



VANCOUVER 2020 A BRIGHT GREEN FUTURE
AN ACTION PLAN FOR BECOMING THE WORLD'S GREENEST CITY BY 2020



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LETTER FROM THE GREENEST CITY ACTION TEAM

At the beginning of 2009, Mayor Gregor Robertson assembled the Greenest City Action Team and threw down an audacious and exciting challenge: to develop a plan to make Vancouver the greenest city in the world by 2020.

During our first meeting in February we brainstormed about what Vancouver could accomplish over the space of a decade if it was genuinely committed to becoming the greenest city on Earth. There was palpable excitement in the air as people described their visions of the city's future. As if to endorse the ideas being discussed, a peregrine falcon swept down from the sky and landed on a railing just outside the window of our meeting room. Peregrine falcons are the fastest animal in the world, reaching up to 320 kilometers per hour (200 mph) when diving in pursuit of prey. Peregrine falcons are also a powerful symbol of hope. The species became endangered in the 1950s and 1960s because of the use of organochlorine pesticides, particularly DDT, which thinned the shells of their eggs. After DDT was banned in North America in the 1970s, an extensive recovery effort was undertaken. Eventually, peregrine populations bounced back and the species is no longer considered endangered in the US or Canada.

The peregrine falcon can be seen as the living embodiment of Vancouver's greenest city aspirations. To be the best in the world. To be a source of inspiration, optimism, and hope. To demonstrate that concerted efforts can turn back the tide of ecological damage that humans have inflicted on the natural world and restore nature's wonders. And we must do so in a way that capitalizes on the tremendous economic opportunities presented by the global shift to a cleaner, leaner economy.

In April 2009, the Greenest City Action Team issued its first report, *Greenest City: Quick Start Recommendations*, including 44 concrete actions that the City of Vancouver could begin planning and implementing immediately. We are pleased to report that work on more than two-thirds of the recommended actions is already underway.



Vancouver 2020: A Bright Green Future is the road map for the next stage of a journey that will challenge all of us—citizens, businesses, and governments—to demonstrate our commitment to making the planet a better place for our children and grandchildren. Moving towards an environmentally sustainable economy is a monumental challenge, but cities at the forefront of this tectonic shift will reap tangible and long-term benefits in terms of green jobs, improved health, and prosperity.

Vancouver 2020: A Bright Green Future sets out the broad long-term vision as well as ten specific goals that we need to achieve by 2020 in order to become the global leader in progress toward an environmentally sustainable future. A series of more detailed implementation plans—for the green economy, energy-efficient buildings, clean transportation, urban forest management, and so forth—will need to be developed by city staff through wide consultation with the community. And then it's up to everyone to do their part, to rethink, re-evaluate, and re-imagine the way Vancouver works and how we lead our lives.

It has been an honour and a privilege to be part of the Greenest City Action Team. We look forward to doing everything we can to help Vancouver achieve its goals in the months and years ahead.

Sincerely,



J. R. Byrd *Karen Cooney* *L. H. P.* *R. J. G.*
Dana B. Coakman *M. Hunsley* *Maura Quayle*
Cheryl G. *Maddalena* *Linda* *David G. G.*
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EXECUTIVE SUMMARY

Vancouverites want to live in a city that is vibrant, affordable and sustainable. They cherish the beauty of this spectacular setting, and rely on the prosperity that has been created from abundant natural resources. They also hope that tomorrow will be at least as good as today, perhaps even better. They want an environment that is healthy for themselves – and for their children – and they want jobs that are rewarding and secure. They work hard in the prosperous present and they deserve a bright, green future.

Why green? Because in the highly competitive, highly mobile modern world, the elements that make a community healthy also make it wealthy. Functionally, a compact, efficient city with a well-organized transportation system and a light environmental footprint is cheaper to run and easier to maintain. The bright, creative people who are the key to conceiving and expanding a globally competitive economy also gravitate to the most desirable – most livable – cities.

So, Vancouver starts with a fabulous natural advantage: ours is often named as the most livable city in the world. But our environmental footprint is almost four times the sustainable level. That is, if everyone on earth lived as Vancouverites do today, we would need three to four planets to support that level of consumption.

We only have one Earth, and Vancouverites are well positioned to show the world how to live, and live well, within its limits. We can be the greenest city on earth.

That is a bold goal, especially when the competition includes international cities like London, New York, Sydney, Stockholm and San Francisco. But it's a challenge that we can succeed in, because we have a head start and because every effort we make – every innovation – will enrich our lives, whether or not it delivers an unqualified “victory.” For that matter, the challenge itself can only produce winners because the contestants will all share their successes. In victory, we all will share a sustainable world.

The attached report is a pathway to victory. Authored by Mayor Gregor Robertson's Greenest City Action Team, it identifies 10 long-term goals, supported by a set of measurable and attainable targets that will have Vancouver well on its way to environmental sustainability by the year 2020. Every green business, green building, new rapid transit line and electric bus, new community garden, and new greenway will generate additional momentum. Each success will create demand for more action.

This is, once again, a path to prosperity. It is a roadmap to health and long life, for Vancouver's residents today and for all the world's children tomorrow. Implemented aggressively and creatively, this plan will cement Vancouver's position as a Green Capital – a hotbed of green commerce and innovation. It will show, unequivocally, that when it comes to economic – and ecological – competitiveness, Vancouver means business, but not business as usual.

The following are 10 long-term goals that will turn Vancouver into the greenest city in the world. These are ambitious goals, some of which may take 20 to 30 years to achieve. Each goal is accompanied by a measurable 2020 target to ensure we remain on track.

ONE

Green Economy, Green Jobs

1. Green Economy Capital: Secure Vancouver's international reputation as a mecca of green enterprise
2020 Target: Create 20,000 new green jobs
2. Climate Leadership: Eliminate Vancouver's dependence on fossil fuels
2020 Target: Reduce greenhouse gas emissions 33 per cent from 2007 levels
3. Green Buildings: Lead the world in green building design and construction
2020 Targets: All new construction carbon neutral; improve efficiency of existing buildings by 20 per cent

TWO

Greener Communities

4. Green Mobility: Make walking, cycling, and public transit preferred transportation options
2020 Target: Make the majority of trips (over 50 per cent) on foot, bicycle, and public transit
5. Zero Waste: Create zero waste
2020 Target: Reduce solid waste per capita going to landfill or incinerator by 40 per cent
6. Easy Access To Nature: Provide incomparable access to green spaces, including the world's most spectacular urban forest
2020 Targets: Every person lives within a five-minute walk of a park, beach, greenway, or other natural space; plant 150,000 additional trees in the city
7. Lighter Footprint: Achieve a one-planet ecological footprint
2020 Target: Reduce per capita ecological footprint by 33 per cent

THREE

Human Health

8. Clean Water: Enjoy the best drinking water of any major city in the world
2020 Target: Always meet or beat the strongest of B.C., Canada, and World Health Organization drinking water standards; reduce per capita water consumption by 33 per cent

9. Clean Air: Breathe the cleanest air of any major city in the world
2020 Target: Always meet or beat World Health Organization air quality guidelines, which are stronger than Canadian guidelines

10. Local Food: Become a global leader in urban food systems
2020 Targets: Reduce the carbon footprint of our food by 33 per cent

The goals listed here are undeniably bold. But they are achievable with current technology, policy and best practices. In each category, the Greenest City Action Team has outlined actions that have been tested and proven in other jurisdictions. Each is also ultimately affordable. Some will require significant capital expenditures upfront. But all will pay dividends that will make Vancouver more efficient, more affordable and finally sustainable. Together, they will make this the Greenest City on Earth.

