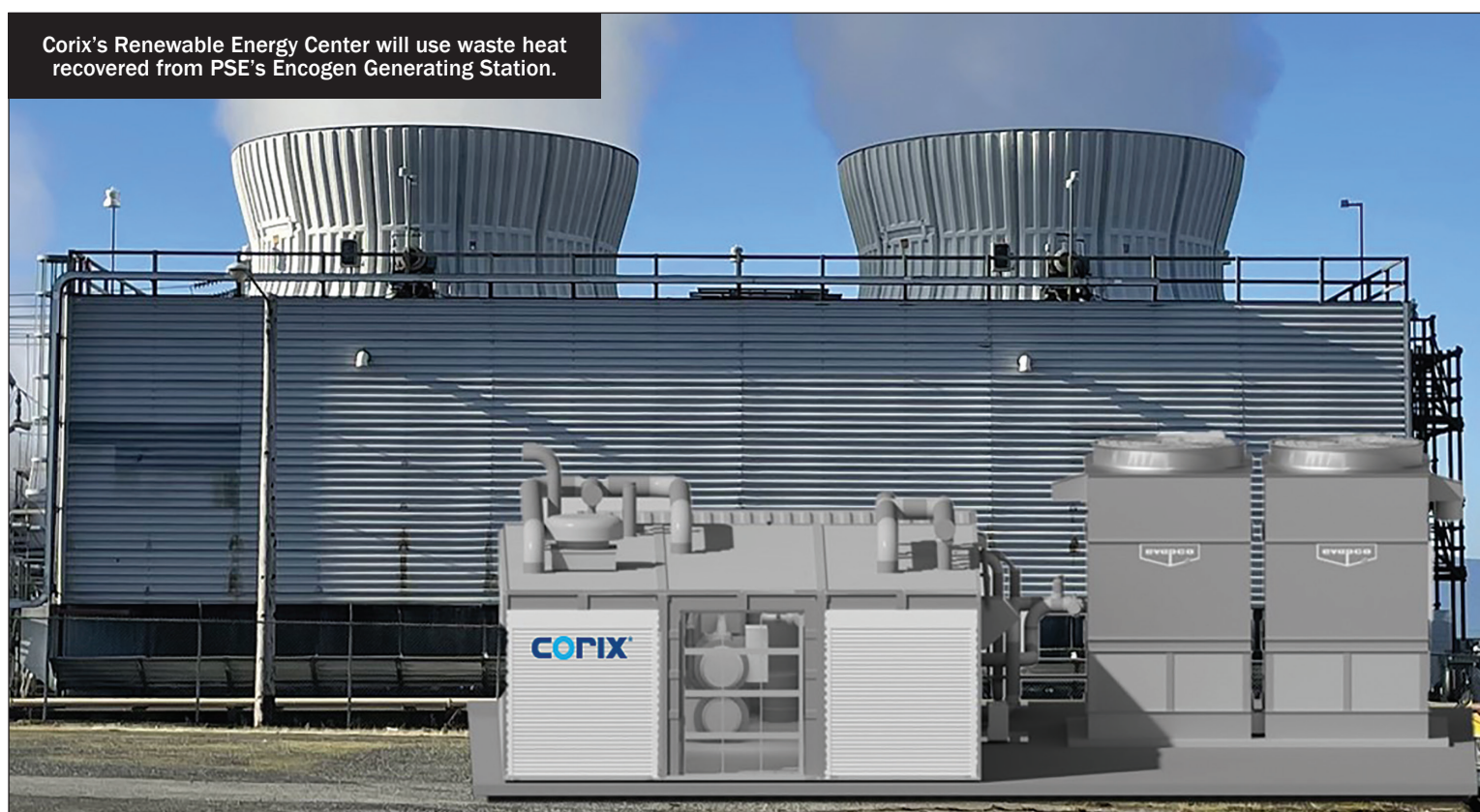
In neighborhoods around the world, a potent resource slips away unnoticed. This buried treasure is waste heat — a powerhouse for low-carbon energy that often remains untapped. Buildings, factories and other facilities vent, wash, or flush a wealth of energy into the air or down the drain. Now, leaders are harnessing it for low-carbon, energy-efficient heating and cooling.



BY SCOTT LOCKE
UMC

WHERE DOES WASTE HEAT COME FROM?

Buildings are wasting heat everywhere, including industrial processes, energy production, mechanical equipment cooling, warm water and hot gases discharge, ventilation or building exhaust, municipal wastewater, and more. The quality of this waste heat varies with temperature, accessi-



bility, economic viability for recovery, and the consistency of the supply. The higher the temperature, the more

opportunities there are for re-use, but with today's technology, even sources as cool as 60 degrees F still have heat to harvest.

WASTE HEAT RECOVERY TECHNOLOGIES

Various waste heat recovery technologies can harness untapped energy, offering major business opportunities for the construction industry to grow our communities sustainably. Not all of these innovations are new, but they are all constantly improving.

Heat exchangers facilitate the transfer of thermal energy between fluids at different temperatures. These come in all shapes and sizes and can be used to capture waste heat, repurposing it for use instead of losing it as heat pollution into the environment.

Heat pumps are the workhorse for today's electric-powered heating and cooling. Heat pumps provide the unique opportunity to take a low-grade heat source and bump the temperature up or down to a point where it's extremely useful for heating or cooling buildings.

Cogeneration systems, aka

combined heat and power (CHP), simultaneously generate electricity and use the waste heat for heating or cooling purposes. Cogeneration maximizes the overall energy output from a single source.

Thermoelectric generators, like Organic Rankine Cycle, harness the principles of thermoelectricity. These generators convert temperature differentials into electrical power.

Once recovered, waste heat can be utilized promptly as either cool or warm air or water. Alternatively, the reclaimed heat can be preserved in thermal storage tanks for subsequent on-demand requirements.

These "thermal battery" systems stand out among other energy storage methods, boasting a 90-98% efficiency rate compared to 80-90% for utility-scale electric batteries. They even enjoy a lower cost to install and a longer lifespan. Remarkably recyclable, thermal energy doesn't have to be "use it or lose it;" with smart insulation, you can keep generating, storing, converting and re-using the same thermal energy over and over.

Many heat sources ready

IMAGE COURTESY OF CORIX THERMAL ENERGY

for recovery are within easy reach. A building's exhaust air streams (typically around 70 degrees) and facility wastewater (ranging from 50-70 degrees) are excellent waste heat sources for the rapidly improving heat pump technology.

Additionally, integrating heat recovery chillers with thermal storage offers an excellent solution for supplying cooling during daytime hours while storing excess waste heat for extended periods until required. This approach is especially valuable in environments requiring heating in the morning and cooling in the afternoon.

CLEAN ENERGY FOR OUR NEIGHBORS

Not far up the I-5 corridor from Seattle, the Port of Bellingham had a vision for redeveloping its downtown waterfront district, adding new life to the community and simultaneously reducing carbon pollution. A partnership among Corix Thermal Energy, the Port of Bellingham, Puget Sound Energy (PSE), and UMC is bringing the vision to life with a new



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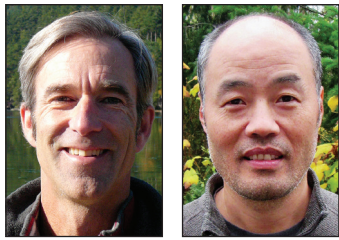


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RECLAIMING OUR SHORES

Puget Sound coastal restoration can aid in the recovery of endangered salmon populations, clean abandoned industrial sites, restore natural ecosystems, increase community access, and address the effects of sea level rise and climate change.



BY JIM JOHANNESSEN & WEI CHEN
NATURAL SYSTEMS DESIGN + COASTAL GEOLOGIC SERVICES

illustrates how investment in Puget Sound coastal restoration aids the recovery of endangered salmon populations, cleans abandoned industrial sites, restores natural coastal habitats and ecosystems, expands parks and recreational opportunities, and addresses the effects of sea level rise and climate change.

