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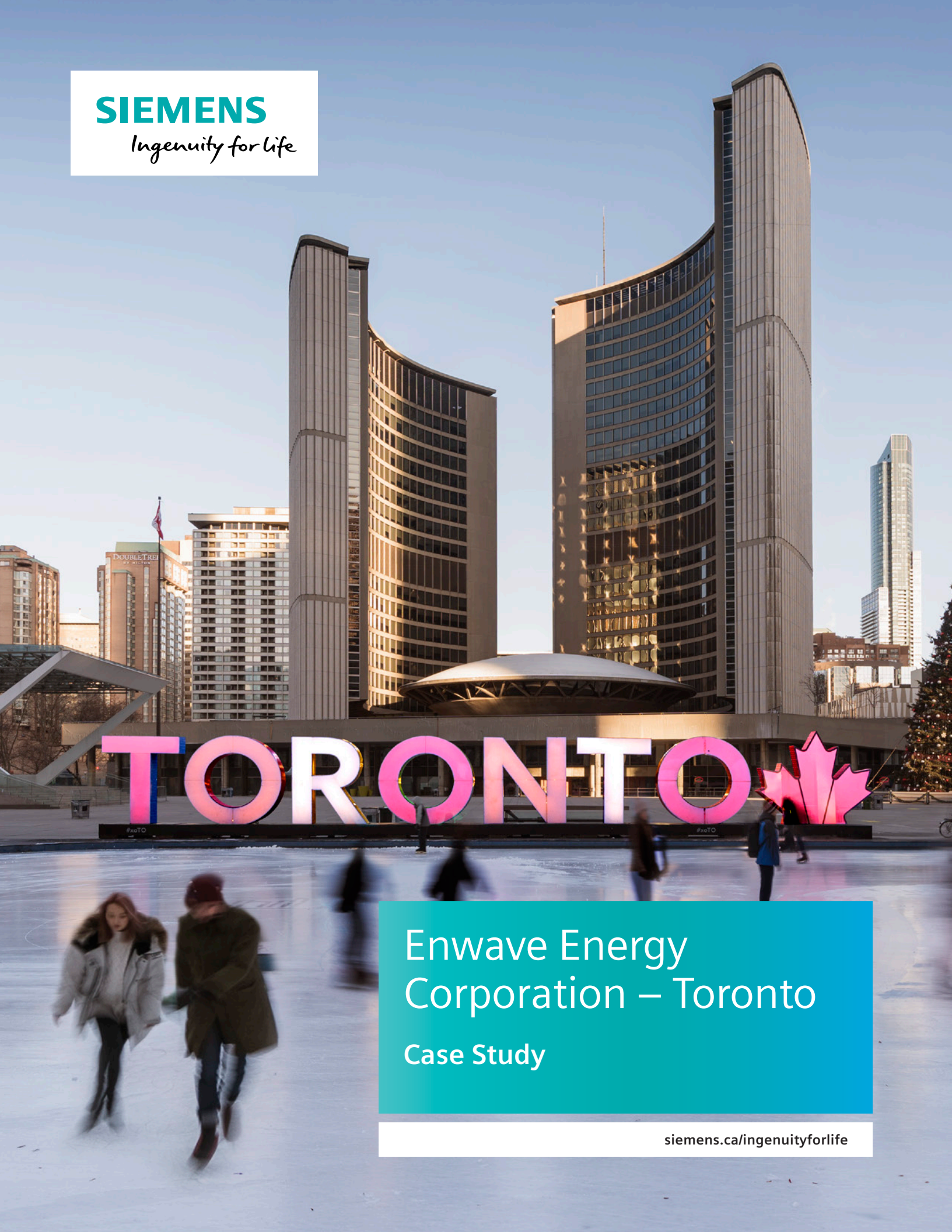

Enwave Energy Corporation – Toronto

Case Study

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Relying on automation technology to heat mission-critical buildings in Toronto

Like all Canadians, Torontonians rely on the comfort of heated buildings in the cold of winter. Considering that hundreds of thousands of people live or work in the heart of the city, providing reliable heating is critical. Downtown Toronto is home to leading hospitals, arts and cultural landmarks, and countless condominium high-rises and office towers housing large financial institutions and other major corporations.

