LIVING TODAY + TOMORROW

THE CHALLENGE SERIES

07

Millennium Water:
The Southeast False Creek Olympic Village
Vancouver, Canada

THE CHALLENGE
SERIES

THE CHALLENGE OF CHANGE

We've heard it all too many depressing times before: climate change, environmental ruin, peak oil, food insecurity. Despite the gloomy forecast, we find change difficult. We're challenged by the complexity, we aren't sure where to move. In the midst of the muddle, we just carry on.

That may be why "sustainability doesn't sell." We're not sure what it means – not sure what it holds for us. What *does* sell is health, happiness, comfort, light, fresh air, convenience, community amenities. Good relationships, a sense of responsibility, a place for children, opportunities for education and knowledge. What if we banned the word sustainability and simply focused on people and their well-being, and physical and spiritual health?

Start, then, with a city that is cradled in the arms of nature, nestled against majestic mountains, enfolding sheltered waters, framed by the depth and soul of an ancient forest. The setting provides strength, and suggestions for celebrating the values that have nurtured the landscape and its millennia of dependants. Learn the essential living ingredients that provide well-being and harmony, that reflect a balance of resource and need. From there, model and respect the delicate balance that sustains life across the planet.

Traditionally, we have developed our world by separating problems from each other. We have become experts at dividing our experts and expertise, at designing articulate solutions for isolated needs. What we have not done is considered the connectivity of nature, its robust ability to adapt, grow and flourish. In particular, we have denied our own place within it – we have forgotten that where nature is healthy, so are we.

So, what *if* we banned the word sustainability and aimed for well-being, and physical and spiritual health? What if we built communities so that relationships are easy, landscapes are restored and most of what we need is close at hand? What if the fabric of the city actually nourished us as the landscape in the wilderness always did? What if we stopped dividing our expertise, and instead confronted the challenge of complexity with the joy of creativity? What if we solved multiple problems with elegant, integrated solutions?

We might combine a children's play area and an experimental garden in a restful green space that treats stormwater and provides habitat. We might fill buildings with daylight so that residents linger to chat and help each other navigate life. We might re-use energy already purchased and used once, by cycling it back into our homes for heat. We might plant our buildings with gardens that grow food, protect the structure, attract birds and nourish our yearning for green. We might celebrate water, saving it carefully and using it respectfully for the life-giving force it represents. We might need less material. We might experience more joy.

We might build our neighbourhoods like this one. Sustainably, because we're happy that way.

CONNECTIVITY

"What if we solved multiple problems with elegant, integrated solutions?"

This chapter invites us on the final leg of a journey that has toured us through the Millennium Water Olympic Village from infrastructure to exterior cladding, from early planning to final plantings. Though it is always risky to write about what has not yet come to pass, we peek at the future life of this community's residents by learning about their homes – the interior design, the intentions for health and activity, the opportunities for accessibility and aging in place.

We also dive into the world of Net Zero – the emerging concept that a building need not be an energy hog and a pollution emitter – but rather can incorporate design that serves residents' needs for heat, light and cooling without being a net consumer of energy. There is hope for the future here – in the efficiencies that reduce resource consumption, and the solutions that find resources where they were previously overlooked.

The Net Zero building in the Olympic Village is intended to show how one day all building should be designed and built.

From there, we launch into vision. Many people collaborated on building this state-of-the-art expression of community sustainability that could be accomplished within the constraints of time, money and current practice and knowledge. These people lived and breathed the challenge of sustainable development daily for two decades. Now, at the conclusion of the project, we collect and present their ideas and thoughts. Far from a statement about the present, however, these thoughts are intended to present inspiration and insight – a springboard for the next evolution of the places we call home. We hope you will take up the challenge.

Gordon Campbell – Leadership

Making the change we need today is a challenging task. It's not just rethinking where we're going to go; it's actually shifting our mindset. We need a more integrated public sector strategy so that we can embrace several goals at once. Zoning was originally developed around separating uses off from each other, but in the 21st century, planning has to be around integrating uses and bringing them together. For sustainable development, we need to set public objectives that look far ahead. Even if we may not know the next step or the step after that, we must share our vision for where we want to go. If we do, it's amazing where we can go.

Private sector leadership is essential too. The future is about partnerships, about innovation and creativity. The private sector is a vital element in creating sustainable, livable, walkable and healthy communities. It won't happen with a plan on a shelf in a city hall anywhere.

The Millennium project in Vancouver, like Dockside Green in Victoria, is enormously beneficial for demonstrating how to build sustainable communities. It's the easiest thing in the world to say the word "leadership," but the toughest is to actually execute the plan that puts you in the front, where you can demonstrate that this adds value – to the residents, the community, the developer. If we're going to have people embrace the vision and shift their mindset, it's critical. Then we can start thinking about how can we use this change – restorative architecture and restorative neighbourhood planning – to really drive a different kind of vision for the kind of communities we can build.

There's an individual challenge here too. In our culture there's a tendency to expect government or someone else to make change. But we have to ask ourselves to change. Something as simple as walking can solve multiple issues. If kids walk to school, it improves their learning, it improves their health and it makes the community feel like a healthier place for everybody to live. If we walk to work, it helps us deal with health care challenges as well as environmental challenges. What we decide to do as we look in the mirror each morning actually does help shape the future.

Millennium Water provides an example to all of us. Whether it's the non-market housing, the waterfront walkway or the way water is treated, it helps us recognize that we can create incredibly beautiful communities that are healthy environmentally too. If we each in our own way do something to improve the quality of our own life as well as the quality of the future life of people we'll never know – the children of our children of our children – I think we will not only have a more purposeful life ourselves, but we'll create even better and more healthy communities for people to live in.

Gordon Campbell
Premier of British Columbia

SHIFTING OUR MINDSET

Gregor Robertson – Setting the Benchmark

We have set a goal for Vancouver to become the world's greenest city by 2020. It's a bold goal to be sure – demanding that a city that already ranks among the most livable cities in the world improve its environmental performance even more.

Our city benefits from decades of forward-looking decisions that protected Vancouver's natural beauty and preserved neighbourhood identity. The challenge for city leaders is to make decisions that create the greatest good for our citizens and our planet.

The Southeast False Creek development exemplifies this pursuit. The site of the 2010 Olympic Village and home to a new neighbourhood following the Games, it embodies many key elements of what Vancouver needs to do to become the world's greenest city.

With qualities supported by successive city councils, Southeast False Creek is now the benchmark for future projects in Vancouver. It embodies best practices in both social and environmental sustainability.

Southeast False Creek is an outstanding example of the sustainability shift our cities need to make. It is living proof that a modern neighbourhood that uses less energy, conserves water, reduces waste and is designed around people, not cars, is not decades away – it's available right now. Cities around the world can build their own examples if they're willing to challenge themselves, to go beyond what is easy and instead pursue a higher goal.

Southeast False Creek is what happens when council decides to plan for how the city should be, not how it is. Some of the best decisions made by past councils embraced this principle. Their successes, both far in the past and in recent years, provide a template for urban policy making that serves all city councils well.

The goal of making Vancouver the greenest city in the world is aiming for the Southeast False Creek standard, but in every environmental category. We're a city blessed with a tremendous population, full of ingenuity, entrepreneurship and passion for the environment – there is no reason why we shouldn't be the greenest.

Gregor Robertson
Mayor of Vancouver

"living proof that a modern neighbourhood is available right now"

Interior Design Concept and Approach to Suite Planning

After planning the infrastructure, developing the public realm and parks, determining the building massing and external design, and incorporating efficiency and sustainability features into building function, one of the most important aspects of the new homes developed at Millennium Water was still left to be determined: the approach to the interior design of the residential suites.

"We wanted to deliver a green product without compromising style or design," says Adele Rankin who was the lead interior designer from CHIL on this project. The interior design concept and approach is to provide a contemporary and international look while focusing specifically on environmentally conscious products and ideals. Meanwhile, the designers did not want to impose on residents. "The interior design provides a luxurious and elegant backdrop for the individual homeowner to present their own style," says Shahram Malek, co-owner of Millennium.

Given Millennium Water's almost 1,100 suites and more than 10 lobbies, the scale of this project was quite different from other projects that primarily focus on one main public space and fewer units. The process of planning the suites was very collaborative, as space planners, architects and the developer worked together on hundreds of layouts for more than a year. "The team was very large, larger than I've ever experienced," says Harvey Reehal, Principal Director of Inform Projects, which specializes in kitchens and bathrooms. "Everyone had to work together. We listened to each other, discussed and modified."

"In working with many different architects and consultants it was necessary to ensure that, although the building design varied, the interior design remained a constant thread throughout," adds Rankin. "It was important to ensure that all buildings received the same attention and focus on design excellence."

What is FSC Certified?

The Forest Stewardship Council (FSC) is an international non-profit, multi-stakeholder organization established to promote responsible management of the world's forests. FSC's model of certification allows products sourced from certified forests to enter the marketplace with a credential that is unique. Any FSC-labelled product can be traced back to a certified source. This aspect of the system is the basis for any credible certification system and is the link between consumer preference and responsible, on the ground forest management.

LEED™ Requirements

This project was different from other interior design projects, with a major difference being the project's objective of qualifying for LEED™ Gold certification for sustainable design. "While we always endeavour to be environmentally conscious in our selections and designs, ordinarily this doesn't always remain the most important aspect due to budgetary concerns, client preferences or availability," says Rankin. "We were able to keep our original selections in this project as everyone involved agreed on and encouraged the LEED™ objective."

All products in the suites and the public spaces were selected and designed with sustainability at the forefront. For example, all appliances are EnergyStar, all plumbing fixtures are water-efficient, the paint is low VOC (volatile organic compounds,) which improves indoor air quality and reduces urban smog as compared to paints with higher levels of VOC, the carpet is 100% wool, the engineered wood flooring and the kitchen cabinets are FSC certified (see sidebar) and the countertops are made of quartz. All of this helped achieve the LEED™ Gold certification.

Design Principles: Open Space, Natural Light and Air Flow

The suites at the Olympic Village are planned around the concept of an open living lifestyle. This means there is more open space, offering a sense of casualness. "People are not living in closed rooms like they used to," says Mona Foreman of Sheffield Design, the space planner for the suites. "Even though we are opening it up, I was also trying to carve a space where you could still define areas that give a sense of intimacy and comfort. The main function is making a space feel really good.

"The kitchen is the hub of a home, so we wanted this to be an open space but have a layout that helps divide the space as well," says Foreman. Every layout has a large island that separates the preparation area of the kitchen from the dining room or family room or living room. The "west coast living" concept, which emphasizes views and leaves living space open to a suite's view opportunities, was also part of the design concept.