Regaining all that the Puget Sound coastal areas have lost is a daunting challenge. According to the Puget Sound Institute at the University of Washington, the Sound has lost nearly 400 miles of natural shoreline in the past 150 years. The Puget Sound Partnership, which tracks the health of the area's ecosystem, said in its 2023 State of the Sound report, "Puget Sound is not doing well, but we see signs of progress." Achieving this progress requires that we overcome a variety of obstacles, but the myriad benefits of the effort – including those highlighted below – are worth the fight.

COASTAL RESTORATION FOR SALMON RECOVERY

"As keystone species, salmon support diverse food chains, bringing nutri-

An 18-second video posted on the city of Bellingham's YouTube channel last September helps summarize ongoing efforts to restore the natural functions and benefits of the Puget Sound shoreline. The time-lapse video shows water pouring from Bellingham Bay into the new Little Squalicum Estuary, with the caption "It's not every day that you get to see water entering an estuary for the first time!"

The historic Little Squalicum Estuary project illustrates how government agencies, non-profit organizations and private businesses are joining together to recapture the ecological, societal and economic value of our treasured shores. It



An aerial photo of Bellingham's new Little Squalicum Estuary taken during construction, immediately after the inlet opening.

PHOTO COURTESY OF BTV – CITY OF BELLINGHAM

ents from the ocean to rivers and streams," the Washington Salmon Recovery Office notes. "Scientists estimate 138 species of wildlife, from whales to insects, depend on salmon for their food. Even trees and shrubs use salmon as fertilizer."

Until the past few decades, salmon recovery efforts focused largely on inland rivers and streams. Further study showed the value of coastal restoration to the lifecycle of salmon, including estuaries, which are areas where fresh water mixes with saltwater. Coastal restoration efforts foster salmon population recovery through increased access for fish, refuge from predators, more forage fish spawning beach areas, and greater shade and temperature regulation.

As an example, the Little Squalicum Estuary project removed a fish passage barrier at the mouth of Little Squalicum Creek, created a 2.4-acre estuary, and reused excavated material as beach nourishment to enhance documented, but degraded forage fish spawning habitat to the northwest. Projects such as this require a deep understanding of geological and coastal processes, as well as the integration of applied coastal engineering to maximize ecosystem and

public benefits, while creating self-sustaining projects.

RESTORE FAILING INFRASTRUCTURE AREAS

Shoreline infrastructure includes coastal roads, shore protection structures, docks, piers and other related structures. When still in use, this infrastructure supports coastal communities and maritime industries. We have many underutilized coastal properties, however, so restoration and redevelopment efforts in Puget Sound incorporate strategies to enhance infrastructure resilience while minimizing environmental impact.

On the Waypoint Park Beach project in the old GP mill site in Bellingham, our engineering team removed 156 feet of creosote-treated wood bulkhead and associated fill to improve the near-shore conditions. This not only helped create a more natural beach, it removed wood treated with chemicals and contaminated soil to prevent further marine water contamination. Removing the bulkhead and plantings enriched coastal habitat by allowing the exchange of terrestrial and aquatic nutrients, invertebrates, and organic material that were otherwise restricted by the

armor structure and lack of vegetation.

A similar project is the 2020 Sucia Island State Park causeway road removal project, which reestablished full tidal exchange and fish passage into a large saltmarsh wetland. As with the Little Squalicum Estuary project, understanding the dynamic nature of the saltmarsh ecosystem and the morphological processes of the tidal inlet at Sucia Island was essential. These projects employed analysis tools with Sound-wide site data that led to the successful design and implementation of self-sustaining systems.

EXPAND PARK AND RECREATIONAL ACCESS

The Waypoint Park Beach and Little Squalicum Estuary projects illustrate how coastal restoration projects can improve access to recreational opportunities. Waypoint Park Beach, completed in 2018, restored a long-contaminated portion of downtown Bellingham's Waterfront District in a way that connected the public to the water, while also benefiting fish and bird species.

A major component of the Little Squalicum Estuary project was enhancing

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ON THE COVER

The vision for a restored False Creek shoreline integrates a needed upgrade to the Heather Creek outfall with a culturally relevant landscape that is co-managed by Host Nations. IMAGE BY PLOMP FOR MITHUN

DJC TEAM

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CENTERING EQUITY, RECONCILIATION AND COMMUNITY IN COASTAL ADAPTATION

Coastal adaptation can have far-reaching benefits for communities, prompting critical evaluation of design and planning processes, and leading to important shifts in the systems that shape the built environment.



BY LAURA DURGERIAN & DEB GUENTHER
MITHUN

With 3,300 miles of coastline exposed to sea level rise and coastal flooding, Washington state is ramping up its work on resilience planning and design. The San Francisco Bay Area and Vancouver, BC also have ongoing efforts to advance regional shoreline adaptation and collaboration.

Initiatives in all three places illustrate how coastal adaptation can shift the needle for the better, bringing immediate and direct benefits for communities affected by coastal flooding and sea level rise – often communities of color or low-income rural communities that have been historically disinvested. To achieve these far-reaching benefits, adaptation can build from Indigenous values, advocacy, and science, increase the health and scale of shoreline ecosystems, connect people safely to the shoreline, and address other community priorities through equitable investments.

Though they range widely in focus and scale, examples in each place embed equity and justice considerations, and connect long-range coastal-adaptation visions to current community priorities. These visions are setting the stage for regulatory shifts, cross-jurisdictional collaboration and alignment in built projects.

BAY AREA: PLANNING FOR REGIONAL ALIGNMENT AND PLACE-BASED NUANCE

The San Francisco Bay Area is currently developing its Regional Shoreline Adaptation Plan (RSAP), to guide “the creation of coordinated, locally planned sea level rise

adaptation actions that work together to meet regional goals.”

Mithun is working alongside the Bay Conservation and Development Commission to develop planning guidelines that will direct subregional shoreline adaptation plans across the nine-county Bay Area. The “One Bay Vision” and RSAP guidelines will align adaptation plans and projects through a common set of baseline assumptions and targets, while recognizing that capacities and conditions range widely across the Bay.

To embed equity and justice considerations into a project of this scale, recurring equity assessments with an equity subcommittee allow for continuous recalibration and questioning of assumptions, language and process. To facilitate regulatory change and coordinated implementation, the team is working to connect guidelines with specific updates to existing plans.

With a draft of the guidelines developed, the team will be holding place-based workshops throughout the Bay with community-based organizations to understand how guidelines may apply differently based on unique conditions and community priorities, and to inform refinement of the guidance for ease of use, flexibility and effectiveness.

VANCOUVER: COMMITTING TO RECONCILIATION ALONG A RESTORED SHORELINE

The Sea2City Design Challenge, completed in 2022, sought an achievable but compelling vision to guide long-term sea-level rise adaptation along False Creek in downtown Vancouver, B.C. Extending beyond a focus on flooding, the challenge was rooted in an explicit commitment to truth and reconciliation with the xwməθkwəyəm (Musqueam Indian Band), Skwxwú7mesh (Squamish Nation), səlilwətaʔt (Tsleil-Waututh Nation), and urban Indigenous communities in the region.