INTRODUCTION

Vancouver enjoys an international reputation as the world's most livable city, reinforced again in 2009 by The Economist. Vancouver also ranks among the greenest cities in the world, thanks to bold decisions made by our predecessors, such as protecting the watersheds of the North Shore mountains, creating Stanley Park, maintaining public access to long stretches of the waterfront, and rejecting freeways through the city.¹ More recently, Vancouver was one of the first cities in the world to recognize the gravity of the threat posed by climate change, with the Clouds of Change Task Force recommending in 1990 that we begin reducing CO2 emissions. Today, residents have the smallest carbon footprint in North America. Vancouver is full of inspired, creative people, with a great deal of passion on environmental issues.

Despite our natural advantages, environmental values, and history of leadership, Vancouver is still far from achieving environmental sustainability. We continue to consume vast quantities of resources and produce prodigious volumes of greenhouse gas emissions, air and water pollution, and solid waste. Our ecological footprints are three to four times larger than the Earth can sustain. The implications are clear: we must find ways to lighten our footprint while at the same time improving our enviable quality of life.

The greenest city in the world will be a vibrant place where residents live prosperous, healthy, happy lives with a one-planet footprint, so as not to compromise the quality of life of future generations or people living in other parts of the world.

Vancouver is not alone in its quest to be the greenest city. We face fierce competition. For example, in July 2009 London Mayor Boris Johnson pledged to make London the "cleanest and greenest city in the world."² Sydney, Copenhagen, New York, Portland, Seattle, San Francisco, Chicago, Toronto, Berlin, Paris, Stockholm, and others have joined the race. Becoming the greenest city is more than an environmental objective: it's also a savvy economic strategy, for it will offer a competitive advantage in attracting highly mobile investment dollars, businesses, entrepreneurs, and talented workers.

Vancouver 2020: A Bright Green Future establishes 10 bold long-term goals modeled on Sweden's world-leading approach to environmental objectives and inspired by the Swedish idea of sustainability within a generation.³ We acknowledge that achieving Vancouver's long-term goals will likely take twenty to thirty years, so for each of the 10 long-term goals, we identified 2020 targets that are ambitious but achievable. The targets use rigorous, robust metrics that will ensure transparency and accountability – proof that Vancouver means business. We

want to lead the world, and leadership requires that actions speak louder than words.

Each of the 2020 targets is accompanied by a section that sets out key issues, benchmarks Vancouver's performance against other world leaders, and explains how the goals could be achieved through a combination of actions in five areas:

- the City of Vancouver leading by example with policies and practices;
- strategic partnerships with businesses, other levels of government, First Nations, universities, and NGOs;
- communications and engagement to increase awareness and motivate action;
- financing mechanisms to supplement existing city resources; and
- advocating progressive policies at the regional, provincial, and federal levels.

Vancouver 2020: A Bright Green Future identifies the kind of innovative actions that will help us meet our targets, but the plan is not intended to be comprehensive. City staff, in concert with residents, businesses, and other interested parties, will develop detailed implementation plans for achieving the 2020 targets. Finally, we have included seven Bright Green Ideas, potentially transformative actions that could accelerate Vancouver's ascent to the top of the greenest city rankings.

Can we afford not to act? The Stern Review of the Economics of Climate Change by Sir Nicholas Stern, former Chief Economist of the World Bank, estimated that the world needs to spend 1 per cent of global GDP now to tackle climate change. Failure to do so could result in a bill up to 20 times higher, amounting to \$6.6 trillion per year globally unless the climate crisis is tackled within the next decade. Our failure to act would place the entire burden of responding to climate change on our children and grandchildren.

LONG-TERM GOALS

To become the greenest city in the world, Vancouver will work together with residents, businesses, other organizations and governments to achieve the following goals. Some of these goals can be achieved quickly and relatively easily. Others will require concerted effort and may take a generation – 20 to 30 years. Accountability should be ensured through regular monitoring and public evaluations.

One: Green Economy, Green Jobs

1. Gain international recognition as a mecca of green enterprise
2. Eliminate dependence on fossil fuels
3. Lead the world in green building design and construction

Two: Greener Communities

4. Make walking, cycling, and public transit preferred transportation options
5. Create zero waste
6. Provide incomparable access to green spaces, including the world's most spectacular urban forest
7. Achieve a one-planet ecological footprint

Three: Human Health

8. Enjoy the best drinking water of any major city in the world
9. Breathe the cleanest air of any major city in the world
10. Become a global leader in urban food systems

2020 TARGETS

Achieving environmental sustainability may take a generation, but we must begin to act now. To become the greenest city in the world, Vancouver needs to reach the following measurable, ambitious, and achievable targets by 2020.

One: Green Economy, Green Jobs

1. Green Economy Capital: 20,000 new green jobs
2. Climate Leadership: Reduce greenhouse gas emissions 33 percent from 2007 levels
3. Green Buildings: All new construction carbon neutral; improve efficiency of existing buildings by 20 percent

Two: Greener Communities

4. Green Mobility: Make the majority of trips (over 50 per cent) on foot, bicycle, and public transit
5. Zero Waste: Reduce solid waste per capita going to landfill or incinerator by 40 per cent
6. Easy Access To Nature: Every person lives within a five-minute walk of a park, beach, greenway, or other natural space; plant 150,000 additional trees in the city
7. Lighter Footprint: Reduce per capita ecological footprint by 33 percent

Three: Human Health

8. Clean Water: Always meet or beat the strongest of B.C., Canada, and World Health Organization drinking water standards; reduce per capita water consumption by 33 percent
9. Clean Air: Always meet or beat World Health Organization air quality guidelines, which are stronger than Canadian guidelines
10. Local Food: Reduce the carbon footprint of our food by 33 percent per capita

ONE

Green Economy,
Green Jobs

GREEN ECONOMY CAPITAL

2020 TARGET: 20,000 NEW GREEN JOBS

Long-term goal #1: Vancouver will be internationally recognized as a mecca of green enterprise

Vancouver's economy, once dominated by natural resource industries, is fast becoming knowledge-based. The fish canneries and lumber mills are giving over to globally renowned clean tech, high tech, and green enterprises. Green enterprises provide a new kind of environmentally sustainable economic growth by offering goods and services that meet human needs but reduce our overall ecological footprints.⁴ Green businesses rely on renewable energy; use energy and materials more efficiently; and substitute safer substances for toxic chemicals. Examples of green products range from organically produced foods to electric vehicles and solar hot water heaters. Examples of green services include energy efficiency retrofits and car sharing enterprises.

Globally, it is estimated that the clean energy sector alone already employs more than two million people, while 20 million new clean energy jobs are expected to be added by 2030.⁶ In the US, clean energy jobs grew at a rate of 9.1 per cent between 1998 and 2007 while total jobs increased only 3.7 per cent.⁷

For purposes of comparison, San Jose (California) aims to create 25,000 new clean tech jobs in 15 years.⁸ Early reports indicate that San Jose is well ahead of schedule.⁹ The City of Vancouver expects to add more than 50,000 new jobs by 2020.¹⁰ Creating 2,000 green jobs annually and 20,000 green jobs by 2020 are ambitious but achievable targets, as San Jose's experience indicates.

Becoming the greenest city in the world will be an economic stimulus both directly and indirectly. Many of the recommendations in Vancouver 2020: A Bright Green Future will create green jobs and attract investment. Tens of thousands of buildings will require energy efficiency retrofits.

The Green Building Code will inspire the next generation of architects, designers, engineers, and building professionals. Building and operating the public transit infrastructure needed to meet our mobility goals will create many more jobs. Initiatives to boost the production and consumption of local food, plant 150,000 new trees, increase recycling and composting, and use water more responsibly will all create green jobs and assist the local economy.