One of the criteria for the interior design was to have as much natural light coming into the unit as possible. "I was always thinking about how we can get the best light," says Forman. "We wanted it to be bright even on a rainy day." This also reduces the need to turn on lights, improving energy efficiency.

In these suites, windows open so there is a natural flow of air through the unit. "The layout was developed so you would have all the amenities you have in a house, such as a patio in the back, and a back door that goes to an exit staircase. Having both physical and visual access on both sides would give you the essence of feeling like you are living in a house," says Foreman.

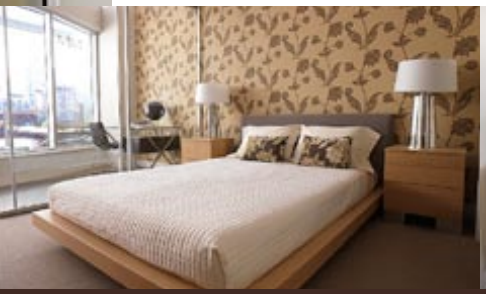
IN MEMORIAM: Richard Negrin

May 19 1956 – September 21 2009
Principal, CHIL

Richard Negrin studied architecture at Dalhousie University and then joined his father's firm, Reno C. Negrin Architects, in Vancouver in the 1980s. After his father passed away, Richard expanded the business, carving out a niche in the development and hotel industry. New clients included Four Seasons, Shangri-La, Fairmont, Silver Birch, Concord Pacific and Millennium.

Negrin's specific role in Millennium Water was overseeing CHIL's interior design. While sourcing locally produced products, accounting for environmentally sensitive material choices, and understanding the requirements and aesthetics of these specialized building systems, CHIL was able to achieve a refined and responsive product and uniquely west coast design. Negrin's 25 years of spatial design knowledge also helped solve many space-planning challenges the designers encountered in creating the approximately 1,100 units, as he worked with clients and other consultants to achieve sellable suites that would meet all the needs of potential buyers.

Richard was respected for his easy approach to both clients and staff, both of whom he treated with respect and dignity. The large turnout at his memorial service was a testament to his ability, and the admiration he had gained in the development and hotel design industries. He is missed for his talent and especially his kindness.



Left: The kitchen design and layout is seen as the hub of the home where it is open, bright and resource efficient.

Right: Living space design emphasizes the views and daylight to create a comfortable space that requires less artificial lighting and energy use.

Efficiencies for Marketability

With hundreds of building design layouts, offering only three colour schemes and eight kitchen layouts for 737 homes helped keep the designs consistent and create efficiencies. “It was much more manageable to inform consumers during the marketing phase,” says Bob Rennie, Principal of Rennie Marketing Systems, the firm handling sales of the suites. Throughout the project, bathroom and kitchen sizes created a brand standard – for example, most master bedrooms have ensuite baths. “We didn’t want to overwhelm people with too many variations and we had to select a very high-end spec as we were building all 737 at once with no customizing allowed,” says Rennie.

Appliances and Kitchens for Marketability and Sustainability

“Vancouver consumers are extremely intelligent. If you’re asking a premium dollar they need premium product,” says Harvey Reehal, Principal Director of Inform Projects. The suites have name brand appliances such as SubZero fridges. “We’re wearing green like jewelry,” explains Rennie. “It really looks good but I need mainstream to incorporate green initiatives; I need ‘Sub-Zero’ to come out and say they have solved something in the energy department. Then I’ve got name brands doing it. When you’re selling condos at a million bucks people want name brand.”

All of the kitchens were imported from Germany. When asked about sourcing appliances locally, Reehal explains that “kitchens and bathrooms are a commodity and we don’t yet have a local industry that provides the high quality appliances that people want. In Europe, they build longer-lasting products… they have a culture of design that relies on technology that is not available in North America.”

Reehal says Europe often not only provides higher quality products with sophisticated design, but also produces less manufacturing waste. “In Europe, the machinery is much more efficient with material. I would guess that you can hold in your hand the amount of waste from a 10x8 foot unit,” says Reehal. He says their durability supports sustainable goals. “The products are not inexpensive but they are a premium product designed to last 50 years. The aesthetics are classic and neutral and with high quality material you will find low replacement.”

Innovative Air Ducting

New design solutions in this project included air ducting that would save energy. A fresh air duct, which is common in a kitchen, loses a lot of heat. This innovative air duct directs the air from the fresh air duct to the fridge cavity, heating the air and releasing it into the kitchen through a venting system underneath the fridge.

Design Challenges

The main constraints or design challenges revolved around the overall scale of the project and timeline. All buildings required concepts, working drawings and onsite presence in overlapping time frames, which was an unusual challenge. "Remaining consistent in design throughout and providing the needed attention to the clients, the consultants and the contractors was a constant requirement.

Also challenging was meeting everyone's expectations that such a high profile project brings, from Millennium's desire for outstanding design, to the architect's hope for design integration, to the consultant's requirements for collaboration, to the marketing department's need for a sellable product – and achieving an interior that the City can be proud to showcase to the world," explains Rankin.

Setting a Precedent

"The most exciting aspect of this design is the precedent it sets in our community, not only with those involved – such as the developer and designers – but also with the general public. Our hope is to build recognition that there does not need to be a choice between good design and environmentally sensitive products," says Rankin.

"Although it was a challenge at times to have the industry understand this, in the end we were able to have a great deal of innovation presented in terms of materials and overall design."

Bob Rennie comments, "I believe this is the model that everyone is going to watch. The Olympic Village is going to show that the consumer in a higher-end demographic values green and that name brands and green do not have to be mutually exclusive."

Left: High quality, long-lasting and energy-efficient appliances contribute to the sustainability goals of the community.

PROFILE

Bob Rennie

Rennie Marketing Systems

Bob Rennie and Rennie Marketing Systems joined the Millennium Water team even before Millennium was confirmed as the developer of the Olympic Village. With 34 years of marketing experience, Rennie has established a practice of creating a buyer profile for developments. This entails effectively translating sustainability by using practical and simple statements related to a buyer's real estate decision. These include, for example, "You are going to need it [sustainability] for resale," and, "Soon, you will compare energy costs between older and newer developments the way you now compare homeowner dues and maintenance fees." In this way, Rennie Marketing Systems has joined the hundreds of others who have helped realize Shahram Malek and Peter Malek's vision of a sustainable, marketable community on the shores of Southeast False Creek.

Rennie not only focuses on the sustainable use of energy, but highlights that sustainability encompasses a diversified community of incomes and social cultures. "I believe emphatically that Vancouver's Millennium Water Olympic Village will be recorded in the history books as the development that the world will use as a benchmark for future sustainability," he says.

SUSTAINABLE DESIGN: THE HUMAN FACTOR

Canadians Spend 90% of Their Time Indoors

Canadians, though typically thought of as "outdoorsy," actually live most of their lives indoors. When we do open the door to go out, the majority of us are in cities. As such, human health is in many ways influenced by designers' consideration for the quality of the interior environments of buildings and the shape and form of cities and neighbourhoods.

Urban sustainability and human health are inextricably linked. Sustainable neighbourhood design must address the well-being of its residents, affording people access to clean air and water, and places to play, socialize and be active. A green building must provide a healthy environment in which people can eat, sleep, learn and work. If a building is resource efficient and built with the most sustainable materials and processes, but does not provide healthy interior environments for its occupants, it cannot be called sustainable.

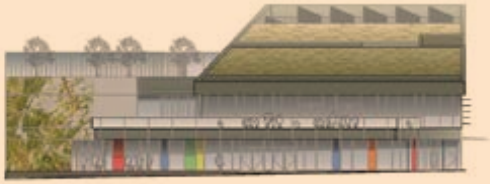
At the design level, outdoor health is addressed by creating opportunities for physical activity, clean air, places for leisure and recreation, and safe, walkable streets. Indoor health revolves around air quality, ventilation, non-toxic and clean environments, thermal comfort, daylight and views to the outdoors, and a regular supply of fresh air. The design of the man-made environments in which we live affects the quality of our lives immensely, and can be measured by our happiness, productivity and physical and mental health.

North Elevation

South Elevation

East Elevation

West Elevation

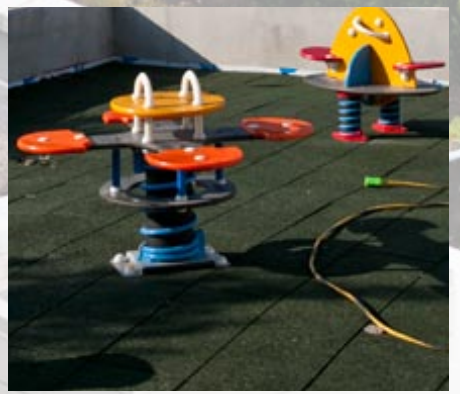


HEALTH OUTDOORS

Courtyard Design

As discussed in Chapter 4, the majority of residential buildings on this project were designed around courtyards. Goran Ostojic of Cobalt Engineering, the mechanical design consultant, explains the design rationale for building exterior accessways that face onto a courtyard. In the Net Zero building (see 'Vision + Concept' on page 16), "it was important to get corridors to the outside of the building for energy conservation reasons. But the added success of the exterior corridor design is that the seniors will have social sustainability," says Ostojic. "They'll come out of their suites and see people – it's a social thing. There are places for people to sit and meet and for kids to play. With this design we've gone back to the basics, when people were living closer together and sharing things."

The experience of coming to and going from the buildings is designed to maximize social interaction and encourage physical activity. The stairwells and corridors are located on the exterior of the buildings as much as possible, some enclosed and some open to the elements. "The goal was to create streets in the sky," says Roger Bayley, design manager for Millennium Water. Bayley refers to the care taken in the design of the buildings' outdoor environments. Largely vegetated, and boasting water features and places to relax and play, the courtyards and gardens contribute to a sense of healthy living.



Rooftop gardens and playgrounds are some of the many features that encourage activity and greater overall health.

Ventilation

If you're alive, you're breathing – it's a fundamental function of the human body, delivering oxygen to our organs and removing carbon dioxide. Humans draw more than 17,000 breaths per day. For such a vital physical process, the quality of the air we breathe is of utmost importance. When measuring quality of life in a city or region, air quality is always a key indicator. The quality of the air indoors is equally significant, and can be achieved through adequate ventilation strategies: eliminating exposure to contaminants, utilizing sufficient filtration, controlling rate of air changes and improving access to fresh outdoor air. The effects of indoor air quality can range from adverse health (see sick building syndrome) to positive impacts such as improved productivity, mood and overall health.