Public events communicat-

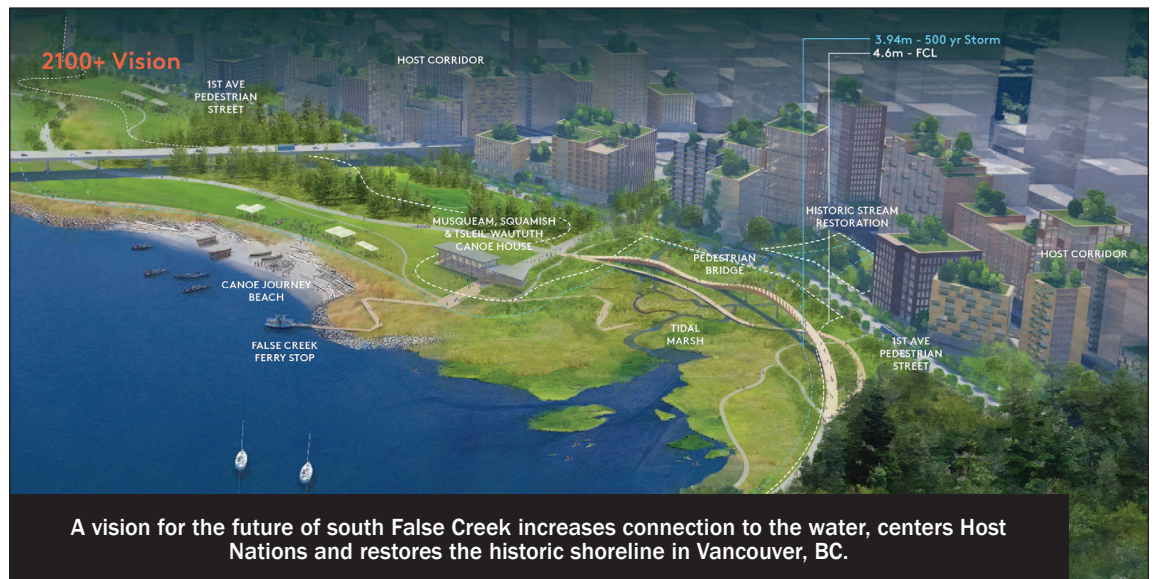


IMAGE BY MITHUN

Creek and offered culturally based events to discuss which values and priorities should guide the design challenge. The city distilled this feedback into seven categories of community values, and worked with Host Nation representatives to co-author an Indigenous Knowledge Value Guide. These values were a guide for the work and were also used as evaluation criteria to confirm that design proposals responded to the established priorities.

The city prompted both teams – the Mithun + ONE Architecture team for South False Creek, and the PWL + MVRDV team for North False Creek – to center decolonization in their design processes, exploring ways to move toward shared land management and financial benefits for Host Nations. Each team worked closely with a Cultural Advisor and a Knowledge Keeper, and heard from Musqueam, Squamish, and Tsleil-Waututh speakers in multiple decolonization and Indigenous perspectives workshops.

This was an impactful process, and led to visions that reframed traditional adaptation planning strategies into language and concepts that better reflected a repaired relationship between people and water; for example, using “acknowledge / host / restore” rather than the traditional “resist / accommodate / avoid” terminol-

ogy to describe adaptation scenarios.

With this grounding in reconciliation, the Mithun + ONE team envisioned a decolonized shoreline as one that is “unbuilt” and co-managed – removing historic fill, shifting development upland where it is naturally protected from sea level rise, and introducing nature-based strategies that bring back healthier creeks and tidal ecosystems to help clean contamination and reconnect people with the abundance of marine life and daily tidal changes.

Realizing this vision while respecting the lives and livelihoods of those living and working along the shoreline requires an adaptation pathways approach, considering when buildings along the shoreline will reach the end of their lifespans, as well as what kind of additional density is required in the upland to re-house those living along the shoreline. With a pathways approach, this visioning can guide near-term investments and restrict conflicting uses in a way that supports the longer-term vision.

Already, the city has decided to rethink siting a new school on low-lying public land along False Creek, and is undertaking a project to define “blue-green systems” for stormwater infrastructure that can be implemented along streets in support of the Sea2City vision.

WASHINGTON: ADDRESSING TODAY'S PRIORITIES AS A DRIVER FOR FUTURE VISIONS

Washington state is involved in making systemic improvements to governance, funding and coordination to help shape coastal adaptation projects that address immediate needs and build long-term community resilience to coastal hazards.

Henry Bell, coastal planner at the Washington State Department of Ecology said, “We’re doing a lot, including providing grant funding for local sea-level rise planning and vulnerability assessment projects. We are also in the early stages of the state rulemaking process to integrate sea-level rise planning requirements for local governments with marine shorelines, and supporting various local and regional coastal resilience project proposals for federal funding.”

“Just last year, the state legislature provided ongoing funding to Ecology for a multi-organization coastal resilience team that is dedicated to helping small and underserved communities access funding opportunities for resilience work,” Bell said. “We piloted this concept as part of the Resilience Action Demonstration Project between 2019 and 2021.”

FIVE ENVIRONMENTAL FACTORS INFLUENCING CONSTRUCTION IN 2024

As a sizeable contributor to global carbon emissions, the building trades can have a huge impact through mindful changes in the way we do business, and the way we help our clients reduce their own impact.

The built environment accounts for nearly 40 percent of carbon emissions globally, with 11 percent embodied in construction materials and 28 percent stemming from building operations.

That's why Skanska is working hard to achieve the climate targets we've set globally: 70% emission reductions by 2030 (including both from our own operations and from the value chain in development projects), and net-zero by 2045.



BY MARK CHEN
SKANSKA USA

To get there, we constantly assess our business for areas of improvement, look at local, state and national policy and legislation, and engage with our clients to help them meet their own climate goals. As we look at the year ahead and beyond, here are five key environmental factors that are driving our business (and much of the industry) forward.

ELECTRIFICATION

All three west coast states pledged to end sales of new gas and diesel-powered vehicles by 2035, meaning new vehicles will need to be tailpipe emission-free from that date forward.

We anticipate many companies with fleet vehicles to begin transitioning to EVs and there likely will be a requisite need to construct or retrofit fleet maintenance facilities to adapt. Skanska has already begun shifting our own fleet to EVs, adding some all-electric Ford F-150 Lightnings to our fleet in Portland, where we've become a member of the local Fleet Decarbonization Coalition. Additionally, we have participated in a few pilot programs to test the viability of electric heavy-machinery on jobsites.

It's not just cars; buildings are going electric, too. Many clients are trying to go fully electric with their buildings to hit sustainability goals, and it's our job to help them figure out how best to do that.

Incentivizing this practice, cities and states throughout the country are introducing

Zero Emission Building Ordinances and other policies to phase out fossil fuel-powered buildings. As of today, 140 state and local governments have implemented policies across a dozen states impacting a combination of new construction and remodels/renovations for commercial, multifamily, public/municipal and single-family use.

ALTERNATIVE FUEL STANDARDS

As with new electrification standards, Clean Fuel Standards have been enacted in Washington, Oregon and California. These various pieces of state legislation have given access to more affordable pricing to companies like Skanska, which has been using lower carbon options like renewable diesel for years with some of our heavy construction equipment. We were the first contractor to use renewable diesel on a major civil project in the state of Washington, the L300 Lynnwood Link Extension light rail project for Sound Transit.