Enwave operates three facilities in the heart of Toronto, including a major plant and flagship energy centre on Pearl Street. That site generates heating, cooling and most recently electricity, as a Combined Heat and Power program has been started, with the produced electricity used in downtown Toronto during high-demand circumstances.

Since the 1960s, the Pearl Street plant has been meeting the challenge of keeping downtown Toronto warm. Large boilers turn water into steam, which is used to heat about 150 buildings through a 40-kilometre network of underground pipes.

TD Centre

Backed by Siemens as a trusted partner, innovative energy services provider Enwave leads the way in delivering mission-critical heating for Canada's largest city

Ingenuity for life with Siemens and Enwave

The flagship plant of Enwave needed a major technology upgrade

- Since the 1960s, Enwave's Pearl Street plant in downtown Toronto has been part of a district serving landmark sites like Toronto General Hospital, City Hall, arts and cultural institutions, government buildings, universities, office towers and an array of condominium buildings
- The company needed to replace its electromechanical control technology

Siemens was selected as the technology partner for a modernized control system

- Siemens was responsible for supply, engineering, installation, maintenance and support of a state-of-the-art control system and the intelligent field instruments connected to it
- Siemens stood out as the best option because of the superior reliability of its solution, as well as an easy-to-use Human-Machine Interface, advanced field instrumentation, competitive pricing, and exceptional after-sales support

The new Process Control System (PCS) lays the foundation for Enwave's future

- PCS 7 from Siemens reduces Enwave's carbon footprint and emissions, improves plant efficiency and capacity, optimizes operations and reduces costs

Siemens and Enwave have developed a strong partnership

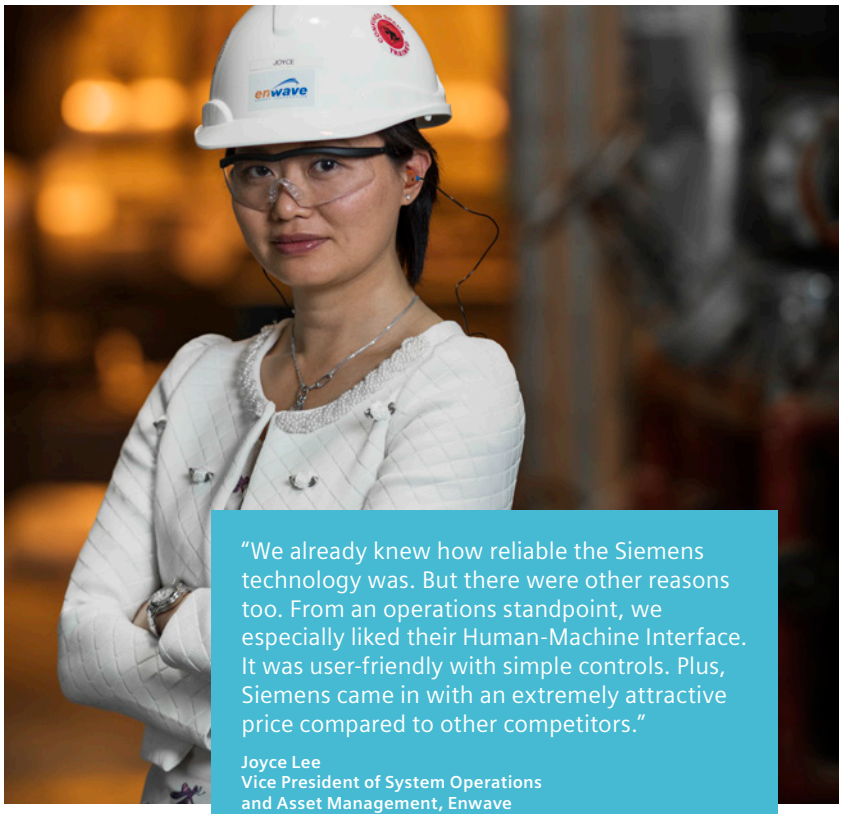
- Siemens is always proactive, flexible and caring in meeting Enwave's needs
- Both organizations are committed to jointly pursuing innovation that helps society

A critical need for modernized control systems

Joyce Lee is Vice President of System Operations and Asset Management at Enwave. She describes how in 2006, it became a priority to pursue a major overhaul of the Pearl Street plant's antiquated electromechanical technology that had been used for decades to monitor and control all of the facility's equipment.