Sick Building Syndrome

Sick building syndrome describes health conditions associated with the interior environmental quality of an individual's workplace or residence. Symptoms can include: irritation of the eyes, nose and throat; neurotoxic or general health problems; skin irritation; and odour and taste sensations. The syndrome is related to poor indoor air quality, often caused by flaws in the HVAC system or from off-gassing of building materials that contain volatile organic compounds, moulds, improper exhaust ventilation of ozone (a byproduct of office machinery), the use of chemicals, location of the fresh-air intake or lack of adequate air filtration.

Designers at the Olympic Village eliminated the potential for sick building syndrome by specifying ventilation systems with high rates of fresh air exchange with the outdoors, and installing operable windows. The choice of interior materials and finishes also contributed to healthy indoor air (see 'Interior Design'). By specifying environmentally benign products, the interior design consultants were able to mitigate the presence of volatile organic compounds and conditions that encourage the growth of allergens and mould.

Daylighting, views and air quality are some of the key indoor features that contribute to the well-being of the residents.

Blower Door Testing

To ensure that buildings achieve baseline indoor air quality levels, LEED™ requires that all buildings meet environmental tobacco smoke control requirements. In residential buildings, this means reducing air leakage between smoking and non-smoking areas in order to minimize occupants' exposure to tobacco smoke.

To achieve the LEED™ requirement, walls, floors, ceilings and doorways must be sealed to protect from air leakage between residential units. Next, LEED™ requires a blower door test to demonstrate the effectiveness of the leak protection measures. A blower door test is a diagnostic tool designed to measure the air-tightness of buildings or rooms and spaces within a building. All buildings at the Olympic Village had to undergo this testing procedure.

To run the test, a blower door fan is sealed into an exterior doorway. The fan draws air out of the suite, creating a pressure difference between inside and outside. This pressure difference forces air through all holes and penetrations in the building enclosure. Airflow and pressure differential are measured using gauges on the blower door, and are then used to determine the leakage rate of the unit.

Challenges and Implications

Protecting occupants from exposure to tobacco smoke is generally recognized as a key measure in ensuring healthy indoor environments. Despite widespread acceptance of the concept, implementation can present a challenge, as industry is relatively unfamiliar with LEED™'s testing procedures.

"We are talking about changing common practices out there," says Jason Packer, Sustainability Consultant at Recollective Consulting. "While it is understood that the whole point of LEED™ is to transform the market, there is significant push-back from owners, developers and builders, particularly when so much money is at stake."

"It is difficult to fix (air leakage) problems once construction is underway," says Packer. To avoid this costly predicament, Packer recommends "having an air leakage consultant do a presentation with the design team so that air leakage testing requirements are considered early on in the design process. Also, it would be useful to require the relevant sub-trades to witness air leakage tests and feel the air flowing with their own hands. These guys are genuinely interested in doing this properly, but they don't have experience with this testing procedure."

"It's important to take advantage of synergies," he continues. "For example, some aspects of fire-stopping regulations provide an opportunity to simultaneously address tobacco smoke control. And there are other benefits – an airtight building can have positive implications for energy efficiency, comfort and even durability." Despite the challenges, the buildings all passed the test, meeting LEED™'s tobacco smoke control requirement.

"We are talking about changing common practices." Jason Packer, Recollective Consulting

ADAPTABILITY + AGING IN PLACE

In many residential neighbourhoods, homes are designed primarily for a particular phase of life and type of resident – those who are mobile, have no significant physical challenges and are not in their elderly years when their use of special equipment may increase.

Unfortunately, this means people may face painful choices when their circumstances change, through age or injury. Homeowners are often forced to leave their neighbourhood and social networks because the cost of special renovations is too high.

A growing awareness of such needs has led to the rise of Universal Design – the idea that products and environments can be designed to meet a broad spectrum of needs, rather than designing specialty products for each niche need.

"It's really incredibly simple, as long as you start at the beginning of a project," says Roger Bayley, Design Manager for Millennium Water. "Everyone involved needs to realize they have some slightly increased space allocations to make, but as long as you're aware of those in the planning process, most are really fairly simple to execute."

Suites in Millennium Water include a variety of features that improve their accessibility and their support for aging in place. Power plugs in every unit are slightly higher than is customary, while light switches are lower. To improve access for those in a wheelchair or with mobility issues, corridors, doorways and spaces between countertops are a little wider. "There are fewer pinch points in terms of how you move through a unit," says Bayley.

Bedrooms have a double set of duplex plugs, says Bayley, "because older people typically use more power around their bed." In washrooms, the taps for showers and bathtubs are offset rather than centred, so that people don't have to lean in so far and don't risk getting sprayed with hot water.

Other features are impossible to see but could prove extremely helpful should a resident's circumstances change. Behind every shower enclosure, an additional plywood backing is already installed, allowing future installation of handrails without rebuilding the wall. Kitchen installers were all instructed to install the sink unit last, so that it can be easily replaced with a low-level unit. "It's future-proofing," says Bayley. "These features mean you can come in later and modify the unit in a way that's reasonably easy to do, and will

Accessibility for all within the homes and to the amenities of the community was a part of the Millennium Water design process from the beginning.

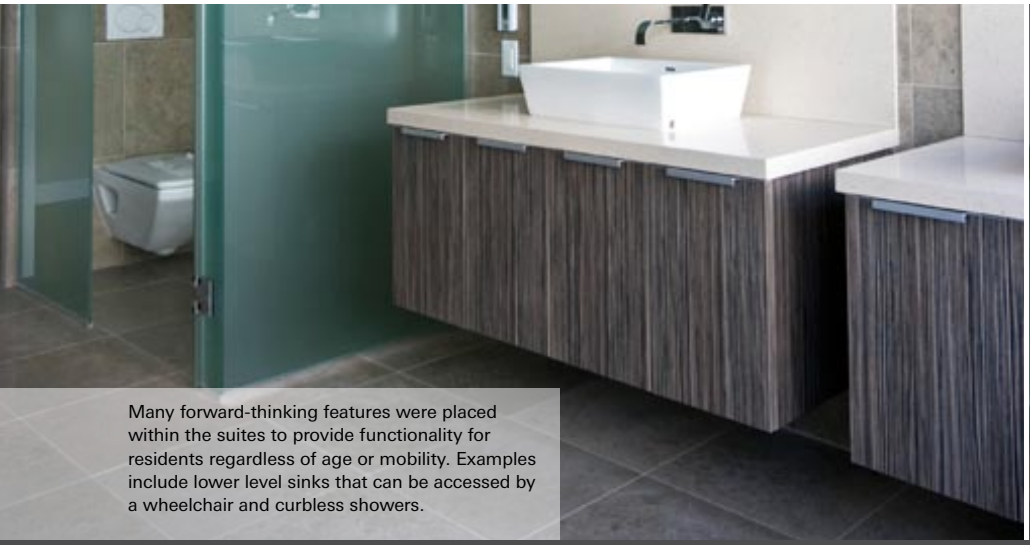
accommodate the kinds of dimensional criteria that handicapped access dictates."

Bayley says a challenging aspect of accessibility was providing level entries to showers and from suites onto balconies, because of issues relating to controlling water.

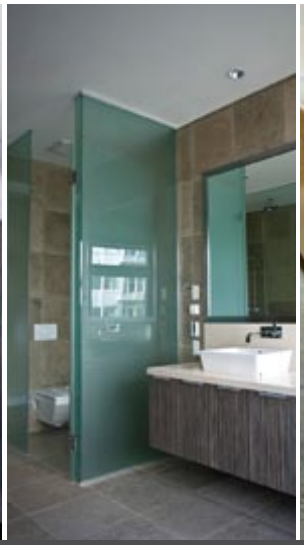
"Building developers are nervous about developing showers without thresholds because of the possibility of leaking into the units below," he says. "You have a plumbing code, then you have people striving to deal with assisted access issues, and their views can be somewhat at odds with each other."

Parcels 9 and 10 will be used to house competitors in the 2010 Paralympics. Robin Petri, Manager of Development at the SEFC Project Office, says an indication of their universal design is that the suites will be used with almost no changes. "There were minor changes needed, mostly around putting in benches so people could slide into tubs and showers, and installing hand-held showerheads, but there wasn't a lot needed to make the suites ready for the Paralympics," she says.

Beyond the suites, the design of the community overall helps support aging in place. "The goal was to create beautiful spaces that encourage people to get out and use those spaces and engage with the street," says Petri. "The streets are designed to cause cars to slow down. There are many benches so that anyone who needs to stop and rest can do so. You have many services that you need all around you – grocery store, drug store, restauarants, community centre, day care, coffee shops – so you get in your car less often, and you're engaging with the people in your neighbourhood. If you're raising your kids there, or you're an older person, you'll feel more secure because you'll feel more connected to the people around you."



Many forward-thinking features were placed within the suites to provide functionality for residents regardless of age or mobility. Examples include lower level sinks that can be accessed by a wheelchair and curbless showers.



DESIGN A BUILDING THAT GENERATES AS MUCH ENERGY AS IT CONSUMES ON AN ANNUAL BASIS

That was the goal for the SEFC Net Zero building, a focal point of sustainable design at SEFC and Canada's first Net Zero multi-unit residential building. The ambition to build a Net Zero building emerged in 2006 from the City of Vancouver's Sustainability Group. "At that time, the idea of doing something that was carbon neutral was really out there," says David Ramslie, the City's Sustainable Development Program Manager.

The City targeted one of the affordable housing buildings, an eight-storey seniors' residence with 67 units, including 6 street-level townhouses, to be the Net Zero building. "With this building, the City wanted to go above and beyond, and see what could be accomplished. LEED™ Gold was impressive, but we knew that Net Zero would be the next generation of green building. This approach was new and could be significant – this would be our showcase piece," says Ramslie.

The project was supported by Canada Mortgage and Housing Corporation (CMHC), who spearheaded the initial design charette for the building. "The SEFC Net Zero Building demonstrates the application of sustainability principles at the multi-unit scale, which is particularly important given that multi-unit buildings account for an increasing share of new construction in Vancouver and cities across the country," says Lance Jakubec, Senior Consultant at CMHC.

"This project – a multi-unit residential Net Zero building – was a North American first. This presented an added challenge, as there was not a lot of experience to draw upon," says Esteban Undurraga, co-founder and former partner at Recollective Consulting, the green design consultant on the project. "What's more, the design was already addressing a multi-stakeholder set of objectives: the City of Vancouver's green building and community plan, Olympic venue requirements, BC Housing's standards, LEED™ Gold rating and the developer's business feasibility.

"In the face of all these challenges, the City's constant support was key to developing this new professional capacity: accepting mistakes, exploring options, making timely decisions and moving forward," says Undurraga.

BUZZWORD: Net Zero

The SEFC Net Zero building generates as much energy as it consumes over the course of a year. Buildings account for about one-third of Vancouver's energy consumption. Much of the energy we use is derived from fossil fuels, which, when burned, release greenhouse gases (GHGs) into the environment. Therefore, reducing our energy use and seeking greener options is one of our biggest sustainability challenges. Net Zero building is a step toward GHG-neutral (or carbon neutral) low-impact building design.