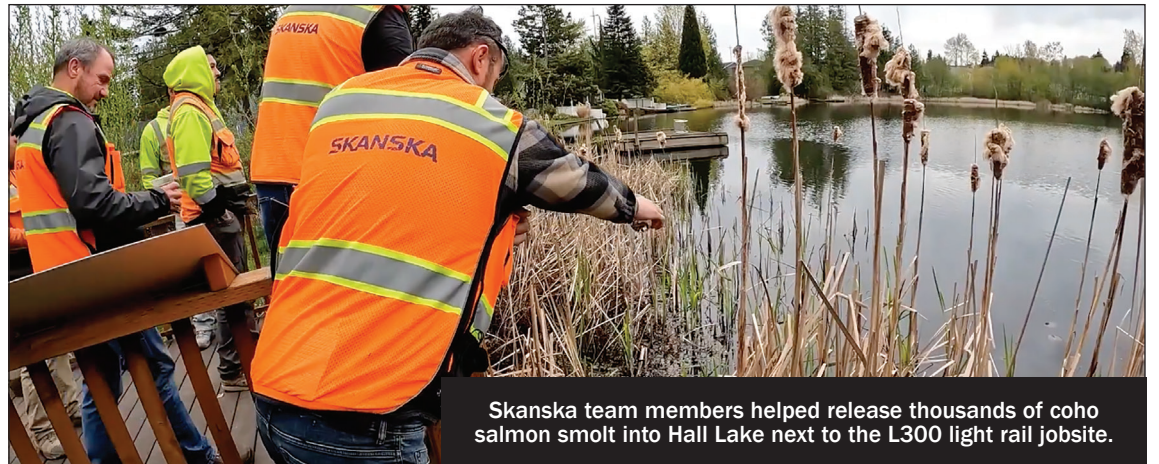
Renewable diesel, which is different than biodiesel, comes from 100 percent renewable feedstocks such as canola, tallow or used cooking oil. It offers a more environmentally sustainable alternative to petroleum-based fuel, reducing tailpipe greenhouse gas emissions by more than 90 percent, and lifecycle greenhouse gas and air pollutant emissions by 60-80 percent depending on the feedstock.

Reduced tailpipe emissions means cleaner air for our trade workers operating and working near the heavy equipment using the fuel, and cleaner air for the communities in which we build. Because of the high Cetane value, renewable diesel also burns cleaner, reduces fuel consumption and lowers engine noise and engines that are easier to start in the cold.

WILDLIFE PROTECTION

When we build, we want to ensure that we're building safely and ethically. That's why ensuring wildlife protection and water quality practices on our jobsites is critically important.

Salmon-Safe is one of the country's leading organiza-



Skanska team members helped release thousands of coho salmon smolt into Hall Lake next to the L300 light rail jobsite.

PHOTO COURTESY OF SKANSKA USA

tions on implementing practices and developments that protect water quality, maintain watershed health and restore habitat. Skanska is a Salmon-Safe accredited contractor in both Washington and Oregon, which recognizes excellence in water quality protection practices. We are proud to work with both public and private sector clients to help certify projects as Salmon-Safe.

Additionally, as part of the I-405 Brickyard project for the Washington State Department of Transportation (WSDOT), Skanska is building six fish passages that will have a direct impact on salmon and steelhead in the Sammamish River. Among other benefits, opening habitat allows more fish at all live stages (including juveniles who aren't yet strong swimmers like adults) to access important spawning and rearing grounds, including areas that have been inaccessible for years.

Through design innovations, we have identified opportunities for a 10 percent reduction in the total length of the fish passages needing to be built, creating additional open channel, promoting natural habitat and reducing impact to the stream buffer.

Also reducing impact is the process by which we will build the fish passages - next to existing culverts. This will allow construction to occur outside fish windows, the time each year when in-water construction is allowed due to the unlikely proximity of migrating salmon. We will connect gravity bypasses to existing streams during fish windows so construction staging areas can be set, and work can occur year-round

without having as much impact on streams.

We will also eliminate the use of barges and temporary structures in the Sammamish River through controlled demolition, will use both physical barriers and debris netting to keep debris and slurry out of the river, and will use pre-casting, pre-fabricating and pre-painting of elements that will be placed over water to reduce construction time and risk to the Sammamish River.

EMBODIED CARBON POLICY

Most companies are good at quantifying their operational carbon footprints, but many clients, especially those in the private sector, are asking us to help them address embodied carbon.

In fact, embodied carbon policy is popping up all over the country and throughout the world as governments tackle this important issue. We see a mix of voluntary (with or without incentives) programs, regulatory frameworks, agency-led initiatives, action plans, pilot programs, education and training, and more, and it's becoming more and more widespread.

There are ways to deal with embodied carbon. Back in 2021, the Rocky Mountain Institute and Skanska released a report laying out a framework for reducing embodied carbon in new construction for little to no cost. The study, called "Reducing Embodied Carbon in Buildings" used Skanska case studies looking at the emissions associated with building materials and construction, helping conclude that materials choices, including lower-carbon concrete, could

significantly reduce embodied carbon with little if any budgetary impact on a project.

Skanska now invests in providing initial embodied carbon assessments on every new construction project over 53,000 square feet using the Embodied Carbon in Construction Calculator (EC3), a product co-created by Skanska with industry partners. Use of the EC3 tool over the past few years has shown that a 30 percent reduction in embodied carbon is typically achievable for little or no cost. EC3 is available free and open source at www.buildingtransparency.org.

SUSTAINABLE AVIATION FUEL

We're looking at our own travel practices to identify ways we can further reduce our carbon footprint. We partnered with Alaska Airlines to purchase the airline's sustainable aviation fuel (SAF), making Skanska the nation's first General Contractor to invest in SAF with the airline. The investment will compensate for the Scope 3 business travel emissions from the domestic and international travel of Skanska's U.S. Sustainability Team for 2024.

Made from a variety of resources including waste materials such as forestry residue and used cooking oil, or carbon recaptured from the air, SAF is a certified drop-in fuel that meets all jet fuel standards, and produces up to 80 percent fewer CO2 emissions on a lifecycle basis.

Our investment today is a start both for Skanska and

EASTSIDE CITIES PARTNER FOR CLIMATE ACTION

Small sustainability offices in Bellevue, Kirkland, Issaquah, Mercer Island and Redmond work together to leverage pooled resources, reduce duplication of efforts, and accelerate climate action.

Even as impacts from climate change in the Pacific Northwest grow more visible by the day, communities are stepping up their commitments to a more sustainable future. Cities and counties across Washington are developing and implementing commitments to reduce greenhouse gas emissions, and prepare for the inevitable impacts of climate change. These plans include dozens, if not hundreds, of actions



BY STACY VYNNE MCKINSTRY
EASTSIDE CLIMATE PARTNERSHIP

that need to be taken over the next few years to keep our communities on track to meet greenhouse gas emission reduction targets. Community members and elected officials have set expectations around implementation, with ambitious timelines for action, and regular data reporting on progress towards targets. In addition, substantial local investment is needed to make meaningful emission reductions to avoid the worst climate impacts, and build resilience for the impacts already projected to affect our region. For many jurisdictions, a single individual or small team is charged with developing climate action programs and policies while also

tracking progress on implementation results. A few years ago, five cities on the eastside of Lake Washington began partnering on specific climate initiatives, from community engagement to home electrification. These cities initially began working on climate action and advocacy as active members of the King County Cities Climate Collaborative (K4C) in 2011. Over the years, the Eastside cities realized that there was synergy in working closely together to more quickly implement climate action, mitigation and resilience measures. The shared

POOLING RESOURCES

CLIMATE ACTION — PAGE 11

The partnership's shared Energy Smart Eastside program supports heat pump installations.



PHOTO COURTESY OF JAMIE FINCH

STRUGGLING WITH EMERGING CONTAMINANTS?

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FLOATING WETLANDS STRENGTHEN URBAN ECOSYSTEMS AND COMMUNITY ENGAGEMENT

Artificial floating structures that mimic natural wetlands ecosystems provide community education and can be designed to address a range of problems, including water quality issues, harmful algal blooms, and even struggling fish habitats downstream.

In 2018, Friends of Green Lake initiated the floating wetlands project to commemorate the life of Taiga Hinckley, a beloved employee of the Greenlake Boat-house Center. The project was selected to reflect Taiga's commitment to lake water quality and wildlife habitat. Herrera contributed to the project design, planning, and installation, and worked with over 30 volunteers to execute this project.



BY LILY SCHREDER HERRERA

The floating wetlands consist of two 650-square-foot islands anchored in the lake. In such an urban setting, the floating wetlands create habitat, improve water quality, provide aesthetic and recreational value, and foster opportunities for community engagement.