Indirectly, environmental quality is a major economic asset. Educated and skilled workers are highly mobile, able to find jobs where they choose or carry jobs to places they prefer. Becoming the greenest city in the world will enrich Vancouver's existing competitive advantage. Our incredible beauty and clean, green environment will serve as a magnet to high tech, clean tech, and green enterprises by providing a virtual 'second paycheck' to sought after and talented employees.

In addition to attracting new businesses, Vancouver needs to promote and support existing businesses. We already have a successful technology-exporting cluster, with industry leaders in clean energy, fuel cells, clean diesel technology, and power management. Xantrex Technology, Ballard Power Systems, Westport Innovations, Powertech Labs, Pulse Energy, Sempa Power Systems, Day4 Energy, and Nexterra Energy are among the local clean tech leaders. Vancouver's leadership in electric vehicle infrastructure gives us a competitive advantage in another important clean tech sector.

What is a green job? There is no single definition and in fact many are being developed as cities and countries work towards greening their economies. The UN Environment Programme offers a detailed definition of green jobs as: Work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contributes substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution.⁵ Green jobs include both new jobs and existing jobs in professions and trades that become green through re-training or new directions. Examples of the latter might include a farmer converting from conventional to organic agriculture, a construction worker trained to do energy efficiency retrofits, and an engineer working on the smart electricity grid.



VANCOUVER

GREEN CAPITAL

The City recently announced a new branding effort called “Vancouver Green Capital”, acting on green economy recommendations from the Greenest City: Quick Start Recommendations report. Conceived by business development experts and the Vancouver Economic Development Commission, this new brand is intended to signal that Vancouver means business, but not business as usual. The brand will be used in marketing the City of Vancouver, its businesses, people, and success stories to the world. For example, it will be featured in Vancouver House during the 2010 Games, showcasing the best and boldest of Vancouver to a global audience. It’s time to challenge London as the self-described Low Carbon Capital, Seattle as the Green Building Capital, and San Jose as the Clean Tech Capital.

Other potential green economy ideas include creating a green business certification scheme that recognizes and rewards businesses that meet predefined criteria and collaborating with business associations to de-

velop and promote “best practice” toolkits for greening businesses. San Francisco operates a successful green business promotion program, as does London, with its Green 500 initiative.¹¹ According to a recent survey of San Francisco Green Businesses, 42 per cent reported an increase in business since receiving their recognition.¹²

A Buy Local campaign, targeting everything from food to fashion, would boost the economy and protect the environment. The City could start by favouring low-carbon goods and services in its procurement policies and then partner with the business community to develop a Buy Local campaign that dovetails with Vancouver’s Green Capital branding. Vancouver could work with local suppliers to green their operations. Buy Local campaigns support jobs, increase the share of profits remaining in the local economy, and boost contributions to local charities (since local businesses are more likely to contribute to local causes than businesses with headquarters elsewhere).

Cooperatives, social enterprises, and community economic development are also important players in the green economy. There are close to 9000 co-ops and credit unions across Canada, with more than 17 million members and 150,000 employees. Local leaders, such as Vancity and Mountain Equipment Co-op, demonstrate that cooperatives are often at the forefront of progressive business change. They are firmly rooted in local communities and are controlled democratically by their members. The City of Vancouver could support cooperatives and community economic development in many ways, e.g. by considering cooperative ownership and management of future district energy systems and including a social enterprise lens in its green procurement policy.

In *Greenest City: Quick Start Recommendations*, we identified a number of actions that will help stimulate Vancouver's green economy, including:

- creating a Green Economic Development Strategy;
- implementing a green jobs pilot project;
- adopting and leveraging a green procurement strategy; and,
- establishing the Greenest City Action Fund.

These actions, while already underway, will need additional resources to succeed. As well, these efforts need to be coordinated with provincial, regional, and private sector green economy initiatives to maximize effectiveness.

Two additional signature ideas are outlined below: the creation of Low-Carbon Economic Development Zones and a green entrepreneur kick-start program. Low-Carbon Economic Development Zones, featuring green infrastructure and a variety of financial incentives, will enable the City to attract businesses that anticipate a carbon-constrained world, whether the constraint originates from legal restrictions on greenhouse gas emissions or skyrocketing prices for oil and gas. The green entrepreneur kick-start program would provide financial assistance, management support, and expert mentoring for aspiring entrepreneurs with bright green business ideas. Capitalizing on these ideas will give Vancouver a leg up on other cities in the race for environmental sustainability.

Bright Green Idea

LOW-CARBON ECONOMIC DEVELOPMENT ZONES

Vancouver should establish a number of Low-Carbon Economic Development Zones, areas designated to serve as magnets for the development of low-carbon businesses, technologies, products, and services. These zones would attract investment capital, research and development funding, grants, and other financial resources for advancing renewable energy, energy efficiency, and other low carbon technologies, materials, practices, and processes. These zones will also serve as real-world laboratories for the implementation, monitoring, and evaluation of policies intended to reduce greenhouse gas emissions. As other governments create these zones, opportunities for cooperation, knowledge exchange, and partnerships will proliferate.

The opportunities are immense. In 2008, global financing for clean energy surpassed fossil fuels, with an investment of \$155 billion.¹³ The global clean energy market is forecast to grow to \$350 billion by 2020.¹⁴ According to the UN Environment Programme, investments in energy efficiency in buildings could generate between two and 3.5 million green jobs in Europe and the US alone in the years ahead.

A Low-Carbon Economic Development Zone could be located in the False Creek Flats, including land zoned for cradle-to-cradle manufacturing (no toxic elements and no waste), a multi-million square foot Digital Village (the new version of a Science and Technology industrial park), the Great Northern Way Campus (focusing on digital media and sustainability), and the Discovery Parks lands. The zone would be a demonstration and experimentation place for leading edge green building and landscape design and construction, clean transportation, zero waste management,

and renewable energy. It would foster relationships between business, educational institutions, and the public sector.

A False Creek Flats Low-Carbon Economic Development Zone could also include:

- The proposed Light House Centre of Excellence in Green Building Design;
- The new permanent farmers market and food processing centre proposed by Eat Local, the Vancouver association of farmers markets; and,
- A focus on environmental art, through commissioned art work such as at the VCC Skytrain station, and the Means of Production artists garden in China Creek Park.

Coordinating these efforts with the City, the Vancouver Economic Development Commission, and other partners could create the synergy for a new model of sustainable low-carbon development. Toronto's Discovery District—a 2.5 square kilometre research park in downtown 'where business and research meet'—offers an interesting model.¹⁵ The Discovery District is home to MaRS, a non-profit innovation centre connecting science, technology, and social entrepreneurs with business skills, networks, and capital to stimulate innovation and accelerate the growth and creation of successful Canadian enterprises.¹⁶

Bright Green Idea

CREATE A GREEN ENTREPRENEUR 'KICK-START' PROGRAM

Vancouver is full of entrepreneurs whose innovative ideas for green enterprises are hampered by lack of access to capital or the absence of expert guidance. While the BC Innovation Council and the BC Technology Industry Association offer programs in this area, a focus on green enterprise could inspire exciting new partnerships.¹⁷ The BC Innovation Council's New Ventures BC program is a competition that challenges aspiring entrepreneurs to turn their ideas for innovative products or services into profitable businesses.¹⁸ Although green businesses were among the winners in 2009, New Ventures BC is not limited to green entrepreneurs.

The CleanStart program, led by the Sacramento Area Regional Technology Alliance, is an inspiring model.¹⁹ The program helps clean energy entrepreneurs assemble solid management teams, secure funding, and accelerate the commercialization of innovative products and services. There are 30 active clean energy companies in the Sacramento region, a number that is projected to grow to more than 300 in the next few years, employing an additional 10,000 people and generating over \$5 billion in new economic activity.