“We knew Net Zero was the next generation of green building”

David Ramslie, Sustainable Development Program Manager, City of Vancouver

Net Zero Design: The Business Case

There’s no formula for reaching Net Zero, and, in the case of the SEFC building, there was no precedent to follow. With all of the constraints associated with the project – schedule, budget, physical site limitations, stakeholder conditions and the required level of innovation – the design team had to build a solid case if they were to be able to realize the Net Zero target.

“One word: resourcefulness,” says Albert Bicol, a mechanical consultant with Cobalt Engineering. “The more resourceful you are, the more success you will have in a project like this.” By examining the building in its specific context, the team looked for an appropriate strategy for achieving Net Zero. As it happened, the perceived constraints of the project – the building’s dense urban context – became the vehicle to reaching the annual energy balance.

“What we learned from the process is that the success of this building was contingent upon the relationships between it and its neighbours. The Net Zero aspiration would not have been attainable without the ability to take advantage of connections to other buildings,” says Undurraga.

“People associate the Net Zero concept with off-grid living. The pastoral image of a carbon neutral building out on its own in a field – like a spaceship – is not what this project is about,” says Ramslie. “It’s true that it takes a village. Trading energy between buildings, and integrating systems, is how we are able to meet the Net Zero goal.”

Northern elevation view including the Net Zero building (second from left).

DESIGN APPROACH

The team had their work cut out for them. By the time the City made a commitment to the Net Zero target, much of the programming for the building had already been determined. "The building was already massed, the site chosen, the proportions already set. Within this context, it was up to the design team to explore how to tweak the form to maximize energy efficiency and how to generate energy onsite," says Ramslie. "It became clear early on that technology alone would not get us there. Getting there would require an integrated approach."

gBL Architects was responsible for the design of the Net Zero building. "The building was designed around a lot of opportunities for passive design," says Stu Lyon, Principal at gBL Architects. "We implemented a significant amount of passive strategies that will affect livability, maximize daylight and natural ventilation and eliminate the need for air conditioning." These strategies were instrumental to lowering the building's energy demand.

The team considered a number of potential layouts for the residential units, with a view to improved comfort and energy efficiency. "We had to maximize cross-ventilation and daylighting from two sides. The typical floor plan for the building evolved around creating as many – if not all – suites either on a corner or with two sides. To achieve this, we eliminated the concept of the interior corridor and put both the corridors and the stairs on the outside perimeter of the building," says Lyon. This resulted in energy savings associated with ventilation and the elimination of mechanical cooling and air conditioning of corridors and stairwells.

We combined a green roof with the solar array – so the rooftop does more than one thing.

Stu Lyon, Principal, gBL Architects

The floor plan in the Net Zero building was designed to maximize cross ventilation and daylighting.

A Low-Tech Solution

A myth about carbon neutral buildings is that they must incorporate futuristic, state-of-the-art technology. "Some Net Zero buildings rely heavily on technology – it takes a person with a PhD to operate them," says Albert Bicol of Cobalt Engineering. "But in our case we really tried to max out the KISS principle: keep it simple, stupid. We didn't rely on high-tech equipment, just high quality materials and smart design."

The building relies first and foremost on passive design. The building features an enhanced envelope, including triple-pane windows. The walls are insulated on the outside, a practice that can be costly, but pays off in energy efficiency (see Chapter 4, Exterior Insulated Wall Assemblies). In the interior, thermal mass is used to regulate the temperature. The envelope has an effective exterior wall R-value of R20, roof R-value of R30 and glazing effective U-value of 0.25.

The team reduced thermal bridging, wherein building components (such as floor slabs) conduct energy (heat) from the inside to the outside. This was accomplished by applying insulation on the upper surface of the slab extensions (under the walking surface) and partially insulating the underside of these balcony and walkway structures. The building's other innovative design features include vertical ventilation shafts. The shafts are kept at a negative pressure, so air is expelled by passive means out of the suites and upward to the roof.

"This isn't really a high-tech building or a technological marvel," says Ramslie. "What it does have is really good insulation, well-placed glazing and a number of other key passive design features. What we really learned is that buildings of the future are really buildings of the past."

Ostojic agrees. "In many senses, the more we rely on technology, the worse off we are," he says. "Take this building. Years from now, the (solar) technology applied on this building will be obsolete – but the smart design will remain."

Occupant Engagement

Another key element of the Net Zero strategy was to reduce energy consumption by engaging occupants to use less energy, since a building's energy consumption in kilowatt-hours is determined in part by the design of the building, and in part by the occupant (see diagram). "We covered everything on this project, from design to influencing occupants' behaviour. How we took care of the 'hours' part of the equation is a great part of the story," says Bicol, referring to the element of the energy consumption equation that is determined by the occupant's consumption pattern.

In the SEFC Net Zero building, occupants will be informed of the goals of the building, and encouraged to change their behaviour to reduce their consumption and help the project maintain its Net Zero balance. A large part of this strategy will be achieved through the installation of energy meters in every suite (see 'Resource Management' in Chapter 5). By looking at the meters, occupants have real-time feedback about how much energy they are using.

"We considered how the occupants and operations and maintenance people would use the building. This is not common practice. What you see most often is that people will design a building and then just leave it. In the case of this project, we put systems in place to make sure it operated properly. There should be an educational component for the people that live in such a high-performing building," says Bicol. In the SEFC Net Zero building, the City of Vancouver will provide a users' manual for occupants and operations people, detailing how user activity affects energy consumption.

Measuring Energy Performance

kWh/m²/year

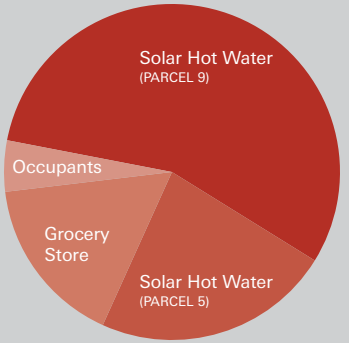
The most accurate way of determining a building's level of energy consumption is kWh/m²/year – that is, annual energy use per area. The kWh/m²/yr measurement is a common unit used to assess and compare the energy performance of buildings.

kW = kilowatt, the amount of energy consumed. This is determined by the design team. Efficient design will lower total kilowatts consumed.

h = hours. This is determined by the user. The hours number is determined by the energy use pattern of the occupant. For example, if the occupant leaves the TV on 24 hours a day, the number will go up.

m² = the area, which provides an indication of the energy intensity of the building design. The lower the usage of energy *per area*, the more energy efficient the building. The importance of this standardized metric for energy efficiency is the ability to compare different buildings and different designs to each other, and determine which provides the best efficiency per unit of space.

Net Zero Energy Balance



First, Reduce Demand

The approach to achieving the Net Zero goal includes three overarching elements: energy-efficient design, occupant engagement and energy generation. Using data from BC Housing and BC Hydro, the design team determined the annual energy consumption of a conventional building in order to establish a baseline annual consumption. The estimate reflected average energy use in similar type buildings – affordable seniors' housing of a similar size and proportion.

Energy loads were broken down into uses, so that the team would be able to address each end-use individually, as well as the building's overall performance. For example, energy loads for appliances such as washer-dryers were managed by specifying low energy models. On the whole-building level, performance was addressed by looking at the building's systems, such as the design of its envelope and mechanical systems.

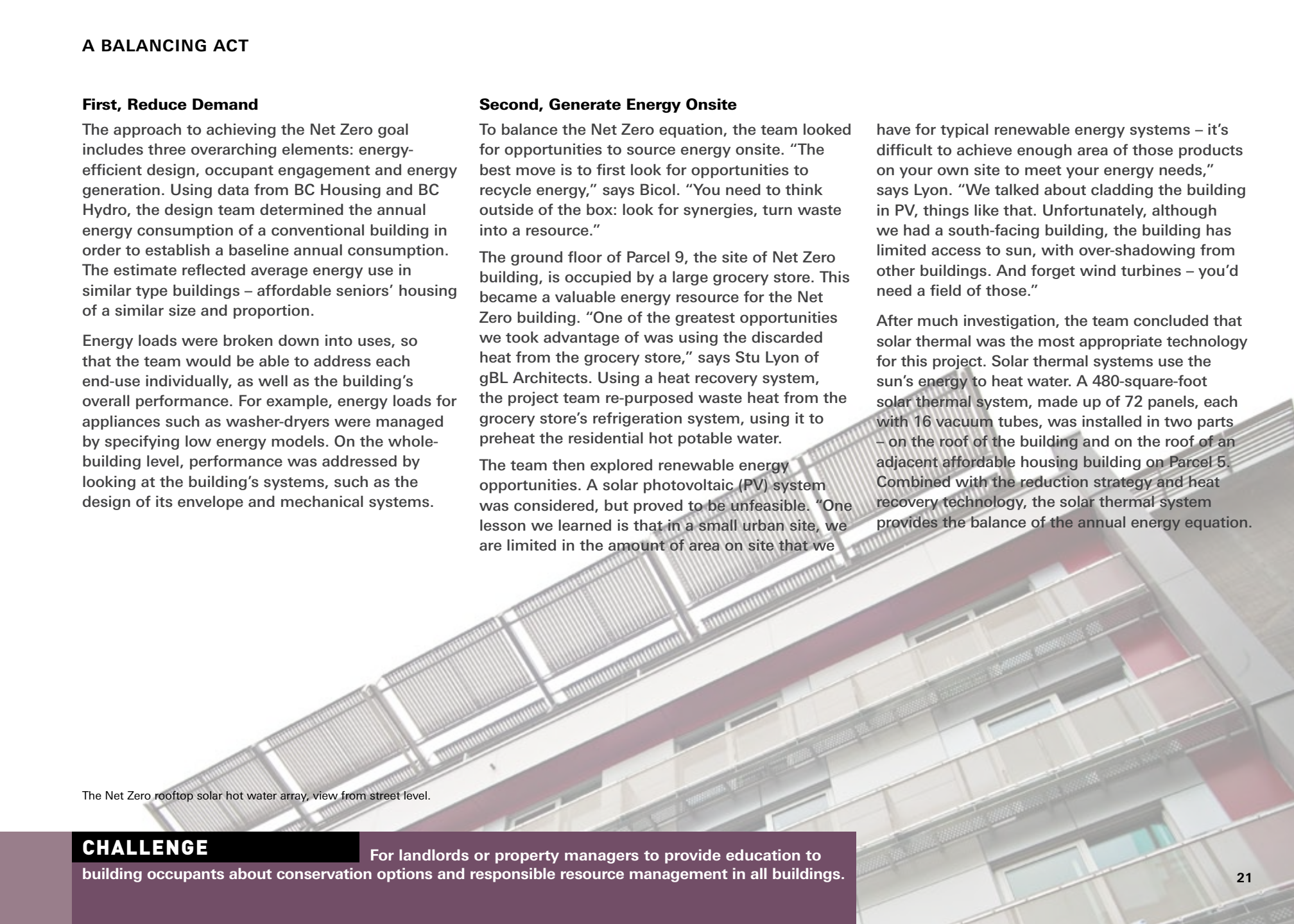
Second, Generate Energy Onsite

To balance the Net Zero equation, the team looked for opportunities to source energy onsite. "The best move is to first look for opportunities to recycle energy," says Bicol. "You need to think outside of the box: look for synergies, turn waste into a resource."