"We recognized that we needed to move into the digital era," recalls Lee, who has been working at Enwave since 2001, and was the Operations Manager of the Pearl Street plant in 2006. "We wanted to re-do all the controls and bring field devices into the system, and be able to do further upgrades once all of that was in place."

She says a number of companies were invited to bid on this large, multi-year undertaking. The list included Siemens, which already had some of its technology in place at another Enwave plant on Toronto's Walton Street.



"We already knew how reliable the Siemens technology was. But there were other reasons too. From an operations standpoint, we especially liked their Human-Machine Interface. It was user-friendly with simple controls. Plus, Siemens came in with an extremely attractive price compared to other competitors."

Joyce Lee
Vice President of System Operations and Asset Management, Enwave

The choice of Siemens

Delivering exceptionally reliable technology

Reliability is the most important factor in any infrastructure or technology decision made by Enwave. When some of the biggest customers are hospitals – and the heat is used to not only keep the building warm but also for sterilizing surgical instruments – Enwave's service has to be up and running all the time.

Differential pressure transmitters from Siemens

"Reliability is our cornerstone," Lee explains. "It's inherent in our systems. We require all of our equipment to have N+1 redundancy. If a piece of equipment is lost, another one can come online right away to take over and pick up the lost capacity. So everything we do is about maintaining reliability."

After a thorough review and in-depth discussions with the candidate companies, and with the priority placed on reliability, it became abundantly clear that Siemens would be the best choice.

"We showed them different architectures with the redundant systems they needed," describes Ken Bhat, Industrial Account Manager from Siemens, who has been working with Enwave since 2006. "Even if something catastrophic were to happen in a control room, everything could still function because each boiler has its own controls. It makes the system as reliable as you will find anywhere, and it's all proven technology. Of course, we gave them peace of mind too because they know we would always be there to support them in any circumstance."

Along with strong expertise in process optimization and asset management, Bhat adds that Siemens also stood out because its technology breadth allowed for an exceptionally comprehensive and flexible solution – which included integrating field instruments to enable superior diagnostics.

As Lee sums it up: "We already knew how reliable the Siemens technology was. But there were other reasons too. From an operations standpoint, we especially liked their Human-Machine Interface. It was user-friendly with simple controls. Plus, Siemens came in with an extremely attractive price compared to other competitors."

Toronto General Hospital

The power of a total solution from Siemens

Siemens moved forward quickly to replace the old legacy technology with its state-of-the-art Process Control System (PCS) – the SIMATIC PCS 7. It was designed to be a key underpinning for Enwave to meet all its operational, management, and environmental requirements.

Partnering with a third-party specialist in the field of combustion and steam production, Siemens served as a one-stop shop for the design, supply, installation and commissioning of Enwave's new PCS.

As part of this complete PROFIBUS-based process automation solution, sophisticated field instruments were deployed for measuring flow, pressure, temperature and valve positioning. In keeping with the highest possible standard of reliability, these devices are designed to keep working through the harshest of conditions.

"Inside a steam chamber, the ambient temperature could be quite high, up to 160 degrees Fahrenheit and 90 per cent humidity, especially in the event of steam chamber flooding" Lee says. "As a result, any hardware installed in the steam chamber will be subject to the harsh environment. Siemens offers us a solution that is able to withstand those extreme conditions."

At the same time, she notes, the powerful data acquisition system that was delivered is simple enough that when more or new data needs to be collected, it's just a matter of adding another card.

"That is a unique solution from Siemens; we cannot find it anywhere else," she says.