The Swiss Venture Kick program is another promising model.²⁰ Funded by private foundations, Venture Kick focuses on business ideas that arise from research at

Swiss academic institutions. Venture Kick works in three stages:

"In stage 1, you structure your business idea, in stage 2, you develop the business case and in stage 3, you test your idea on the market. Each stage ends with a presentation before a high caliber jury. Three stages, three presentations. If you convince the jury, you will receive a financial kick and professional guidance to help you master the next stage. The grants increase from stage to stage, from 10,000 francs to 20,000 francs, and finally to 100,000 francs." [1 Swiss franc = \$1.06 Canadian]

Aspiring entrepreneurs get seed capital and expert guidance. Since its inception in 2007, Venture Kick has supported more than 70 promising businesses, providing exciting new jobs and nurturing an entrepreneurial culture.

A Vancouver GreenStart program could include both public and private partners, including the provincial government, municipal governments, the BC Innovation Council, the BC Technology Industry Association, post-secondary institutions, Vancouver Board of Trade, Yaletown Venture Partners, Chrysalix, BC Hydro, Sustainable Development Technology Canada, and others. The program would require the elaboration of criteria and the recruitment of investors, mentors, and proposal reviewers.

GreenStart would make Vancouver the "go to" place for aspiring green entrepreneurs.

CLIMATE CHANGE LEADERSHIP

2020 TARGET: REDUCE GREENHOUSE GAS EMISSIONS 33 PER CENT FROM 2007 LEVELS

Long-term goal #2: Eliminate dependence on fossil fuels

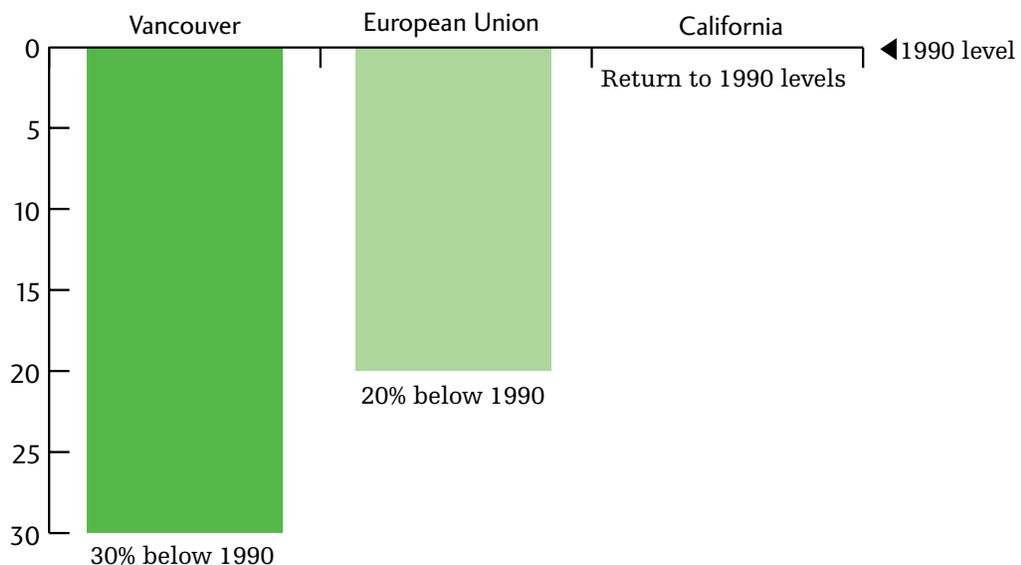
Can you imagine the City of Vancouver without fossil fuels? We can. We envision a bright green future that couples economic prosperity, health, and happiness with decreasing greenhouse gas emissions. We envision less pollution and cleaner air, less machine noise and more birdsong, less pavement and more green space, fewer sick days and healthier people. We want to send a clear and compelling message to the world: prosperity and environmental stewardship can be partners, not opposing forces. We can meet the challenge of climate change in ways that will improve the quality of life for our children, and our children's children.

Metropolitan areas are one of the keys to the global climate challenge, generating more than 70 per cent

of global greenhouse gas emissions. Vancouver already has the lowest per capita emissions in North America, and per capita emissions are down 15 per cent since 1990. The City is committed to becoming carbon neutral in its own operations by 2012. But to be a world leader Vancouver must do more. Our emissions are still twice as high as Oslo, the leading European city.

Vancouver has adopted the province's ambitious target of reducing greenhouse gas emissions 33 per cent below 2007 levels by 2020. But its long-term goal of reducing emissions 80 per cent by 2050 is inadequate. The Greenest City Action Team recommends that Vancouver commit to eliminating fossil fuels by 2040, a realistic goal given the pace of technological and behavioural change as well as capital investment cycles. By comparison, Copenhagen, the self-described "Global Climate Capital," is aiming to reduce its emissions by 20 per cent between 2005 and 2015, and to become carbon neutral by 2025.²¹ Stockholm is aiming to be fossil fuel free by 2050.

Target 2020 Greenhouse Gas Emission Reduction from 1990 levels (%)

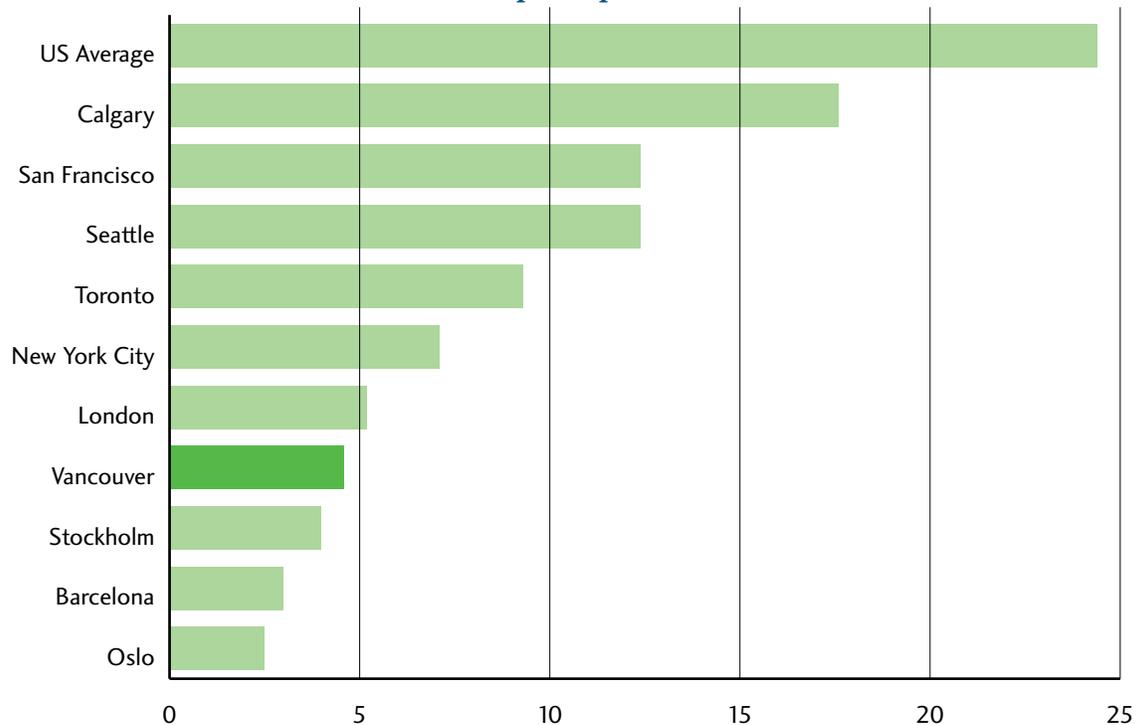


Land-Use Patterns

Buildings and vehicles produce more than 85 per cent of Vancouver’s greenhouse gas emissions and are the focus of the next two sections of this report. However, there is an overarching issue that affects emissions from both buildings and vehicles: density. Land-use patterns are probably the single most important determinant of people’s greenhouse gas emissions and their ecological footprints.²⁵ If Vancouverites lived in complete communities—with a mix of housing types, jobs, schools, daycares, shopping, and recreational opportunities within a ten-minute walk—they would rarely need cars and when they did, most trips would be shorter. Mixed-use neighbourhoods bring jobs closer to homes and allow for live/work space that eliminates commuting entirely. Done right, they are safe, vibrant, people-centred communities that are beautiful and healthy places to live and work.