The ground floor of Parcel 9, the site of Net Zero building, is occupied by a large grocery store. This became a valuable energy resource for the Net Zero building. "One of the greatest opportunities we took advantage of was using the discarded heat from the grocery store," says Stu Lyon of gBL Architects. Using a heat recovery system, the project team re-purposed waste heat from the grocery store's refrigeration system, using it to preheat the residential hot potable water.

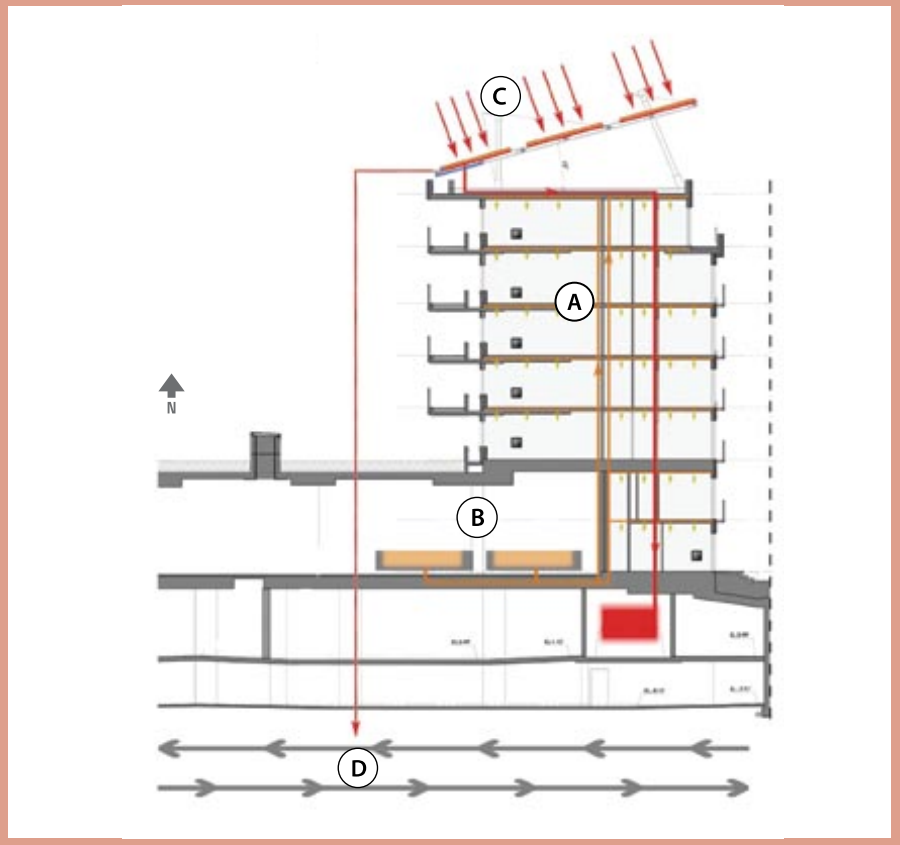
The team then explored renewable energy opportunities. A solar photovoltaic (PV) system was considered, but proved to be unfeasible. "One lesson we learned is that in a small urban site, we are limited in the amount of area on site that we have for typical renewable energy systems – it's difficult to achieve enough area of those products on your own site to meet your energy needs," says Lyon. "We talked about cladding the building in PV, things like that. Unfortunately, although we had a south-facing building, the building has limited access to sun, with over-shadowing from other buildings. And forget wind turbines – you'd need a field of those."

After much investigation, the team concluded that solar thermal was the most appropriate technology for this project. Solar thermal systems use the sun's energy to heat water. A 480-square-foot solar thermal system, made up of 72 panels, each with 16 vacuum tubes, was installed in two parts – on the roof of the building and on the roof of an adjacent affordable housing building on Parcel 5. Combined with the reduction strategy and heat recovery technology, the solar thermal system provides the balance of the annual energy equation.



The Net Zero rooftop solar hot water array, view from street level.

CHALLENGE **For landlords or property managers to provide education to building occupants about conservation options and responsible resource management in all buildings.**



A. DESIGN & OCCUPANT ENGAGEMENT Energy consumption is reduced through efficient building design and occupant engagement.

B. HEAT RECOVERY Heat recovered from the grocery store's refrigeration system provides space heating for the building

C. SOLAR HOT WATER ARRAY Arrays on two buildings provide the remainder of energy to meet the net zero balance. The solar installations provide hot water to the building and excess heat is sold to the Neighbourhood Energy Utility (NEU) **(D)** and used in adjacent buildings.

Energy Savings Before the addition of renewable energy, the Net Zero building's annual energy savings compared to a conventional building is 68%. With the energy production from the solar hot water system as well as the heat recovery from the grocery store refrigeration system, the building achieves Net Zero energy. Including the renewable energy contribution, the predicted annual GHG savings for the building compared to a baseline model is equal to roughly 280 tonnes of carbon dioxide equivalent.

Thermal Net-Metering

On long, sunny summer days, the solar thermal arrays will produce an abundance of heat energy – an amount that far exceeds the building's demand. During the winter, when the sun is often obscured by clouds and the days are shorter, the rooftop solar arrays will be less efficient. To address these seasonal fluctuations in solar heat production, the City of Vancouver and the Neighbourhood Energy Utility (NEU) devised a "thermal net metering" system. Through this agreement, excess hot water produced by the solar thermal system that is not used by the building is transferred to the NEU and distributed for use in other buildings on the SEFC site. Conversely, on low-production winter days, the Net Zero building will derive the balance of its heat energy from the NEU.

"The building is successful because of its context," says Ramslie. "It would not achieve its energy goals if it were not connected to the Neighbourhood Energy Utility network and therefore able to export heat energy." Similarly, the building was only able to meet its energy production goals because it was able to use the rooftop of a neighbouring building for solar panels, and draw waste energy from the adjoining supermarket.

The interrelationships between the buildings provide a useful lesson, a model that is transferable to future projects across Canada and beyond. According to the 2006 census, four out of five Canadians (more than 25 million people) live in urban areas. As the urban population continues to rise, it is crucial for Canadians to explore ways of applying and integrating clean energy technologies in an urban context. Implementing renewable technologies in a dense urban environment presents challenges that include shading from neighbouring buildings, limited site area and managing stakeholder relationships.

The approach taken at SEFC turned the challenge of a restrictive urban environment into an opportunity to establish relationships between the buildings and the various energy systems. "This process ended up delivering a high-performing building relying mostly on passive design, and proving that such projects are business models of urban collaboration towards collective targets, rather than isolated design exercises," says Undurraga.

Performance Indicators

Although the design team went to great lengths to estimate the building's annual energy balance, it's not enough to design a Net Zero building and assume that it will meet its projected performance objectives. Once the building is occupied, it is key to monitor the building's systems and track its actual performance. The building has a monitoring system in place that will record its performance over time to measure the success of the chosen technologies, and offer lessons for future applications. "Monitoring is fundamental. If we don't have feedback and reporting, we don't have Net Zero," says Ostojic.

Education and Engagement

Behaviour change – the human factor – is an element that is often overlooked in discussion of sustainable design. When trying to meet the Net Zero goal, the design team had to consider how the occupants would use the building. Part of the occupant agreement for the building is that the occupants must be made aware of the building's objectives and their role in helping to meet them. "You know you've achieved a successful green building not when you get the plaque, but when occupants are engaged," says Ramslie.

Collaboration

The strategy to meet the Net Zero objective emerged from a dedicated integrated design team, with each member bringing individual expertise and a commitment to out-of-the box thinking. With a shared vision, the diverse team of professionals met regularly to assess their progress. "I learned that good buildings are a collective effort of design that involves clients, city officials, users, a cohesive design team, and a well-crafted set of objectives and road map. Learning from the best in doing so changed forever my understanding of architecture," says Undurraga.

Transferability

"This project was a great opportunity: it was Vancouver's first trial at a Net Zero multi-unit residential building. As we designed the building, we thought about how transferable this would be to other sites in Vancouver, how it could inform future development. This building, the shape and footprint is similar to a typical Vancouver 120-foot deep site. Theoretically, the lessons that we learned here can be applied to sites around the city," says Lyon.

"Monitoring is fundamental. If we don't have feedback and reporting, we don't have Net Zero."

Goran Ostojic, Principal, Cobalt Engineering.

CHALLENGE

For local governments to make it easier to transfer energy across property lines, in order to boost efficiency, share resources and create opportunities for turning waste into fuel.

PROFILE

Albert Bicol

PEng
Partner, Cobalt Engineering

Albert Bicol was involved early on in the master planning for the Olympic Village site. Later, he played a key role as mechanical consultant on the design of the Net Zero building. Bicol contributed his expertise in passive design to the process of lowering the energy demand for the building.

"It's important to be open-minded. Don't think about boundaries. Use things twice," says Bicol, citing examples of the Net Zero building's use of 'waste' heat from the grocery store, and the building's outdoor corridors having a dual function as both hallways and shading devices.

Bicol's passion for passive design is counterintuitive for a mechanical engineering professional. He delivers presentations around the world on the topic. "We're putting ourselves out of business," he jokes, by advocating an approach to energy-efficient building design that reduces reliance on mechanical systems.

"The Net Zero building was a bold statement, and a step toward regenerative buildings. Telling the story of this building will encourage others, and inform future projects. There's a huge learning curve for everyone, but the more we get educated, the more we will achieve."

On the south shore of False Creek, develop a neighbourhood that is the model of sustainability, incorporating forward-thinking infrastructure; strategic energy reduction; high-performance buildings; and high transit access.

With those words in 1991, the City of Vancouver challenged itself to redevelop an abandoned brownfield site adjacent to its downtown core into a vision of what Vancouver – and all cities – could become in the future. Though many involved at the time will confirm they didn't know exactly what "sustainability" meant or would look like, they understood it was a critical goal.