Floating wetlands are artificial floating structures designed and installed to mimic natural wetland ecosystems in bodies of water. These structures typically consist of a buoyant platform that supports vegetation and other wetland flora. The purpose of floating wetlands is to provide ecological benefits, such as habitat creation and water purification, while also addressing human activities that may negatively impact natural wetland areas.

Floating wetlands provide an innovative approach to environmental challenges, and can be designed to address a range of problems. They play a role in water quality improvement by fostering the growth of a microbial biofilm on the roots of plants. This biofilm actively absorbs excess nutrients from the water, reducing issues like harmful algal blooms and promoting a healthier aquatic ecosystem. Additionally, the shading effect created by floating wetlands can help regulate water temperatures, particularly in stormwater ponds, contributing to improved downstream fish habitats.

Herrera recently designed

and helped install floating wetlands in a stormwater pond for the Snoqualmie Tribe. The aim of this project was to improve water quality and reduce pond temperature. Herrera Ecologist Eliza Spear explains the benefit of using floating wetlands to reduce water temperatures, "By covering a significant portion of the surface area of the stormwater pond, the goal was that the floating wetlands would provide enough shade to cool water temperatures, which is important for enhancing downstream fish habitat. Fish are very temperature sensitive, so reducing water temperatures can improve fish habitat in the basin."

Beyond their water quality contributions, floating wetlands serve as habitats, supporting a diverse mix of plant species and wildlife. The modular design of these structures allows for flexible and creative habitat configurations, addressing specific environmental goals and conditions. This biodiverse ecosystem enhances the overall health of the water body and provides opportunities for community engagement. The presence of floating wetlands in urban environments sparks curiosity and fosters a sense of ownership among communities. Volunteers participate in installation and maintenance activities, contributing to both the success of the project and the environmental education of the community.

Floating wetlands offer an aesthetic and recreational dimension to water bodies. Their integration into urban landscapes provides unique opportunities for public interaction, such as viewing the structures from shore or anchoring them to piers or bulkheads with direct access to them. The ease of installation and adaptability of floating wetlands make them a cost-effective and resilient choice for environmental enhancement, providing an attractive alternative to traditional land-based restoration projects. At about \$50 per square foot, they can cost less than 10 percent of a constructed wetland because there are no land



One of two mature 650-square-foot floating wetlands in Hicklin Lake in White Center, photographed ten years after Herrera installed them for King County.

PHOTO BY ROB ZISETTE

procurement or excavation costs, permitting is simpler, and plant survival is much higher on the water. Overall, these innovative structures not only address urban envi-

ronmental challenges but also contribute to the creation of sustainable, community-centered ecosystems with long-lasting benefits.

Rob Zisette, a Principle

Aquatic Scientist at Herrera, has championed floating wetland projects since 2008. Rob has had a diverse

WETLANDS — PAGE 10



ENVIRONMENTAL CLEANUP SOLUTIONS FOR A VARIETY OF PROPERTY TYPES

- Phase I/Phase II Environmental Site Assessments
- Construction Oversight
- Asbestos Surveys
- Underground Storage Tank Assessments
- Remediation Services
- Expert Witness



A PARK FOR ALL PEOPLE — AND THE ENVIRONMENT

Beneath the upgraded 132nd Square Park in Kirkland's Kingsgate neighborhood, rainwater passes through a series of three filter vaults before slowly seeping into the ground, mimicking the forested conditions that existed pre-development.

Stormwater infrastructure and community recreation are two spheres that rarely overlap. Stormwater management is typically fenced-off in drainage



BY AARON
HUSSMANN
CITY OF KIRKLAND

ponds or buried under our streets, out of sight and out of mind. But, in a tale of collaboration and innovation, the city of Kirkland recently celebrated the successful completion of a \$12.2

million capital project that combines massive stormwater treatment infrastructure with significant upgrades to a community park. 132nd Square Park is a 10-acre park nestled in the Kingsgate neighborhood in northeast Kirkland. Today, the park boasts state-of-the-art facilities, including updated

multi-purpose turf fields, expanded restrooms, and inclusive playgrounds that serve a wide range of cognitive and physical abilities.

WHAT LURKS BENEATH

Under the new field lies an impressively large stormwater vault – 248 feet long by 44 feet wide and 10 feet deep – that receives rainwater runoff from almost 50 acres of the nearby neighborhood. Much of this area was developed before modern stormwater regulations, leading to flooding issues and poor water quality downstream in Totem Lake and Juanita Creek.

Now, rainwater passes through a series of three filter vaults designed to remove oil and other pollution before entering the main vault. Filtered water then travels to the large, bottomless infiltration trenches in the concrete vault where it slowly seeps into the ground, mimicking the forested conditions that



An aerial view of the completed 132nd Square Park that is expected to treat over 90% of the rainwater runoff from the nearby neighborhood and the park itself.

PHOTO BY ROSALIE WESSELS, CITY OF KIRKLAND

existed pre-development. This new filtration system and vault are expected to treat over 90% of the rainwater runoff from the nearby neighborhood and the park itself.

A DECADE IN THE MAKING

Kirkland's journey towards revitalizing 132nd Square Park began more than a decade ago with a grant

application to the Washington Department of Ecology to plan for stormwater management at a watershed scale.

PARK — PAGE 12

Help Save Our State Fish

Wild steelhead are at a fraction of their historical numbers along the West Coast of the United States, with many populations listed under the Endangered Species Act. Wild steelhead need your support now more than ever.

Luke Kelly photo



Your help is needed. Please join us to conserve and rebuild the runs of this iconic game fish.

Support wild steelhead at www.wildsteelheadcoalition.org

PLANNING FOR A RAINY DAY, EVERY DAY

Investing in effective stormwater management infrastructure is a long-term, large-scale commitment that results in cleaner water going into creeks, rivers, lakes, groundwater, and Puget Sound.

When the rains come, we see water flowing down streets, across parking lots, and into those seasonal stormwater ponds scattered all around. We see water rising in streams and rivers. What we don't always see is the pollution that gets swept up in that stormwater. Unmanaged, stormwater can erode stream banks, damage salmon habitat, and carry oils, metals, pesticides, bacteria, trash, and tire rubber particles straight into Washington's rivers, lakes, and Puget Sound.



BY VINCENT
MCGOWAN
DEPARTMENT
OF ECOLOGY

Washington communities are investing in managing stormwater in a way that supports our growing population and strong economy, while protecting the environment. Managing stormwater can look different in every neighborhood, town and city. Stormwater infrastructure can be hidden in plain sight. For example, low-impact development design principles leading to more green spaces people can enjoy when the sun is out, and when it rains, these green spaces filter chemicals and metals from stormwater.

Although the idea of low-impact development is pretty straight-forward, the planning and design needed to successfully meet this challenge can be extremely complex. Investing in effective stormwater management infrastructure is a long-term, large-scale commitment for the entire state.

This year, the Department of Ecology has a number of projects underway that will improve our stormwater infrastructure, fund local stormwater projects, and support new research to better understand emerging pollutants in stormwater. All of these efforts are possible due to ongoing collaboration and on-the-ground work by local governments.

UPDATING THE STORMWATER PERMITTING PROGRAM

Ecology's water quality per-

mits address the pollution that can come with stormwater. Municipal stormwater permits require public entities, such as cities, counties, and the Washington State Department of Transportation, to regulate and manage stormwater from urban and suburban landscapes by developing comprehensive Stormwater Management Programs. The overarching goals are to let rain soak into the ground where it lands, prevent stormwater pollution at its source, treat stormwater to remove pollutants, and control the flow of stormwater runoff. All of these actions result in cleaner water going into creeks, rivers, lakes, groundwater, and Puget Sound.

In 2023, Ecology proposed updates to these municipal stormwater permits, including important updates to address specific pollutants and to ensure that, as communities change and grow, work is done to invest in proper stormwater management and protect water quality.