Some of the actions committed to in Vancouver’s Ecodensity program, related to increasing environmental sustainability while increasing density, are a step in the right direction, and City Council’s recent approval of laneway housing is an excellent initiative. Much more can be done. Most importantly, Vancouver should complete the planning processes required to increase density and permit mixed uses. Increased density is imperative in neighbourhoods close to public transit hubs, employment centres, existing and proposed district energy systems, and amenities such as shopping streets. The award-winning One Planet Community framework could provide a useful model and can offer examples of success ranging from BedZED in the U.K. to Sonoma Mountain Village in California.²⁶

Greenhouse Gas Emissions per Capita (metric tonnes)



If Vancouver is to become the greenest city in the world, it must integrate planning for land-use, transportation, energy, waste, water, green space, and urban food systems. We need to look at our city as an integrated system in which waste is a resource (e.g. compost feeds urban agriculture), density is the key to the development of new transport and renewable energy systems, and those systems help us meet our targets for greenhouse gas reductions and green buildings. Greenways throughout the city will spur walking and cycling while connecting green space, urban agriculture, recreation, and other social gathering spaces. An integrated Greenest City Plan should use a systems approach to create an over-arching vision and structure that shows low carbon energy opportunities, viable sustainable transportation routes and nodes, potential for expanding green spaces, employment nodes, and appropriate housing density. This integrated approach is essential to achieving many of the Greenest City long-term goals, and will facilitate the development of sector-specific plans (e.g. transportation) that are informed by, and consistent with, the bigger picture. The integrated plan should be incorporated into the CityPlan process in 2010.

Climate Change Adaptation

Even if, in the coming years, the world begins to reduce emissions of greenhouse gases, scientists say that some degree of climate change is inevitable. In particular, we must expect more extreme variability in our local climate. In order to safeguard our city's bright green future, Vancouver must monitor the latest climate projections and take appropriate actions to ensure our economy, physical infrastructure, and social frameworks are resilient to a range of new conditions. While many of the actions recommended in this report—building a green economy, reducing waste, reducing our dependence on cars, conserving water, and boosting local food systems—will move

Vancouver in the right direction, other adaptation steps may be necessary.

Other Climate Change Recommendations

In *Greenest City: Quick Start Recommendations*, we emphasized the importance of developing an integrated energy strategy and working with large emitters of greenhouse gases to reduce emissions. Both of these actions are underway. The integrated energy strategy will address both demand-side and supply-side management, with a major emphasis on expanding the use of renewable energy. A key element for Vancouver will be substituting renewable sources for natural gas, both in large district energy systems and at the residential level. As the costs of small-scale renewable technologies continue to fall, they will become increasingly attractive to building owners.

Other ideas for addressing climate change include:

- developing onsite renewable energy at high-profile locations (e.g. City Hall, Science World, schools, hospitals, and other public buildings);
- providing educational materials on climate change with property tax bills;
- incorporating the social cost of carbon emissions into procurement, policy, and capital planning and decisionmaking;²⁷
- implementing rules that reduce the energy use of lighting (e.g. streetlights and billboards lit from below) and also reduce light pollution;²⁸
- offering taxpayers an opportunity to voluntarily offset their carbon emissions. (In Bogota, Colombia, 60,000 people responded to the inclusion of a voluntary contribution to a fund for civic restoration projects by adding 10 per cent to their tax bills).²⁹

Vancouver cannot achieve its emission reduction goals without the participation of residents, businesses, and other organizations. We also need strong actions by the provincial and federal governments. For example, Vancouver benefits from the provincial government's requirement that all electricity be carbon neutral, and the carbon tax, if it proves effective in reducing emissions. Vancouver should urge the provincial government to reinstate the popular LiveSmart program, which provided homeowners with incentives and rebates for completing energy efficiency retrofits. Earlier this year, in *The Globe and Mail*, a group of high-profile British Columbians outlined additional provincial and federal actions that would assist Vancouver.³⁰

- invest \$650 million a year between now and 2020 in new funding for public transit to meet the goals of the provincial public transit plan, including \$450 million per year for the Lower Mainland;
- provide funds to connect Vancouver to President Obama's \$8 billion high-speed passenger rail plan;
- invest at least \$100 million a year in pedestrian and cycling infrastructure;
- provide zero interest loans to B.C. communities through the Municipal Finance Authority for investments in green infrastructure, such as community energy systems;
- increase funding for building energy-efficiency retrofits to \$100 million yearly;

- expand the carbon tax to cover all of B.C.'s greenhouse gas emissions;
- increase the low-income carbon tax credit at the same rate as the tax increases on greenhouse gas emissions;
- adopt world-leading energy-efficiency standards for cars, light and heavy trucks, appliances, and buildings;
- enact a feed-in tariff that supports the accelerated development of clean, renewable energy sources such as solar, wind, and geothermal;³¹
- require that a proportion of new buildings meet European 'passivhaus' standards, and increase the proportion over time (these super-efficient buildings don't need heating systems);³² and,
- require a proportion of new vehicles to be zero-emission (electric or hydrogen) or ultra low emission (hybrid), with the proportion rising over time.³³

Finally, the provincial and federal governments must address the municipal fiscal imbalance—the growing demands placed upon municipalities by senior governments that are not accompanied by increased financial resources. The Conference Board of Canada, the Institute for Research on Public Policy, and the External Advisory Committee on Cities and Communities all recommend that municipalities need expanded revenue-raising powers and/or an increased portion of provincial/federal tax revenues (through a long-term revenue sharing agreement).³⁴ Without additional resources, Canadian cities will be hard-pressed to finance the changes necessary to remain livable, let alone grapple with the unprecedented demands of addressing climate change.

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GREEN BUILDINGS

2020 TARGETS: ALL NEW CONSTRUCTION CARBON NEUTRAL; IMPROVE EFFICIENCY OF EXISTING BUILDINGS BY 20 PER CENT

Long-term goal #3: Lead the world in green building design and construction

A. Renewal Strategy for Existing Buildings

Given that most greenhouse gas emissions will come from existing buildings over the next decade, we recommend that the existing building stock undergo improvements that reduce total energy use by 20 per cent. A vital step towards achieving this goal, introduced in Greenest City: Quick Start Recommendations, is to require energy efficiency retrofits when a building is sold and when renovation permits are being issued. Berkeley, California, successfully pioneered this approach but Vancouver will be the first Canadian city to implement it. In a similar vein, New York City recently passed legislation requiring all buildings over 50,000 square feet to conduct an energy audit every ten years, make any improvements that pay for themselves within five years, and upgrade their lighting to more energy-efficient systems. New York's Green Building Plan will save New Yorkers \$750 million and create 19,000 green jobs.³⁵

It's a rewarding time to improve the energy efficiency of residential buildings because of healthy financial incentives—more than \$5,000 in federal rebates, plus the 2009 federal home renovation tax credit, and rebates offered by utilities. Vancouver could partner with the provincial government, BC Hydro, Terasen Gas, and Solar BC on a coordinated social marketing program to encourage uptake of these rebates. Recognizing that the upfront costs of energy retrofits are a barrier, we recommend that Vancouver pilot an innovative "On-Bill Financing" financing program (described below).