The willingness to set a vision and then reach for it, through community consultation, private sector collaboration, and eventually, the driving urgency of the Olympic deadline, resulted in the Millennium Water Olympic Village that stands on the shores of SEFC today. In chapters past, we have detailed the tangible steps of the development journey. Here, we include reflections and comments from those who were involved, as they consider where they have come from and where we all go from here.

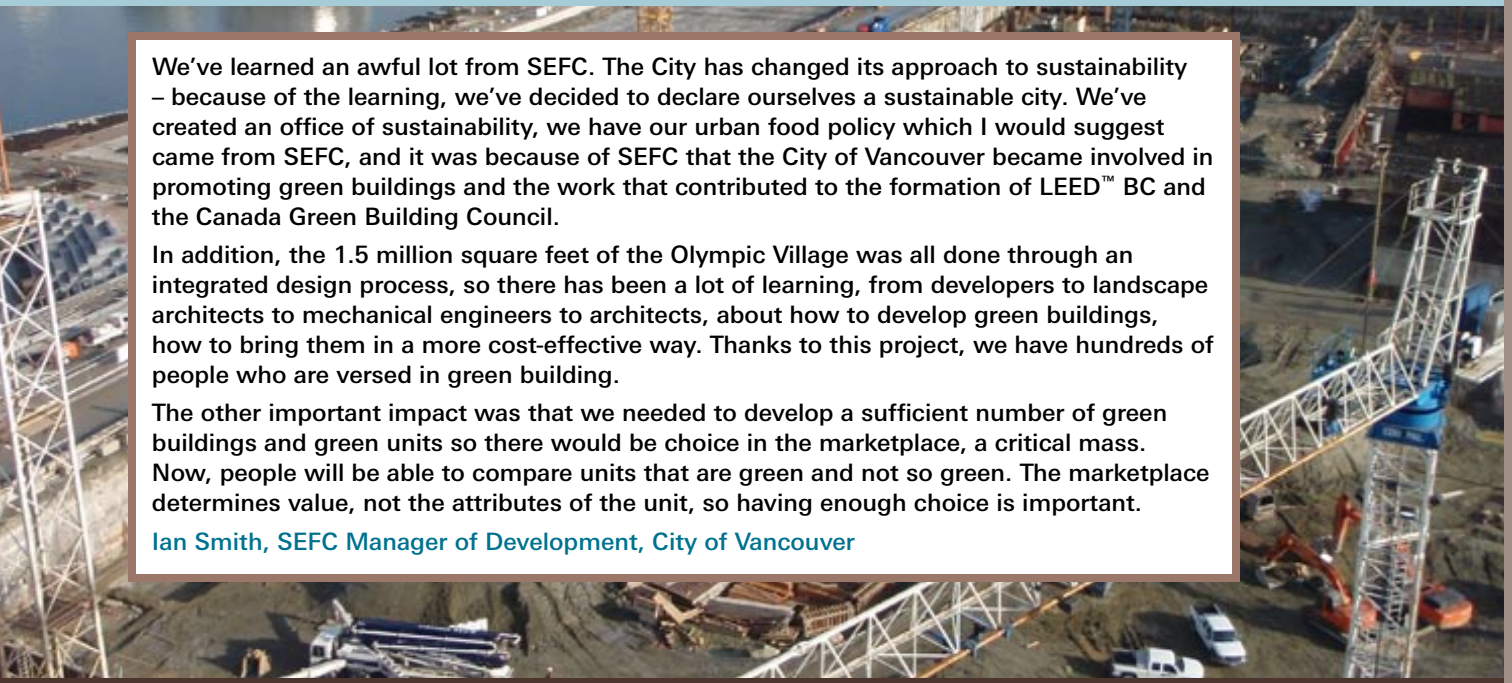
The site of the future Millennium Water Olympic Village, prior to development, c. 2006.

SEFC and the Olympic Village establish a new model for Vancouverism. It's one of the most interesting mixes of sustainability, urbanism, livability and vibrancy that we've ever seen. It dispels the myth that we do one type of building in Vancouver – the tower and podium. The message that sustainability can take many forms is going to be very powerful for us as a city.

Models are only useful if they change business as usual, and the Olympic Village has already changed the status quo – how our zoning works, the way we perceive barriers to green design, the way we see passive design and urban agriculture, the way we think about urban form and density. Everything has changed.

The residents of this new community will be able to lead a matchless lifestyle for sustainability – very urban, very sustainable, very healthy, very safe and very vibrant. It's usually pretty hard to get all of those components in one place. I think the careful planning in the Olympic Village has achieved a community that is more than the sum of its parts.

Brent Toderian, Director of Planning, City of Vancouver



We've learned an awful lot from SEFC. The City has changed its approach to sustainability – because of the learning, we've decided to declare ourselves a sustainable city. We've created an office of sustainability, we have our urban food policy which I would suggest came from SEFC, and it was because of SEFC that the City of Vancouver became involved in promoting green buildings and the work that contributed to the formation of LEED™ BC and the Canada Green Building Council.

In addition, the 1.5 million square feet of the Olympic Village was all done through an integrated design process, so there has been a lot of learning, from developers to landscape architects to mechanical engineers to architects, about how to develop green buildings, how to bring them in a more cost-effective way. Thanks to this project, we have hundreds of people who are versed in green building.

The other important impact was that we needed to develop a sufficient number of green buildings and green units so there would be choice in the marketplace, a critical mass. Now, people will be able to compare units that are green and not so green. The marketplace determines value, not the attributes of the unit, so having enough choice is important.

Ian Smith, SEFC Manager of Development, City of Vancouver

PROFILE

City of Vancouver Sustainability Group

The Sustainability Group focuses on climate protection, green building and bringing sustainability to all aspects of running and building the city. The idea for building a Net Zero demonstration project at SEFC emerged from the Sustainability Group.

The City of Vancouver is a North American leader in green building policy. "We've always taken our Kyoto commitment seriously," says David Ramslie, the City's Sustainable Development Program Manager. "The City has set a goal for new construction to be carbon neutral by 2030."

In order to meet this ambitious target, the Sustainability Group's multidisciplinary team takes an integrated approach, advocating for a low-carbon lifestyle. This encompasses a sustainable approach to transit, building codes, infrastructure, zoning and development, design guidelines, and public engagement in conservation efforts.

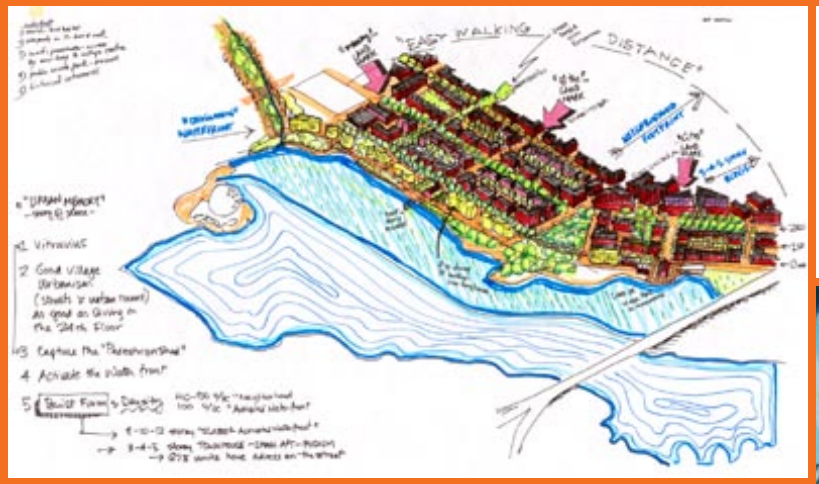
At SEFC, the Sustainability Group's dedication to the Net Zero target meant that the goal could be realized. "The City allowed energy to be transferred between properties – this is a big deal, says Goran Ostojic of Cobalt Engineering, giving credit to the Sustainability Group's leadership. "The concept of crossing boundaries should be transferred to future developments if we are to make progress with carbon neutral building."

Let's go back in history. I remember when there were no Olympics, no Athletes' Village. There was an industrial site there, part owned by the City, part not. If you talked about sustainability at that point, most people wouldn't know what you were talking about and the other half would think you were an idiot. Historically, if you looked at our policy framework, we didn't have much on alternative energy, there was no urban agriculture, and so on. Since SEFC, those issues are now at the forefront.

Larry Beasley, Former Director of Planning, City of Vancouver

Throughout this project, we had a level of cooperation with other agencies that we don't always have, and I think the key was that from the start we said, 'Let's not talk jurisdictional lines. Let's have a process where our goal is that everyone agrees, where we make decisions based on everybody accepting that the solution is the best one given the circumstances.' It was a very good process. I hope we can continue that, because it made a lot of sense.

Tilo Driessen, Park Planner, Vancouver Park Board



Sustainable design is not about getting to the top of the mountain, it's about moving the mountain to where it should have been in the first place. When we started doing the main master planning [for SEFC] in 1997, we wanted to create the new normal – it was a very humble and absolutely global ambition that we had, a simple desire to completely change the way everything is done.

Graham McGarva, VIA Architecture

This project was a watershed of learning in this industry in Canada. It brought in the energy of the community. It was innovative because of all the free advice of hundreds of people.

Mark Holland,
Principal, HB Lanarc

Future buildings and cities will look and feel similar to the development at SEFC, where technical and design innovations result in buildings and communities that minimize the impact on the environment, maximize comfort and enjoyment for the residents, and function better in countless subtle yet significant ways. The future involves extending the integrated design process beyond buildings to designing our communities, benefitting from economies of scale so our neighbourhoods work better in everything, from how we heat our homes to how we get to work. The SEFC development is a pioneer in rethinking sustainable neighbourhoods in Canada.

Lance Jakubec, Senior Consultant, Research and Information Transfer, CMHC

Up until the last 150 years, the world evolved very slowly because we had no ability to tap into this wonderful thing called fossil fuel – we used common sense to define how life would be. As soon as we were able to tap into this great medium, we started to ignore a lot of things including the laws of physics and common sense. What is passive design anyways? If you're sitting under the hot sun what would you do? Put the shades up! But instead, since fossil fuel is so cheap, we decide to burn fossil fuel to have cold air blowing in our face while we have the sun on our head. Or we have windows that don't open and we rely on a mechanical system to deliver fresh air, instead of having windows that open and letting nature be nature. The more I have been working in the field of green building, the more I feel like we've totally ignored common sense and the basic laws of physics, and have ended up designing systems to fight it instead of designing systems to work it.

SK Lai, Managing Partner, Cobalt Engineering

Health is not the absence of disease – a person can be terribly unhealthy without being subjected to a disease. It's the quality and richness of one's life that is at the core of health – it's a survival-rich strategy. In SEFC, the herring have quietly moved back in. Why? Because it's safe, and it's healthy.