NEW DEVELOPMENT AND REDEVELOPMENT

Including stormwater best-management practices, such as runoff treatment and flow control, in the planning for new development and redevelopment projects is the most cost effective and efficient way for communities to manage stormwater. The permit updates Ecology proposed will result in more stormwater treatment, meaning less pollution in state waters.

INCENTIVIZING RETROFITS

Existing development built before modern stormwater management requirements were in place is the greatest threat to water quality and also provides an important opportunity to better protect local waters. Ecology proposed updates that will lead to more stormwater infrastructure retrofit projects, adding stormwater treatment facilities where they are needed most. A few of the ways we are doing this is by incentivizing multi-jurisdiction collaboration, increasing benefits to over-

burdened communities, and prioritizing retrofit projects in high pollution-generating areas.

We received a lot of helpful feedback on our proposal, both the early drafts and during the formal comment period. We plan to make our final decision on the updated permit requirements by July of this year.

SUPPORTING LOCAL STORMWATER INVESTMENTS

Municipal stormwater programs are funded through local stormwater utility fees. Washington is unique in the amount of state funding passed to local governments in the form of stormwater grants and loans. Cities, counties and ports use this funding to create staff positions; to design and build new stormwater facilities, such as bioretention facilities or engineered wetlands; and to treat and manage runoff across the state.

Every year there are opportunities for stormwater project funding. In January, we announced our annual draft list of funding for clean water projects. This year's list includes \$38 million for stormwater projects.

A TRIED-AND-TRUE APPROACH TO NEW CHALLENGES

With new research, evolving science, and lessons learned, we are always working to do more and do better to sustain healthy, thriving watersheds and provide cool, clean water to fish, shellfish, wildlife, people and businesses.

Investments made in researching new pollutants can lead to game-changing discoveries, such as the discovery of 6PPD-quinone in 2020. 6PPD is a chemical used in vehicle tires and its by-product, 6PPD-quinone, can kill salmon and cause toxic effects in other aquatic life. If stormwater isn't managed appropriately, 6PPD-quinone ends up in salmon-bearing waters. A great deal of work is being done to address 6PPD, including finding safer alternatives.

The good news is that many of the existing stormwater best management practices

This Marysville intersection is a stormwater project that received Department of Ecology funding. The green infrastructure helps reduce runoff pollution from flowing into Ebey Slough.



PHOTO COURTESY OF THE DEPARTMENT OF ECOLOGY

like bioretention are proving effective at capturing 6PPD-quinone and reducing the amount that goes into the water. This means the investments communities made in recent years to install stormwater treatment are already helping to address this toxic chemical.

Even so, the Department of Ecology is updating stormwater permits and related stormwater management manuals to address this threat. We are conducting and funding research to better understand 6PPD-quinone and the best management practices that can keep this and many other toxic pollutants out of local waterways. From studying the effectiveness of street sweeping and different types of stormwater treatment, to conducting sampling to determine the persistence of 6PPD-quinone in different waterbodies, universities, private businesses, municipalities, Tribes, and state agencies are collaborating on projects that will inform stormwater management decisions and help communities make meaningful

investments.

In the coming months, we'll announce new funding opportunities through Requests for Proposals and Interagency Agreements to conduct 6PPD stormwater best management practice effectiveness research and pilot projects. Combined, Ecology and the National Estuary Program will have more than \$3 million available in funding for this work.

This funding represents yet another opportunity for us to work together to better protect our waters for decades to come. As climate change makes weather patterns less predictable and more extreme, and new research helps us prioritize treatments that will best manage a wide range of toxic pollutants, the need for us to collectively continue to invest in stormwater management only stands to grow.

Vincent McGowan is the program manager for the Department of Ecology's Water Quality Program.

ADAPTATION

CONTINUED FROM PAGE 4

Ecology recently received an \$850,000 grant to partner with the Washington departments of Transportation and Fish and Wildlife, and Washington Sea Grant. A similar partnership between the Pacific Conservation District, Sea Grant, and Lower Columbia Estuary Partnership has supported a series of public workshops with affected communities centered on sea-level rise risks to help identify priorities and potential project opportunities.

“Our approach is based on finding where future conditions or changes overlap with today’s priorities,” explains Jackson Blalock from the Pacific Conservation District. “It’s harder for communities to dedicate limited resources to future conditions if they don’t also address an active priority, so this has helped get projects moving, instead of falling into a planning wormhole.”

It’s been said that it’s a privilege to think about the future. Equitable long-term

visions acknowledge this reality – that planning must address the needs of capacity-limited communities that have experienced harm and disinvestment as the first step toward a better future where everyone can reap the benefits.

A long-term vision rooted in current priorities enables coastal adaptation work to be more than a Band-Aid, addressing future flood risk as one of many important objectives that improve the quality of life for affected communities today, and support the wellbeing of future generations.

“This has helped develop projects that break out of the disaster-response cycle and move toward more sustainable process-based approaches, such as collaborations that span property lines or jurisdiction’s boundaries,” Blalock said.

Coastal adaptation can have far reaching benefits for communities, prompting critical evaluation of design and planning processes, and

leading to important shifts in the systems that shape the built environment. In the San Francisco Bay, the RSAP is setting the stage for regulatory shifts, regional alignment and cross-jurisdictional collaboration. In Vancouver, planning processes and visions support reconciliation with Host Nations, and define a path toward repaired shoreline relationships. In Washington, coastal adaptation efforts are identifying current needs of affected communities to drive investments that aim to improve present wellbeing, and shape better shorelines for future generations.

Laura Durgerian is a landscape architect and urban designer at Mithun working on shoreline adaptation, planning and research. Deb Guenther is partner at Mithun, where she focuses on high-performance landscape design including equity-driven collaborations on coastal adaptation and resilience projects.

WETLANDS

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career working in water quality and aquatic restoration and floating wetlands became his focus after he was introduced to them while working on a water quality project in Ningbo, China. Rob met the owner and inventor of Biomatrix Water, Galen Fulford, who creates highly resilient structures for floating wetland projects. After seeing the power and potential of floating wetlands, Rob has spent the last 15 years bringing them to the Pacific Northwest.

However, floating wetlands are not without controversy. In Washington State, many regulatory agencies view floating wetlands similar to docks and require mitigation for their installation—ironically, while others view floating wetlands as a type of mitigation. Some believe floating wetlands threaten salmon because predator species can hide under the structure, while research by the University of Washington has shown that not to be the case. Agencies in other states but not Washington provide mitigation credits for installing floating wetlands in stormwater ponds.

The value of floating wetlands is challenging to quantify. Significant water quality improvement is often not

observed because pollutant concentrations are so highly variable and too small of the waterbody area is covered to produce measurable change. Habitat and ecological value are rarely measured and typically undervalued or not recognized. Qualitative observations have shown that these floating ecosystems provide essential habitats for juvenile fish feeding on the biofilm invertebrate community and for bird species browsing and nesting on the wetlands, which contribute to biodiversity and overall ecosystem health and value. Moreover, the vastly improved aesthetics, environmental education opportunities, and shared sense of ownership they create bring intangible value to urban water visitors and sur-

rounding residents.

Rob’s vision for floating wetlands in the next 10 years includes a gradual increase in projects in the Pacific Northwest, increased visibility through high-profile initiatives, and a focus on retrofitting stormwater ponds where benefits are most pronounced. In addition, the development and acceptance of crediting systems for floating wetlands is crucial to fund these projects, and will require further education of the public and regulatory agencies about their many benefits.

Lily Schreder is a marketing specialist at Herrera with a background in marketing and environmental studies.

FACTORS

CONTINUED FROM PAGE 5

what we hope is for the entire construction industry. As we work with clients across the country on maximizing their sustainability goals, we want to ensure we are taking one more step to impact ours.