The City should also strive to achieve energy performance labeling of all buildings by 2015. Denmark pioneered this policy in 1996 and it is now being implemented throughout the European Union.³⁶ A similar effort is underway in Ontario, suggesting that it may be preferable to advocate for provincial implementation here as well.³⁷

We also stress the importance of other Greenest City: Quick Start Recommendations, including:

- priority permitting for low- to no- emission buildings;
- a solar thermal hot water pilot project; and,
- advocating for federal and provincial funding for green jobs training and energy retrofit financing.

These green building innovations will create thousands of new jobs, create a significant economic stimulus, increase the value of buildings, reduce property owners' operating costs, help Vancouver become more resilient to climate change and energy price fluctuations, and position Vancouver as a global leader in green building technologies and expertise.

B. New Buildings

Vancouver has the greenest building code for homes in North America, but the technology already exists to support a more ambitious new construction requirement: net zero or carbon neutral buildings. The UK requires all new homes to be carbon neutral by 2016, Denmark by 2020. Vancouver should develop a green building strategy that will enable all new construction to be carbon neutral by 2020, consistent with the recommendations of the provincial Climate Action Team.³⁸ The cornerstones of carbon-neutral construction are:

1. financial mechanisms to enable the cost of super-efficient construction to be repaid through long-term energy savings;
2. new district energy systems that allow new buildings to connect to a low-carbon energy source;
3. capacity building—training, education, and awareness; and,
4. increasingly strong building code requirements (and associated compliance mechanisms) that both decrease absolute energy and fossil fuel use while increasing the contribution of renewable energy.

The strategy should include a heating bylaw, passive design guidelines, and energy performance requirements for all new buildings. As well, buildings need to be integrated with green transport plans through the provision of parking spaces for car-sharing enterprises, bicycle infrastructure, and other requirements.

Green buildings are designed to maximize the use of low impact and local materials, minimize water use, avoid the use of toxic substances, and minimize waste. In addition, green buildings provide occupants with healthier, more comfortable spaces for living, working, and studying. Studies show that green

buildings contribute to higher test results for students, higher sales in stores, increased productivity in offices and factories, and earlier discharges from hospitals. Green buildings provide higher market value, lower operating costs, less risk of obsolescence, and put less pressure on local infrastructure.

The City demonstrated leadership in green buildings through its commitment to achieving LEED Gold for new municipal facilities. Vancouver should take the next step, and pledge to make future municipal facilities Living Buildings, which generate their own energy, collect and re-use their own water, and manage their own waste.³⁹ The current policy of requiring LEED Silver when private buildings are re-zoned should be upgraded in 2010 to require a minimum of LEED Gold.

A successful transition to carbon neutral building will require education, training and intensive consultation with architects, designers, engineers, developers, contractors, builders, and tradespeople. Given climate change, limited energy resources, and rising energy prices, it is inevitable that the global construction business will move in this direction. Vancouver should seek partnerships with the province and trade unions to develop world-class green job training programs and apprenticeship opportunities. Being at the forefront of green building will enable Vancouver to generate a wealth of expertise that will translate into further economic opportunities.

Bright Green Idea

On-Bill Financing

On-Bill Financing allows individuals and businesses to match the timing of their payments to the benefits realized from energy efficiency and renewable energy investments. Many buildings could dramatically reduce their annual energy use and associated greenhouse gas emissions through upgrades or renovations that earn an attractive return on investment. In Vancouver, multi-unit residential buildings (MURBs) are the largest users of energy and greenhouse gas emitters, but they have limited access to financing.

It can cost anywhere from several thousand dollars to hundreds of thousands of dollars to improve the energy efficiency of a building or install renewable energy systems. Despite the generous rebates available from governments and utility companies, the current rate of retrofits is too slow to meet Vancouver's target of reducing the total energy use of existing buildings 20 per cent by 2020.

Four main barriers discourage energy efficiency upgrades in single-family homes, MURBs, and small commercial buildings:

1. Lack of access to capital: where owners or occupants are not able to obtain loans from financial institutions – for example:
 - a. Strata Corporations are unable to offer common property as collateral despite having remarkably good credit ratings;
 - b. Individuals with low credit rating are not able to get conventional loans, and,
 - c. Small businesses often lack the collateral required for conventional loans.
2. Split incentives: where those required to invest in the energy efficiency measures or renewable technologies do not receive the benefits—for example:

- a. Landlords, who are responsible for investing in building upgrades, do not benefit from their renters' reduced energy bills (and/or cannot recover costs through rent increases); and,
 - b. Home and condo owners may not anticipate recovering the full cost of their investment if they don't intend to be long-term owners.
3. Perceived uncertainty of energy savings and ability to recover investment: Some consumers are skeptical about paying for large investments in energy efficiency when there is a perceived risk that they will not realize the savings and recover their investment.
 4. Low electricity prices: Cheap electricity rates lower the return on investment for energy efficiency and renewable energy retrofits.

To overcome some of these barriers, the City of Vancouver should create a voluntary Local Improvement Charge system that allows the City to pay the upfront capital costs of energy efficiency projects, with repayments by building owners over a period of years through a charge on their property tax bills.⁴⁰ The overall costs of a major retrofit program can be reduced by bundling large numbers of upgrade projects together to achieve economies of scale unavailable to single building owners.

An On-Bill Financing Program for Vancouver could work like this:

1. A homeowner or landlord would secure an energy audit and then choose an accredited contractor to carry out the recommended energy efficiency and/or renewable energy upgrades (within the scope of the program as defined by the city). Potential improvements could include high-efficiency windows; wall upgrades; additional insulation; on-site renewable energy generation; and improved heating, ventilation,

- and air-conditioning (HVAC) systems.
2. The property owner applies to the city for financing, secured by the property.
 3. The city approves the proposed work.
 4. The contractor does the work and is paid by the city.
 5. The property owner repays the city through an increment on their property taxes.

Financing is the key to this kind of program. American cities are financing energy efficiency retrofits through the issuance of bonds, called PACE bonds (Property Assessed Clean Energy Bonds).⁴¹ With PACE bonds, the proceeds are lent to commercial and residential property owners to finance energy retrofits. The property owners then repay their loans over 20 years via an annual assessment on their property tax bill. PACE bonds can be issued by municipal financing districts or finance companies. Berkeley is a North American pioneer in using this financing tool.⁴² It began accepting applications for its Berkeley FIRST pilot project on November 5, 2008 and the entire budget of \$1.5 million was applied for within 10 minutes.⁴³ The success of the program led to its expansion across California.⁴⁴ More than a dozen states have passed enabling legislation in the past two years.⁴⁵ Portland recently started a pilot project.⁴⁶

Vancouver currently does not have the legal power to issue this kind of bond. This is a major barrier to Vancouver's desire to be at the forefront of tackling climate change through making our buildings greener and more efficient. In order for Vancouver to emulate these popular retrofit financing programs, it needs to persuade the provincial government to amend the Vancouver Charter to give it this power.

As a potential alternative or complement to the proposed On-Bill Financing program, Vancouver could work with BC Hydro and Terasen Gas to establish a similar program using transferable utility bill financing (on-bill financing).⁴⁷ The utility company or a third party source of finances would pay the upfront retrofit costs, which would be repaid over time through a surcharge on the utility bill.

These innovative approaches address several of the barriers described earlier. The Local Improvement Charge is similar to a loan but is tied to the property and thus is transferred to subsequent owners if the property is sold. The system is fair because both current and future owners share benefits and costs. Financing could come from the City of Vancouver, the provincial government, the federal government, BC Hydro, Terasen, the Federation of Canadian Municipalities, or a private party such as a bank or credit union. These financing mechanisms also could be used for new green buildings.