Patrick Lucey, Senior Aquatic Ecologist,
Aqua-Tex Scientific Consulting Ltd.

It's a long-term process to change our society. Hinge Park [the recreation and water treatment facility] is part of that, I believe. We're experimenting, we're learning and we're educating the public. I don't know what the long-term outcome will be, but I think we're changing our society in ways that are really, really positive. You couldn't have built this park 30 years ago because you wouldn't have got anybody to buy into it.

John Clelland, City of Vancouver Engineer

This is a damn exciting time. I've been doing this for 16-18 years, and this is the time of the most rapid change ever. You should have tried selling green buildings 15 years ago – that was a challenge. You can get depressed and say we're moving slowly. On the other hand, we are accelerating. I'm quite encouraged about the future, and that's after a long time of heavy slogging.

Blair McCarry

The green roofs and the rainwater toilet flushing are just another paradigm shift we have to go through to get to sustainability. We equate it to the situation 20 years ago, when we would put wild grasses on boulevards, and the public would call the parks department to ask why they weren't taking care of the boulevards and mowing them. Attitudes change, but it takes time. Hopefully the paradigm shift will happen here too.

Peter Kreuk, Principal, Durante Kreuk Landscape Architects

This development shows us there is an alternative to densifying the city that doesn't involve slim tall buildings and streets that are always 66 feet wide. More important is livability. I think the people of Vancouver need to see and experience a neighbourhood with narrow streets, more like Europe. This project will help us visualize spaces that we could densify in Kits, in Kerrisdale. Tower and podium is a model for downtown. This is an urban design model for other areas of the city.

James Cheng, Principal, James KM Cheng Architects

We need to look at buildings as parts of a larger system. Interconnectedness, collective efficiency and performance-based design are all values already present in nature. This [Net Zero] building should be considered as a small step towards better built environments for people, and a more responsible link to natural systems. More than a stepping-stone to something, this project can be considered as a serious revision of how buildings are currently being designed versus how buildings used to be designed before we went off track and started depending on cheap fuel and sophisticated technology. The new paradigm is re-understanding that design is still at the core of great buildings.

Esteban Undurraga, former Partner, Recollective Consulting

It was a bit daunting at first. We would go to these meetings, and people had different perspectives, sometimes a bit at odds. For some City staff who had been so focused on sustainability, it was a real eye-opener for them to think about the various aspects of marketing. And from our team's perspective, it was really interesting listening to the passion of these folks. At the end, everyone was open-minded, everyone listened, everyone embraced everyone else's ideas and a lot of people learned from each other. And now when we talk, everyone speaks a common language. That's a legacy of this project.

Shahram Malek, Principal, Millennium Development Corporation

What it did is challenge us as a group and as individuals to come up with better ideas to enhance performance, with longevity in mind, and as close to zero maintenance as you can possibly provide. We were trying to live creatively in what can be done. If we're not being creative, we're not going to meet the challenges we face.

Doug Dalzell, General Manager, Keith Panel Systems




We all inspired each other. There was no one champion. Everyone fed off each other. The workmanship on the project is phenomenal; people took so much pride in absolutely everything.

Margot Long, Principal, PWL Partnership Landscape Architects

This project definitely raised the capacity of the industry locally. With the size of this project, there were many contractors and sub-trades involved, so it gave them the ability to learn from one another, and the application of these technologies became more familiar. Education on how to do these things was definitely part of the project.

Dave Fookes, Engineer, Morrison Hershfield

What we may see in the next round of sustainable community development is onsite sewage treatment, except it will be called 'WERCs' – Water and Energy Recovery Centres. If we take this one step further, not only do you have wastewater treatment on the site, and streams and wetlands on the site, but that water literally comes through the soil on the green roofs of the buildings, down through the soil on the green walls of the buildings, and by the time it gets through all that soil to the basement, it's drinking water quality again. You've truly completed the cycle. And that, of course, is nature's system.

Patrick Lucey, Senior Aquatic Ecologist, Aqua-Tex Scientific Consulting Ltd

We've learned in SEFC that to change the world, we have to manipulate things we never manipulated in the past, that we've never thought of manipulating before. For example, how energy was delivered was always a given; in SEFC, we're forming our own energy utility. Now, a real challenge is genuine middle-income affordability; I don't think we've headed there very well. We have to start modelling a new sector of housing, a private market non-profit sector. I tell young people this is the struggle they're going to have because I'm pretty sure green construction is in the bag. And the only way we will always be at the cutting edge – no matter how much we celebrate – is to also be critical.

Larry Beasley, Former Co-Director of Planning, City of Vancouver

It's been great for me to see what people are capable of when challenged. Now, our challenge is to see everybody step up here and figure out how they can refocus their developments and their attitudes to not necessarily duplicate this, but to meet those energy-saving challenges, meet those design challenges, create great places for people to live and work in a sustainable place. I believe that is what people will look forward to in the future and it's helpful that we started down that path with Millennium Water.

Hank Jasper, Project Manager, Millennium Development Corporation

There's an original vision for this area that is still completely valid. The challenge now will be for the City to stick with its vision as the rest of SEFC is built. If they keep to the vision and policy statement, this will be an amazing neighbourhood. It will be truly phenomenal. You'll sense it.

Margot Long, Principal,
PWL Partnership Landscape Architects

Lighting standards at the Shipyard Plaza, designed to represent the shape of ribs in a ship's hull, have been fitted with lighting capable of creating a range of moods and colours.

"The Olympic Village is turning out to be the jewel of the Games"

VANOC CEO John Furlong, on CBC's *The Hour*, December 2009

Ultimately, this is not just about sustainable building. The question before us is how we, as social beings, as many tribes living on this delightful piece of hardware floating through space, collectively take responsibility for its well-being at every level in a way that's real, practical and doable.

Environmental issues are in some ways less critical than what we're doing at the community level. At that level, we're densifying the city and making much better use of existing resources by tying into transportation systems, bringing people closer to their employment opportunities, preserving agricultural land by not spreading out. That's where SEFC's contributions lie. We've demonstrated that you can take an inner city precinct and you can provide a livable, residential community that fully supports the working opportunities that people have in cities, and we've created an environment in that city that is healthy. That's the lesson here, I think, and the example I hope we take into the national and international marketplace. The fact that we put blinds on the outside of our buildings, well, that was fun, but Europeans have had blinds on the outside of more sophisticated building envelopes for years and years. But if you go to the centre of many cities you won't find the kind of community or neighbourhood of the type we're talking about in SEFC.

So the real lesson of SEFC is not about individual buildings; it's about community. In building this, have we built a better community from the social point of view, in terms of the relationships that exist in it, and the livability and the value to life? Have we at the same time contributed to our environmental resource issues and have we contributed to an economic environment that helps people sustain their livelihood? The real issue lies in understanding community building in relationship to the massive urbanization of the global population that's underway. SEFC has begun to define many of these issues in a constructive way. It shows us what can be done.

Roger Bayley
Millennium Water Design Manager

Left and centre: Their royal highnesses Prince Charles and Camilla, Duchess of Cornwall, toured the Millennium Water Olympic Village in November, 2009. Right: The completed Salt Building and south end of the plaza await the arrival of Olympic athletes.

PROFILE: ROGER BAYLEY

As a youth completing secondary school in New Zealand, Roger Bayley may have first shown his tendency for balancing tradition with a desire to head off the beaten path. "Tired of school," the young Bayley announced he would not attend university. When confronted with limited job options, however, his practical streak intervened, and he completed a degree in structural engineering.

Still seeking adventure – and now better equipped for it – Bayley immigrated to Toronto. There he was recruited by a Canadian engineer assembling a team to develop the King Abdulaziz University in Saudi Arabia, who "thought I had the right spirit for it," Bayley says. The team completed the master planning and early concept design work for what was at the time the largest building program on the globe. On the job, Bayley worked with architect Paul Merrick of Vancouver.

Returning to Canada, Bayley and Merrick launched Merrick Architecture in 1984. "It was before people were using the word sustainability," says Bayley. "Still, we talked about doing things more efficiently, and adopting standards that are more respectful of the human condition and the environment."

When green building consultant Andy Kesteloo died unexpectedly during the Millennium Water Olympic Village project, Bayley picked up his role. Already acting as project-wide design manager, he was propelled on a demanding learning curve about sustainable design, bringing diverse opinions together through an integrated design program. Bayley earned credit for keeping the aspirations of sustainable development in sight while helping the team resolve the myriad challenges of on-the-ground implementation.

"An incredibly bright, enthusiastic and energized group formed around this project," says Patrick Lucey, an ecologist who consulted on SEFC. "But to be successful, it needed a man of extraordinary vision. Roger is the catalyst that made all of this happen."

For Bayley, it was the experience of a lifetime. "This has been the most spectacular, wonderful, delightful, engaging opportunity. People have wondered how I've survived it given the complexity and the demands, but it was exceptional, to take land in the industrial heart of a city and demonstrate what can be done in community development, with sustainable infrastructure, and considering both social and environmental responsibility." Bayley credits the Maleks, "who had the confidence to take it on in the most complicated construction environment ever seen in Canada."

Bayley developed The Challenge Series to "celebrate what people have done here, from drywallers and heating installers through to the municipal planning authorities who set the vision to begin with."

Bayley's adventure continues as he launches his own company, Roger Bayley Inc. "At the end of the day we need real demonstrations of responsible action; we need to improve people's lifestyles and their ability to raise their families and participate in the global community. If I can take the experience here in Vancouver and use it to help others, that's a valuable conclusion to my career."

ROGER BAYLEY
BE Structural, PEng

SHAHRAM AND PETER MALEK
Millennium Development Corporation

PROFILE: PETER + SHAHRAM MALEK

"When the call came for expressions of interest for the Olympic Village project, we consulted with people we respected. Whoever we talked to would try to put us off doing it. It just wasn't fish or fowl – it was so different."

With a smile, Shahram Malek remembers the discussions as Millennium decided to bid on a project to build an entire community on an abandoned brownfield site in time for the Olympics. The challenges were many: to create a mix of market housing, social housing and commercial space, tied into community facilities not yet developed; an imperative to meet LEED™ standards, implement extensive green roofs and utilize a district energy system; develop unit designs that could meet Olympic athletes' needs and then be sold as high-end condos; and an inability to wrap up financing until after the Olympics. Plus the timeline: only two-and-a-half years with no room for error.

Challenge, however, is what the Malek brothers were brought up on. Born in Iran, their father sent them to boarding school and then to university in the UK, then brought them home to join the family construction and development company, one of the largest in the Middle East. "He told us it was about hard work and honesty, not about money. Anything you aspire to, you can make it happen. He had confidence in us and gave us responsibility at a very young age."