"The technology we have delivered to enable Enwave to operate, monitor and control the heating, is the latest modern technology one can find on the market," adds Bershu Nkwawir, Vice President, Sales, at Siemens. "It allows Enwave to be the embodiment of innovation in achieving some amazing improvements."

Behind the technology

Dedicated professionals who are trusted advisors

It came as no surprise to Lee that Siemens completed the project seamlessly, with everything delivered ahead of schedule and without any disruptions to Enwave customers. It reflects a strong bond of trust that underpins a partnership with Siemens that goes far beyond a typical client-supplier relationship.

"Siemens is very proactive and always in contact with us, exchanging ideas and information; they have a strong understanding of our needs," says Lee. "It's why every time we go out with an RFP, they always seem to come back with the best proposal."

A special arrangement illustrates how closely the two sides work together.

Enwave is always trying to optimize the amount of spare parts that have to be kept on site. If an item is needed, it's up to Siemens to get it there right away. To enable that, Siemens came up with an open blanket purchase order agreement, so if a piece of equipment breaks down, there is no protracted procurement process to worry about that is typical in such situations. Enwave just needs to quote to its blanket purchase order and an expedited shipment will immediately be on its way to them.

"It speaks to their flexibility and truly understanding our needs," Lee says. "It demonstrates how much Siemens cares about our business and helping us. Our technicians, project managers, the engineering team and myself included, all find that the Siemens team actively seeks feedback. They listen to us on how they can improve, how they can serve us better, which is very appreciated. We often don't get a lot of attention from our suppliers. Once we buy a piece of equipment or software, we don't hear from them until the next upgrade because their product is obsolete and not supportable. I don't find that with Siemens. Their after-service is always wonderful."

A state-of-the art Process Control System

- SIMATIC PCS 7 system is based around five AS-417 redundant controllers and rack-mounted SIMATIC industrial PCs
- System features switchgear and intelligent meters integrated using PROFIBUS DP Fieldbus communications
- Other products involved include pressure and temperature transmitters, flowmeters, and valve positioners
- A modern HMI for operators completes a total package that enables full visibility of the operation, with the ability to immediately identify and service any disturbance