TWO

Greener
Communities

GREEN MOBILITY

2020 TARGET: MAKE THE MAJORITY OF TRIPS (OVER 50 PER CENT) ON FOOT, BICYCLE, AND PUBLIC TRANSIT

Long-term goal #4: Walking, cycling, and public transit are the preferred transportation options

Vancouver has a history of leadership in clean, green transportation. In the 1970s, Vancouver was the first city in North America to implement permanent traffic calming, beginning in the West End. In the 1990s, the City began building a network of bikeways and greenways intended to ensure that every resident lived within half a kilometre of a bike route. Since 1994, walking, cycling and transit have increased substantially while the role of private vehicles has declined. The most recent data indicate that transit and walking each make up 17 per cent of trips while cycling accounts for 3 per cent.

Once the integrated Greenest City Plan described earlier is complete, Vancouver should update its 1997 Transportation Plan. The top priorities should continue to be walking, followed by cycling, then public transit, while building no additional road capacity. The Plan should provide a detailed explanation of how the Greenest City targets will be achieved, with particular emphasis on reducing greenhouse gas emissions. The key actions will include:

- making Vancouver easy, safe, and cool to walk or cycle in;
- increasing the convenience of public transit;
- accelerating the shift to zero emission vehicles; and,
- moving goods efficiently (including working with the Port of Vancouver to continue greening its operations).

The 2020 target envisions that at least 25 per cent of trips will be via walking and cycling while at least 25 per cent of trips will be on public transit. Land-use changes that promote density and complete connect-

ed communities will play a major role in achieving these goals, as will the promotion of tele-commuting options. Advances in communications technology will offer new and improved ways to connect with people, work from home, and avoid travel. All of these actions will reduce car trips, meaning cleaner air, reduced risks from climate change, better health, and fewer traffic accidents.

Walking and Cycling

Great green cities are walkable cities. Walking is the most environmentally sustainable form of transportation, creating no emissions, no noise, and requiring the least amount of infrastructure. Vancouver already scores well on the Walkability Index, created by Professor Larry Frank and others at UBC. The Walkability Index measures four factors that are key influences on walking behaviour—land use mix, commercial density, residential density, and street connectivity.⁴⁸

Vancouver could do much more to facilitate walking and cycling, although the allocation of additional space on Burrard Bridge is a step in the right direction. Important actions to increase walking and cycling include:

- increased density;
- proximity to services and amenities through mixed land use (zoning);
- additional traffic calming measures;
- additional space for pedestrians to ensure safe sidewalks and crosswalks;
- enhancing the greenways network through lower speed limits for motor vehicles on all non-arterial roads (as recommended in Greenest City: Quick Start Recommendations) and protected bikeways in the downtown area;
- a downtown bike centre as the cornerstone of improved facilities for cyclists commuting to work ;

- promoting a culture based on active transportation;
- interesting streetscapes—art, street furniture, vegetation, community plazas;
- pedestrian and cyclist friendly lighting;
- additional cycling infrastructure, from bike racks to covered parking to showers and lockers at end-of-trip locations;
- improving the connections between bikeways (e.g. filling gaps in the separated cycling route around the downtown peninsula, such as Carrall St. to Coal Harbour), and,
- targeted efforts in neighbourhoods with low scores on the Walkability Index

Studies have found that fewer accidents occur the more people cycle and walk.⁴⁹ In Copenhagen, where 36 per cent of all trips are taken by bicycle, cycling injuries have fallen 50 per cent.

A particularly helpful step would be to connect all primary and secondary schools in Vancouver to the existing greenway system, in an effort to get children walking and cycling to school. The greenways should also connect to community centres, recreational facilities, libraries, and other public services. This will have tremendous health and environmental benefits, as well as building social capital because more people are out walking and cycling. In Vancouver today, 64 of 92 elementary schools and 13 of 18 secondary schools are within 300 metres of an existing greenway. Therefore it would take only a modest effort to complete the connection to the remaining schools. Marin County, California implemented a “Safe Routes to School” program that increased the number of children walking to school by 64 per cent and cycling by 114 per cent.⁵⁰

BENCHMARKS

Copenhagen goal: 50 per cent of commutes by bicycle by 2015

Sydney: 10 per cent by bicycle by 2030, 50 per cent pedestrian

New York City: 34 per cent of trips are already by walking, with 30 per cent using public transit

Public Transit

Vancouver urgently needs a rapid transit line along the congested Broadway corridor. The Downtown Streetcar project should get the green light, and express bus services should be expanded on busy routes (e.g. Commercial/Victoria). Electric express buses should be used on Hastings, 4th Avenue, Broadway/West 10th Ave, and 41st Ave. Waterfront Station should be redeveloped into an accessible and attractive multimodal transportation hub. Local ferry services should be encouraged and supported.

Adequate funding is the lynchpin for these transit projects. At least \$450 million per year is required to improve public transit in Metro Vancouver over the next ten years, requiring provincial and federal financial support. The Greenest City Action Team supports full-cost pricing for road travel, including Translink's suggestion that tolls be imposed on Metro Vancouver bridges to finance transit improvements. Road pricing has been a major success in cities such as London and Stockholm, reducing traffic, accidents, air pollution, and greenhouse gas emissions, while raising funds for transit and other public realm improvements (e.g. wider sidewalks).⁵¹ Increased fees for parking represent another potential revenue source.

Vancouver should vocally support expansion of the regional rail system, both passenger and freight, including extension of the West Coast Express into the Fraser Valley. Moving goods by train will reduce greenhouse gas emissions, reduce air pollution, and decrease traffic congestion.

Clean Vehicles

Even with significant efforts to improve the infrastructure for walking, cycling, and public transit, there will still be vehicles on our roads for the foreseeable future. Facilitating the adoption of clean vehicle and clean fuel technologies will be critical to successfully meeting the 2020 greenhouse gas reduction target.

As set forth in Greenest City: Quick Start Recommendations earlier this year, Vancouver should build on its early leadership and natural advantages in promoting zero-emission vehicles. At least 15 per cent of new vehicles in Vancouver should be fully electric, plug-in hybrids, or fuel cell vehicles by 2020. A growing proportion of public transit should be powered by electricity. The City's own fleet should be gradually converted to fully electric, fuel cell, or plug-in hybrids. Vancouver should continue its North America-leading effort to require electric vehicle charging infrastructure in new residential parking spaces and work with provincial and federal governments to find ways to promote the installation of charging infrastructure in existing homes.

The Greenest City Action Team endorses the provincial government's clean fuel regulations, the federal government's commitment to higher fuel efficiency standards for vehicles, and incentives offered by both governments for the purchase of smaller, cleaner, more efficient vehicles. These initiatives will assist Vancouver in meeting its climate change goals and should be strengthened even further.

Bright Green Idea

RE-IMAGINING VANCOUVER'S PUBLIC SPACES

Today, approximately 32 per cent of the City is paved, for streets, back alleys, and parking lots, while just 11 per cent of Vancouver consists of green spaces in the form of parks, beaches, playgrounds, sports fields, and golf courses. Vancouver residents face a choice: what is more important, cars or people?

Cities such as New York, Sydney, and Paris are taking radical steps to redesign public spaces, putting people first. New York closed iconic Times Square and Herald Square to motor vehicles, making wildly popular new pedestrian plazas in the heart of the city. Broadway is now a pedestrian mall from 47th to 42nd Street and from 35th to 33rd Street. This is part of New York's commitment to create a new public plaza in every one of the city's 59 communities by reallocating pavement to people-friendly uses.⁵² New York is also converting parking spaces for use as bicycle infrastructure.