The revolution in Iran resulted in the family's emigration to Canada, where the family started over again in the early 1980s, launching a small construction company and building up to large development projects. The seven-tower City in the Park development in Burnaby gave them experience with building an entire community from scratch. L'Hermitage in Vancouver saw Millennium creatively bringing together market housing, commercial space and social housing in one plan by combining several lots of land and being willing to experiment. Both provided learning and experience that would serve them well as they took on the Millennium Water Olympic Village.

"I think what was intriguing in this project was that it was on the water, right in the centre of Vancouver, with an influence on the whole area. And we felt the Olympics were an opportunity to do something that could be truly unique," says Malek. "Our father always said, 'Do your homework, do your research and be wise, but get the right project. If you don't enjoy what you are doing, you shouldn't be doing it.' So that's the way we approached it – we didn't have time for any fear or regrets.

"We always knew it was going to happen, but certainly it was a huge relief when we were able to take a deep breath, and it was suddenly over with the buildings ready for the Olympics. The next stage will be when the community is being used by people, when everyone can walk through it and enjoy all that it has to offer, including plazas, parks, shops and other amenities. That's something we're really looking forward to."

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Contributors

THE CHALLENGE SERIES TEAM

Roger Bayley
Principal, Roger Bayley Inc.

Sarah Cheevers Northcott
Writer and Project Manager

Ashlee Jollymore
Public Relations

Mizu Creative
Graphic Design

Rachel Moscovich
Writer and Project Manager

Tom Norman
Communications Coordinator

Grace Tang
Asian Marketing

Nina Winham
Editorial Director and Writer

GUEST WRITERS

Gordon Campbell
Gregor Robertson

roger bayley inc

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PLATINUM

Millennium Southeast False Creek Properties Ltd.

Millennium Group is an award-winning Vancouver-based team of professionals and the developers of Millennium Water Olympic Village. They are renowned for their disciplined commitment to high quality architecture and luxurious design. At 1.4 million square feet, Millennium Water is the largest single-phase development in Canada. It is designed to be Canada's largest LEED™ Gold neighbourhood and a leading model of how to build a sustainable residential community.

Metro-Can Construction (OV) Ltd.

Metro-Can Construction is among the top 50 general contractors in Canada and the top five in British Columbia. Focusing on turning visions into buildings and delivering value to their clients, Metro-Can has completed over 280 institutional, commercial and multi-family residential projects. Since placing the first foundations on the Millennium Water project in June 2007, Metro-Can has proceeded to construct 10 LEED™ Gold buildings incorporating 540 condominiums, 250 social housing units, 60,000 square feet of retail space and a LEED™ Platinum community and boating centre.

ITC Construction Group

ITC Construction Group has proven capabilities in multi-unit residential, commercial and social housing construction projects. Established in 1983, they have successfully completed over 100 projects for private developers and public initiatives in BC and Alberta. ITC is proud to be the General Contractor of the eight luxury waterfront towers at Millennium Water. These LEED™ Gold certified structures consist of 315 condominiums and will be complemented by 13,619 square feet of commercial/retail space at the ground level. Quality Counts.

Rennie Marketing Systems

Rennie Marketing Systems (RMS) proudly leads the sales and marketing campaign for the residential component of Millennium Water. Led by Bob Rennie, RMS works closely as "Millennium's representative" to bring to market the most innovative sustainable community in North America. Maintaining the project's identity of environmental awareness, RMS utilizes eco-friendly elements throughout the marketing campaign. RMS marketing objectives extend beyond sales achievements and include increasing global awareness of a new standard of development.

Durante Kreuk Landscape Architects

Durante Kreuk is an award-winning landscape architectural firm with over thirty years' experience in the private and public realms of design and development. A broad perspective and diverse thinking are the key to creating a wide range of sustainable, people-focused urban places. At Millennium Water, the unique challenge of creating a sustainable neighbourhood through an integrated design process was both complex and rewarding. The result speaks for itself.

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Olympic International Inc.

Olympic International creates comfortable, healthy and energy-conscious indoor environments. As a manufacturers' representative, they are committed to bringing the world's most innovative and sustainable technology to local markets. The Millennium Water project utilizes radiant heating and cooling technology, which will substantially reduce energy consumption and system noise, increase available ceiling height and improve overall thermal comfort and indoor air quality.

Enerpro Systems Corp.

Enerpro Systems Corp. are market leaders in intelligent energy management for new construction and infrastructure upgrades to existing buildings. Since 1996, BC's only customizable energy management programs have been providing no-cost, full-service solutions that maximize efficiencies in energy and water use, reduce consumption and provide numerous economic benefits. This groundbreaking innovation has spurred a series of firsts in energy management, such as the ability to view a real-time display of all energy and water consumption within 1,100 housing units at Millennium Water.

Keith Panel Systems

Keith Panel Systems (KPS) is North America's leader in the design, manufacture and installation of rainscreen wall systems. They are proud to be part of constructing Millennium Water. The wall systems installed by KPS will preserve the performance integrity of the exteriors, reduce the heating and cooling loads, provide an extended service life and are virtually maintenance free. Alucobond®, Swisspearl® and specialty glass are the quality exterior finish products featured on proprietary systems by KPS.

Wilco Landscape Westcoast Inc.

Wilco has become expert in the construction and delivery of built landscapes. Offering project management and landscape construction services for civil, parks and development projects, Wilco is a leader in successfully delivering complex projects to its clients. Wilco thrives on diversity and challenges and seeks out projects that require the depth of experience and knowledge that they have accumulated through the vast array of projects the company has built throughout BC and Western Canada.

The City of Vancouver

The City of Vancouver is one of the most livable cities in the world. The City has now also adopted the target of being the "Greenest City" in the world by 2020. Vancouver has received several awards for its various services and programs, including a United Nations (UN) award for Innovation in Public Service and being among the four inaugural cities invited to join the UN's Carbon Neutral Network. To further support these goals Vancouver has spent over a decade in conceiving, and now developing, the Southeast False Creek and Olympic Village Shipyards Neighbourhood as a global model for sustainable urban development.

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VANCOUVER GREEN CAPITAL

Vancouver Green Capital is a statement about Vancouver's commitment to, and position at the forefront of the emerging global green economy. Vancouver Green Capital showcases the City's sustainability leadership and serves to challenge imagination, innovation, and the pursuit of new opportunities. Welcome to Vancouver, where business is green and green means business!

Vancouver Green Capital is especially relevant to Southeast False Creek and the Olympic Village, which has created an exceptional cluster of green expertise and facilities. Learn more at Vancouver.ca or vancouvereconomic.com.

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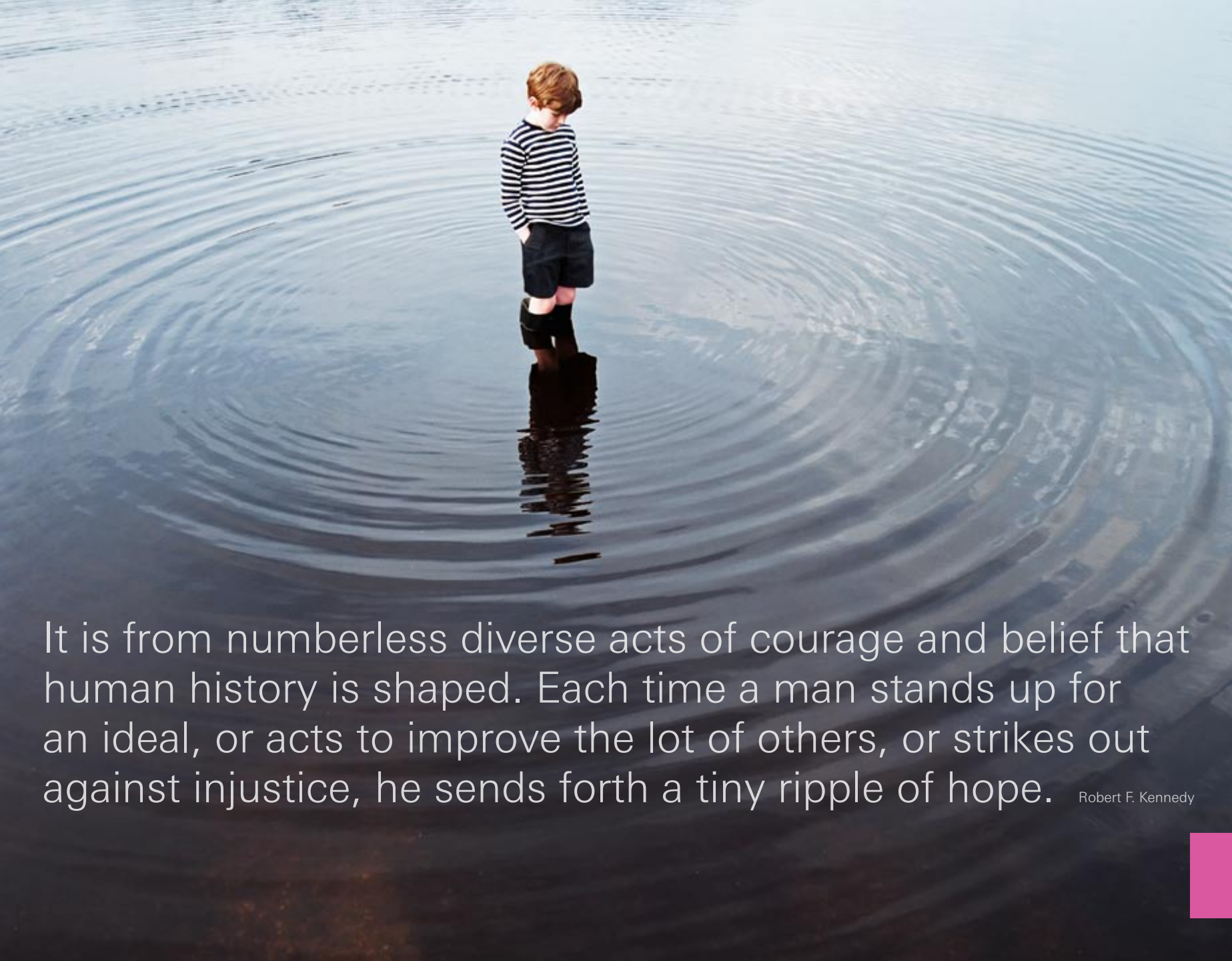

It is from numberless diverse acts of courage and belief that human history is shaped. Each time a man stands up for an ideal, or acts to improve the lot of others, or strikes out against injustice, he sends forth a tiny ripple of hope. Robert F. Kennedy

FRONT COVER Millennium Water Olympic Village completed, Fall 2009.
BACK COVER The Challenge Series seeks to preserve the story of the Olympic Village to inspire future sustainable community development.

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