When looking towards a sustainable future, it’s important to remember that there

is no single solution, no panacea. We must cast the net wide and look for a variety of ways to better our industry, better our construction practices and better our planet.

Mark Chen is National Carbon Manager for Skanska USA.

SHORES

CONTINUED FROM PAGE 3

access and safety at the extremely popular Little Squalicum Park. Project elements included installation of a new trail network, construction of a pedestrian bridge at the estuary mouth, and the planting of 4,500 native plants by volunteers hosted at a community event by the city of Bellingham and the Nooksack Salmon Enhancement Association.

The NSD + CGS team is also assisting the city of Bellingham on park improvements in Boulevard Park and creating new South Beach at Salish Landing Park at the old landfill, both of which involve debris removal and new beach creation.

ADDRESS SEA LEVEL RISE & CLIMATE CHANGE

Accelerating sea level rise and climate change exacerbate the already difficult task of restoring Puget Sound shores. For this reason, all shoreline restoration initiatives must fully consider and account for the changing conditions we expect in coming years. Planning and designing for climate change is crucial in maintaining the function of shoreline projects and infrastructure, as well as avoiding the potential for costly repairs and replacement later.

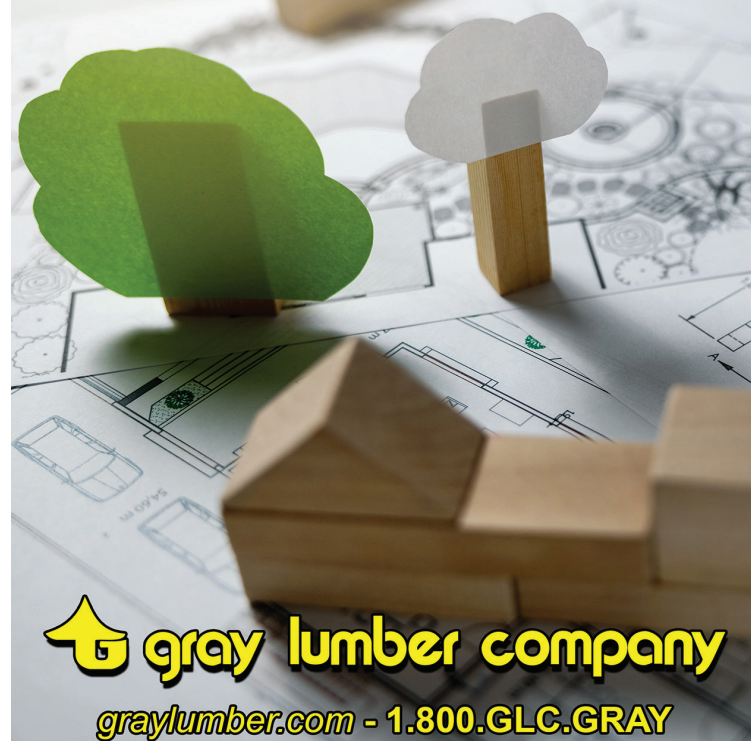
The Waypoint Park Beach project accommodated the

projected 2.4-foot sea level rise by the year 2100 by adding three to five feet to its elevation. Our engineering team used gravel, sand and access structures to shape a beach to meet the uplands park area. At the larger new beach in the coming Salish Landing Park, we planned for over four feet of sea level rise to better ensure that we contain contaminants.

Coordination is key. The path to efficient and effective coastal restoration in Puget Sound is through a coordinated, multifaceted approach. Coastal ecosystem recovery and habitat restoration efforts are futile without addressing the impacts of sea level rise and climate change. We must keep this in mind as we collectively continue our efforts to preserve the beauty of Puget Sound, while regaining the immense ecological, social and economic benefits that its shores offer.

Jim Johannessen is a licensed engineering geologist and principal coastal geologist for Natural Systems Design + Coastal Geologic Services. Wei Chen is a licensed engineer and principal coastal engineer for Natural Systems Design + Coastal Geologic Services.

Building for Tomorrow by Building Green Today



CLIMATE ACTION

CONTINUED FROM PAGE 6

interest in collaboration grew into the formal relationship of the Eastside Climate Partnership (ECP), which includes the founding members of the cities of Bellevue, Kirkland, Issaquah, Mercer Island and Redmond. After successfully working together on multiple climate initiatives, the ECP was formalized in 2023 through an Interlocal Agreement signed by the respective mayors and city managers.

The partnership builds on successful collaboration between our cities on economic development initiatives, human services programs, water infrastructure, affordable housing, transit planning and more.

Through the partnership, small sustainability offices can leverage pooled resources, reduce duplication of efforts and accelerate climate action. Our approach includes specific efficiencies such as hiring shared staff, developing joint grant applications, coordinated marketing, and sharing the load for contract management. This innovative partnership model allows the five cities to collectively grow our climate programs, while keeping program administration at a minimum, to achieve more ambitious and impactful climate action at the regional scale.

To date, the ECP has accomplished the following:

Secured over \$1.5 million in state grants to support our initiatives to reduce emissions from fossil fuels through home electrification.

Launched the Energy Smart Eastside heat pump program, providing a regional and national model for a coordinated heat pump installation program across multiple jurisdictions. The program has installed over 100 heat pumps for households with low and moderate incomes, while also providing incentives for households at any income level. Our heat pump program reduces reliance on fossil fuel heating sources, increases home comfort, and provides cooling during extreme heat events.

Educated over 300 building owners and property managers on state building energy efficiency standards. The clean building programs provide access to free services such as assessing energy usage compared with standards and submitting required reports, as well as support for securing incentive funds. Improvements made in the participating buildings will lead to

cleaner buildings through improved energy efficiency and reduced reliance on fossil fuels.

Launched the Eastside Climate Challenge, which has committed over 800 eastside households to actions that will reduce carbon dioxide emissions by 170 tons, which is the equivalent of taking 38 gasoline powered passenger vehicles off the road. This program provides an opportunity for community members to track their own actions and engage their neighbors in support of progress towards regional climate goals.

Jointly prepared greenhouse gas emissions inventories for our communities and municipal operations. Over time, these inventories track where emissions reduction progress has been made (or not) and provide guidance for where to focus climate action efforts in the future.

These actions and accomplishments highlight how the partnership of five Eastside cities has a greater impact than a single jurisdiction could alone. We are sharing our success around the region and country to help other jurisdictions reconsider their approach, and identify if similar partnerships are possible.

Climate action and sustainability is a priority for our community members and city councils, which allows the ECP to focus on how to achieve our goals in a more impactful way. Looking ahead, the ECP has already identified areas to expand our ability to continue to foster resilient, healthy, and sustainable communities. Climate change remains a critical issue, but when communities make it a priority to address and when innovative approaches like the Eastside Climate Partnership are developed, we can make strides to significantly cut our emissions and help our communities become more resilient to potential impacts.

Primary author Stacy Vynne McKinstry is the sustainability manager for the city of Issaquah. Contributing Authors: David Barnes is a senior planner and sustainability manager for the city of Kirkland. Alanna DeRogatis is the sustainability program analyst for the city of Mercer Island. Jennifer Ewing is the sustainability manager for the city of Bellevue. Jenny Lybeck is the environmental sustainability program manager for the city of Redmond.

WASTE HEAT

CONTINUED FROM PAGE 2

low-carbon district energy system that will turn waste heat into efficient heating and cooling for a neighborhood of approximately 1.6 million square feet of mixed-use development.

This ambitious project will put to work waste heat from PSE's Encogen Generating Station located nearby and is the first to meet the 2021 Washington State Energy Code's "low carbon district energy system" with some of the most stringent efficiency and performance requirements in North America.