A foundation for an exciting future

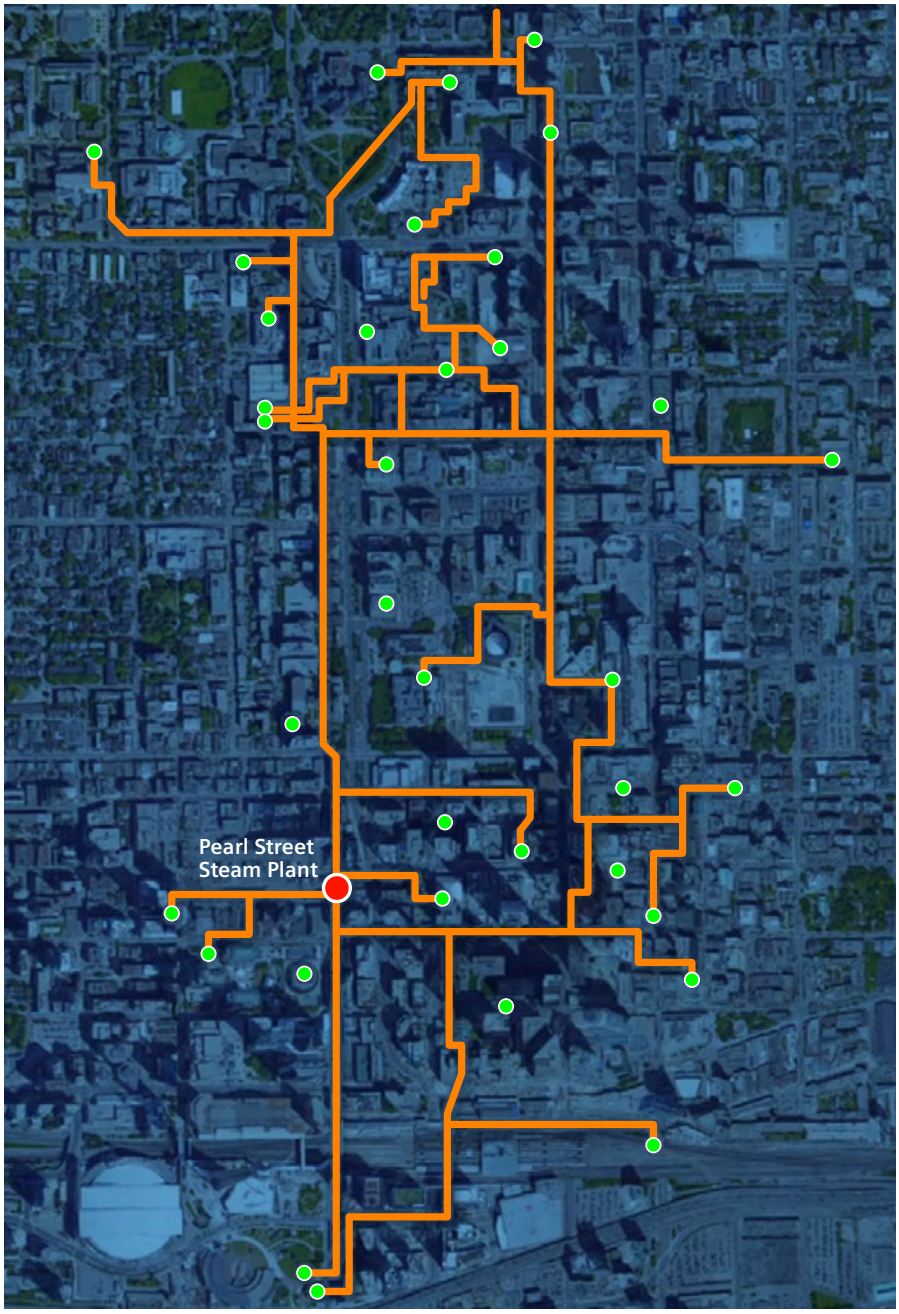
Leveraging the companies' shared passion for innovation, plans are now in the works on some amazing new possibilities.

For example, for the Combined Heat and Power program, the objective is to take automation to the next level of sophistication. It's expected to not only be fully controllable remotely, but also able to proactively calculate the exact timing of when electricity should be dispatched.

Another example is replacing Enwave's traditional planned maintenance model with a new computerized maintenance management system. As the instruments from the field tie into the plant's equipment with data on pressure, temperature, and other parameters, the critical operating conditions will be automatically compared to information baselines. If any data point exceeds an acceptable range, warning notifications will be triggered, and it's only then that maintenance is required.

"We have instruments diagnosing themselves all the time," explains Bhat. "Think of a typical flowmeter out there. It's checking itself constantly. And it will warn beforehand: 'I am doing fine for the moment but maybe on the next shutdown have a look at me.'"

Bhat notes that this new model will mean operational and maintenance cost reductions, quicker fault finding and improved plant diagnostics, increased plant efficiencies, and guaranteed improvements in reducing the company's environmental footprint.



Enwave Energy's heating distribution in downtown Toronto

Ingenuity for energy modernization

Add it all up and what it ultimately means for Lee and her colleagues is a sense of enormous pride at the impact Enwave can have – and a big part of it is their relationship with Siemens.

"It is difficult to find a newly built steam plant operating at the level of efficiency that we can. And our plant is over 60 years old!" she says. "It's complete innovation at Pearl Street – an amazing energy centre. We give a lot of tours to district energy companies from around the world, and even a lot of people from different industries. It is an impressive showcase."

And, as Nkwawir concludes, there are countless benefits to people in downtown Toronto.

"Think of all the wonderful things that Toronto General Hospital is doing, and together with Enwave, we are able to make a contribution to its sustainable operation," he says. "There is such a high concentration of people in Toronto and because of Enwave, everyone can be kept warm in the winter. We are so proud to support a company doing something so valuable for society. We know Enwave and Torontonians will benefit greatly for many years to come from the modernized plant technology we have put in place for them."