CANADA'S CLEAN50

PART 5 OF 5: RESILIENT INFRASTRUCTURE

DON IVESON

Edmonton is making great strides toward sustainability under the leadership of Mayor Don Iveson with green initiatives like Edmonton's Energy Transition Strategy, the Edmonton Declaration (which calls on cities to adopt science-based emissions targets), electrification of public transport and a planned carbon-neutral community.

SUSAN ANCEL

As a mechanical engineer with over 30 years of experience with EPCOR, Susan Ancel developed integrated resources plans for water and stormwater utilities. The result: innovative solutions that reflect community values, in part by considering risk tolerance levels and optimizing financial investments to achieve goals.

RYAN MITCHELL

Championing a strategy of growth driven by innovation and the pursuit of cleaner energy solutions at Saint John Energy, Ryan Mitchell has the vision to create a smart grid driven by advanced artificial intelligence. The goals? Improving efficiency, curbing greenhouse gas emissions and increasing the percentage of renewable energy.

MORE DETAILS ABOUT THE AWARD WINNERS AT CLEAN50.COM

IMPROVING SUSTAINABILITY AND RESILIENCE WITH TRENCHLESS WATER MAIN RENEWAL

Water is one of our most precious resources, yet crumbling underground infrastructure is posing a challenge for communities across North America. In a recent report, the American Society of Civil Engineers estimates that there is a water main break in the U.S. every two minutes, with six billion gallons of treated water – or enough to fill over 9,000 swimming pools – being lost every day.

Conditions in Canada are similar, says Martin Bureau, vice-president, Innovation, SANEXEN Environmental Services, which is part of the Quebec-based LOGISTEC Corporation. At a time of shrinking municipal budgets, many water networks, which were designed to last 50 years, are well beyond their "best by" date, with some of them being 100 or even older.

Consider such outdated infrastructure challenges in the light of heightened climate risks, like storms and flooding, and you arrive at a potential nightmare scenario, believes Dr. Bureau. "You could have surface water seeping into the system. You could have pressure overloads with damage to the entire system when you reboot the network. You are also at risk of seismic activity," he explains. "The costs of repairing water networks are gigantic – in the scale of billions of dollars."

The good news is that SANEXEN's water main renewal technology allows municipalities and water utilities to upgrade their underground water infrastructure without excavating the entire length of the pipes, says Dr. Bureau. "You access the water main from a small pit at one end of the section you need to renew, typically near a fire hydrant. There, a mobile plant will insert our technology into the pipes."

A partnership dedicated to improving fresh water infrastructure brought together (from left to right) Don Williams, Joe Resong and Genevieve Han from the Los Angeles Department of Water and Power, Prof. Tom O'Rourke from Cornell University and Martin Bureau from SANEXEN. SUPPLIED

A seamless circular woven liner, produced in Quebec, acts as a structural composite that is cured in place after being inflated with water in a closed circuit network, he says. "The insertion and curing process takes a few hours, so a water main renewal project can be completed in days or weeks rather than the months it takes for traditional upgrades."

In addition to shorter project duration, benefits include less social disruption, increased water conservation and a reduced environmental footprint. And further interventions on rehabilitated water mains are no longer necessary, notes Dr. Bureau. "The high-tech composite material is extremely strong and resilient. And that means the pipes – regardless of their original material – become stronger than before as well as earthquake resilient."

Sustainable Development Technology Canada confirms that the 2,000 kilometres of installed SANEXEN water technology have resulted in eliminating 55 million cubic metres of drinking water leaks and 443 kilotonnes of greenhouse gas emissions – as well as removing more than one million trucks from the road, which would otherwise have been deployed for excavating and filling trenches.

Dr. Bureau applauds the "smart long-term vision" of cities like Montreal and Toronto for ensuring their infrastructure is resilient. "Cities have to regard their water distribution network as a major asset," he says. "Their investments will impact the resilience of the city as well as our country, because if one municipality has a problem on one street, that can affect our collective well-being."

Technology innovation plays an important role in finding sustainable solutions, says Dr. Bureau. "We simply cannot afford to continue using traditional methods. We need to think about the social, environmental and economic impact, especially when we need to invest billions."

Canada is a leader in environmental technology, and SANEXEN recently received the prestigious Canada's Clean50 award. "When the result of our work is recognized, this reinforces our strong conviction that we can make a difference," says Dr. Bureau. "That's why we're doing this – it's about making the world a better place for all of us."

A COMPREHENSIVE – AND INCLUSIVE – STRATEGY FOR STORMWATER MITIGATION

Intense storms are becoming more frequent due to climate change, and Canadian cities look to innovative solutions for being better prepared. An exploration into stormwater mitigation in Edmonton led to the development of a methodology designed to enhance equitable outcomes without putting undue stress on ratepayers.

Work on the Stormwater Integrated Resource Plan (SIRP) brought together multiple stakeholders, including the City of Edmonton and representatives from the utilities and insurance sectors, says Susan Ancel, director of One Water Planning at EPCOR, a leading provider of clean water and safe, reliable energy. "We started with the premise that climate adaptation has to address environmental, social and economic concerns – that's why SIRP considers stormwater mitigation from numerous perspectives."

Since historical models often focus on the financial implications of property damage that are ranked according to property value, Ms. Ancel proposes a different approach "where priorities are assigned in a more equitable way."

Two scenarios, of a basement versus an underpass flooding, help illustrate the distinction. With limited public funding, which of the two would take priority? And what mitigation measures are appropriate for each example?

"An underpass flooding doesn't necessarily cause physical damage, but it carries a high health and safety risk compared to a flooded basement, which can have a lot of damage but less impact on the health and safety side," she explains. "Our strategy looks at health and safety, environmental, social and financial risks."

To gauge Edmontonians' priorities for mitigation measures, an online survey asked participants to rank priorities for different impact scenarios. "We had 1,500 respondents representing the city's demographics," says Ms. Ancel. "Participants agreed that considering financial risks is important, but they rated health, safety and social implications even higher, with key concerns revolving around the impact of potential disruptions to emergency response, health and social services, and water and power."

To address such a wide range of considerations, SIRP proposes five actions: slow, move, secure, predict and respond. "'Slow' means capturing stormwater closer to the source, such as through green infrastructure. When that's not possible, we want to 'move' it to a location without impacting properties; for example, stormwater ponds," Ms. Ancel explains. "The 'secure' component is about flood-proofing properties. 'Predict' is using smart technologies and monitoring to know where and when a storm is coming, and 'respond' is building up our emergency response protocol."

These five dimensions can make the strategy more cost effective, she says. "For example, traffic control can be considered a more efficient investment for addressing underpass flooding, while a dry pond or green infrastructure would be a fitting intervention for areas where residential properties are at risk."

Word about the publicly available methodology has spread across Canada: Edmonton recently placed first (tied with Regina and Toronto) on a list of 16 major Canadian cities for limiting the risk of flood mitigation, according to the Intact Centre on Climate Adaptation at the University of Waterloo. And Ms. Ancel was recognized with an individual Canada's Clean50 award in the cities category for her leadership role in SIRP.

A recently completed dry pond in the neighbourhood of Parkallen in Edmonton is an example of the range of measures that can contribute to stormwater mitigation. SUPPLIED