Corix will capture waste heat from PSE's cooling tower and return the water to a cooler temperature, further improving the efficiency of PSE's steam turbine – a win-win for everyone. Not only cutting pollution, the system will be about four times more efficient than traditional heating systems. It can be scaled with additional capacity, ensuring equipment and capital are deployed as needed as the neighborhood thrives and grows. This extraordinary system goes live this spring.

"District energy is such a powerful infrastructure

strategy — it offers low-carbon energy by reclaiming waste heat," said Travis Hickford-Kulak, senior vice president at Corix.

WASTE HEAT REVOLUTION FOR CLIMATE SOLUTION

While waste heat recovery is not a new concept, new technologies are emerging to answer customer demands to meet new codes and policies, battle climate change, and keep up with the world's ever-increasing energy demands. Many U.S. jurisdictions are proposing or have already implemented policies that reduce or ban fossil fuels in certain new and renovated buildings, both individually and in campus settings. When powered by low-carbon electricity, waste heat recovery and storage coupled with district thermal can efficiently and affordably create, use, store, and share sustainable heating and cooling.

In Washington State, policies driving building decarbonization include the Clean Buildings Standard for energy efficiency, energy codes

curbing fossil fuels in the built environment, and municipal policies like the city of Seattle's new Building Emissions Performance Standard. Some building codes are now specifically requiring heat recovery in high-rise residential buildings, with further codes on the way for heat recovery in commercial buildings. Combined with customer demand, these policy pushes are driving rapid progress in waste heat recovery in Washington.

Waste heat recovery systems with thermal energy storage help reduce overall energy requirements, lowering the stress on the larger electric grid and empowering buildings to integrate thermal storage for peak-shifting, demand response, and accelerating fossil fuel phaseout. That means affordable climate comfort, carbon responsibility, and resiliency for all – for the individual buildings involved, for their linked energy districts and the broader community.

Scott Locke is an associate principal and director in UMC's Energy Services Group.

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PARK

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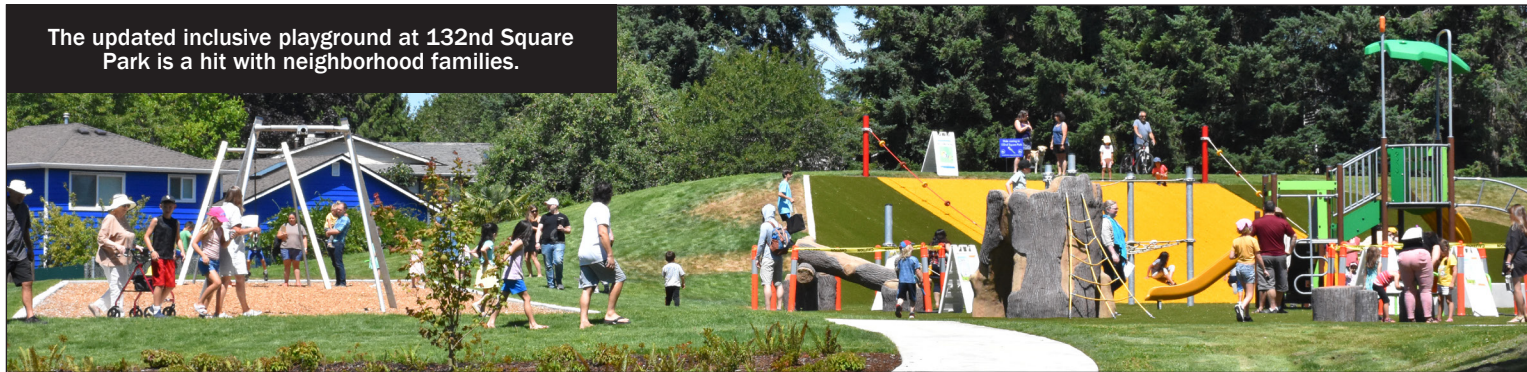
The Totem Lake Stormwater Retrofit study sought to identify locations where large regional facilities could slow down and filter a large-scale volume of rainwater runoff.

Grant funding in hand, a team of hydrologists, civil engineers, and mapping specialists studied the 665-acre Totem Lake watershed, searching for ways to slow the flow of rainwater from hard surfaces – and the sediment and pollutants carried with it – into Totem Lake and Juanita Creek.

The team identified and outlined three different rainwater management projects that would help achieve this. The largest and most effective of the three solutions was at 132nd Square Park.

“The study looked at where our stormwater system is now, and where it needs to go to support fish and people’s need to recreate and be in touch with the water in our creeks and lakes,” says Jenny Gaus, Kirkland’s project manager for the original grant and subsequent 2014 Surface Water Master Plan.

Equipped with the promising results of the Totem Lake



The updated inclusive playground at 132nd Square Park is a hit with neighborhood families.

PHOTO COURTESY OF THE CITY OF KIRKLAND

Retrofit Study, Kirkland formalized its commitment to this watershed-scale retrofit approach by making regional facilities a priority in its 2014 Surface Water Master Plan. This plan served as a foundational document, guiding the city’s actions to protect its creeks, maintain its infrastructure and reduce flooding over the next 7-10 years. An updated plan was adopted in 2023.

While the location for the stormwater facility seemed a perfect fit, it would require excavation of the fields at the park.

A PARK FOR ALL

The park redevelopment at 132nd Square Park followed its own long journey to fruition. First identified as

a priority in the 2015 Parks, Recreation, and Open Space Plan, the re-envisioning of 132nd Square Park went through many iterations, public feedback sessions and deliberations.

The original park had limited facilities and a poorly drained field that reduced its usable season. After Kirkland’s 2011 annexation of the Kingsgate neighborhood, redevelopment of the park was a priority to develop equitable access to recreation amenities in an underserved and growing area. However, funding was another matter.

By leveraging grants from the Washington Department of Ecology and the King County Opportunity Fund for the stormwater portion of the project, and park impact fees to fund park redevelopment,

Parks and Public Works were able to seize the opportunity to overhaul a significant community asset to create a park with more capacity and a higher level of service.

THE WORK CONTINUES

Silent footsteps walk a meditative path through a brick paver labyrinth while laughing children roll down the year-round “sled hill.” Across the park, whistles blow during soccer drills, and young batters take their first T-ball swings. After two years of construction, 132nd Square Park is pulsing with life again.

This park “is for everyone, and we’re excited for the entire community to experience it,” said Parks and Community Services Department Director Lynn Zwaagstra.

The park serves as a strong example of collaboration and innovation between city departments, local and state agencies, and neighborhoods to create community amenities that benefit people and the environment.

Based on this success, Kirkland is now planning for regional facilities in the North Rose Hill, Finn Hill, Juanita and Kingsgate neighborhoods. The focus will continue to be on identifying sites that can provide community benefits such as parks, traffic calming and open space, as well as rainwater management opportunities.

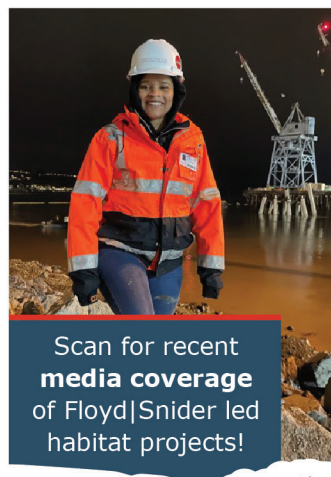
Aaron Hussmann is environmental education & outreach coordinator for the city of Kirkland.

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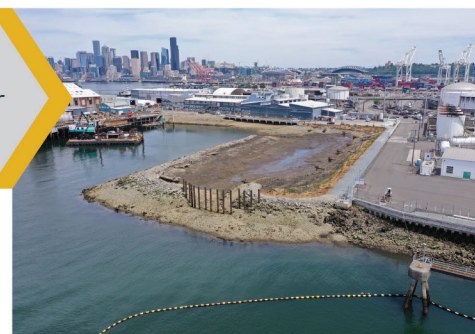
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