Sydney, Australia hired Danish architect Jan Gehl to create a new vision for the city. He responded with a proposal to turn George Street into a great boulevard where cafes, pedestrians, bicycles, and buses replace private vehicles.⁵³ Gehl also suggested eliminating the Cahill Expressway and the Western Distributor, two freeways that have long haunted Sydney and blocked access to the waterfront of Darling Harbour.

In 2008, French President Nicolas Sarkozy asked 10 teams of architects and urban planners to imagine a "Grand Paris" of 2040 that would be among the world's most environmentally-friendly and boldly designed capitals. Some incredible designs were proposed, and while Sarkozy's plans have encountered resistance, he has already committed roughly \$50 billion for an ambitious upgrade of the Parisian public transit system.⁵⁴

Vancouver should consider engaging the services of landscape architects, or establishing a competition to re-imagine Vancouver's public spaces. The time is now for implementing big ideas, such as making Granville and Robson Streets downtown into vibrant car-free corridors, enhancing public access to the waterfront along the Downtown Eastside, replacing the Georgia Viaduct, and creating a linked series of public plazas at Robson Square, BC Place, Waterfront Station, and throughout the downtown core. Some brilliant concepts were produced in the Vancouver Public Space Network's recent "Where's the Square?" competition to design public plazas for the city.⁵⁵

ZERO WASTE

2020 TARGET: 40 PER CENT REDUCTION IN SOLID WASTE PER CAPITA GOING TO LANDFILL OR INCINERATOR

Long-term goal #5: Create zero waste

Vancouver is already committed to the Zero Waste Challenge, with an interim goal of diverting at least 70 per cent of solid waste from going to landfill by 2015. Achieving the ambitious objective of zero waste over a period of several decades will require restructuring our mindsets and the economy so that things formerly regarded as waste become viewed as resources. No city can achieve zero waste on its own. The goal requires policy changes, changes in business practices, and shifts in consumer behaviour. Still, there is much that Vancouver could and should be doing. Many other cities have embraced the Zero Waste Challenge, but no city has yet accomplished the goal. Vancouver should strive to become the first.

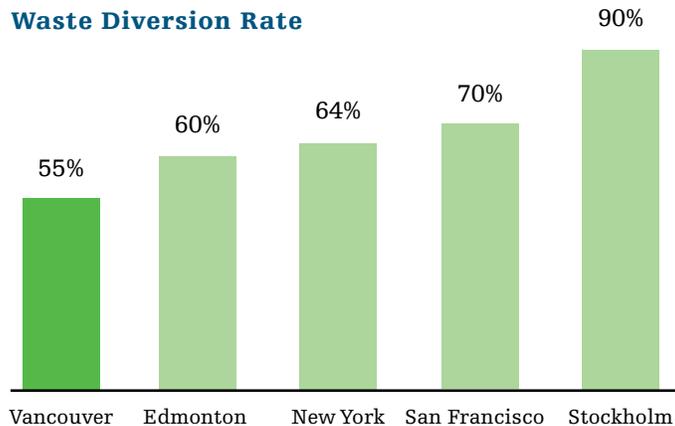
Metro Vancouver produces 1.5 tonnes of solid waste per capita annually, or more than four kilograms per person every single day of the year. Approximately 55 per cent of this garbage is recycled or composted, meaning Vancouver trails leading cities in for solid waste diversion (see graph). However many of the cities with higher diversion rates rely on the controversial practice of incineration (waste-to-energy), burning waste to generate heat and electricity. If done poorly, incineration can pose a threat to health through air pollution and toxic substances in the residue. On the other hand, waste-to-energy is used by some of the world's greenest cities, such as Stockholm and many others in Europe. A preferable approach would be to reduce the sources of solid waste, gradually moving towards a cradle-to-cradle economy where everything can be re-used, recycled or safely composted.

In part because of growing concerns about the health and environmental consequences of disposing of garbage, the costs of disposal have risen steadily and are expected to continue rising. The City of Vancouver's trash is trucked to a city-owned landfill located in Delta, near the Burns Bog protected area, while trash from other regional municipalities goes to Cache Creek. Finding suitable locations for new landfills is becoming more and more difficult, while incineration facilities have high capital costs. From an economic perspective, reducing solid waste creates a competitive advantage as scarce resources are freed up for investment in other priorities.

Therefore, waste reduction needs to be Vancouver's top priority, through by-laws, education, and expansion of extended producer responsibility programs (which require industry to take back products ranging from computers to batteries for recycling and reuse). Plastic bags and polystyrene foam (Styrofoam) take-out food containers, cups, and utensils should be banned or taxed, as many cities and even nations have already done. (Vancouver currently lacks the statutory authority to enforce such a ban, so the provincial government should be pressured to either impose a province-wide ban or amend the Vancouver Charter to allow the City to act on its own.) Vancouver lags behind other cities (e.g. San Francisco, Toronto) in tackling these symbolic sources of trash and litter. San Francisco has achieved 94 per cent compliance with its bylaw prohibiting Styrofoam and requiring all take-out food containers to be compostable or recyclable.⁵⁶

The second solid waste priority for Vancouver, identified by residents and incorporated in Greenest City: Quick Start Recommendations, is to accelerate work with Metro Vancouver to implement city-wide composting programs that include all residents, all businesses, and other institutions, such as schools and

Waste Diversion Rate



hospitals. Work is underway, and should include support for backyard composting, neighbourhood-scale pilot projects, and participation in Metro Vancouver’s planned regional composting program.

A third priority is to improve the recycling program for businesses and multi-unit residential buildings. This will require cooperation with Metro Vancouver and additional resources for outreach, education, monitoring, and enforcement.

Once a citywide composting system is in place and improvements made to the recycling system Vancouver should consider adopting a comprehensive recycling and composting bylaw similar to the one recently enacted in San Francisco.⁵⁷ San Francisco’s Universal Recycling and Composting law requires everyone—single family residents, multi-family residents, and businesses—to sort their waste into containers designated for recycling, composting, and garbage. Building owners are required to educate tenants, employees and contractors, including janitors, on how to separate materials.

A fourth priority is to strengthen existing measures for construction, renovation, and demolition waste. The acceleration of energy efficiency retrofits in Van-

cover has the potential to increase this element of the waste stream. One potential action that would address this problem and create green jobs is to create one or more Re-use Centres, in partnership with local social enterprises. Re-Use Centres would collect functional and valuable items that would otherwise go to landfill—building materials, furniture, electronics, and household goods. Portland’s ReBuilding Center diverts eight tons of reusable building materials from landfills every day, and then resells these items—sinks, tubs, tile, lumber, doors, windows, trim and much more. The ReBuilding Center also operates an eco-friendly demolition service, runs a furniture making shop (reusing wood and other materials), provides a free pick-up service, and offers a variety of classes and workshops.⁵⁸

A fifth priority would be tackling hazardous wastes, which merit special attention due to their threat to health and the environment. Hazardous wastes can be reduced effectively at the source through provincial product stewardship programs, public education, and outreach, including support for local businesses. The City recently included information on household hazardous waste and extended producer responsibility programs with the annual collection calendar. Oth-

er opportunities to pursue similar initiatives should be pursued. As recommended in *Greenest City: Quick Start Recommendations*, Vancouver should work with other municipalities, the provincial government, and industry to expand the scope and effectiveness of extended producer responsibility programs and move towards the cradle-to-cradle approach.

As a guiding tool for implementing all these priorities, the City should apply community-based social marketing principles in order to achieve the best possible results from investments in new programs or services. This kind of marketing emphasizes direct contact among community members and the removal of barriers. It has been shown to be effective in bringing about behavioural change, which is a necessary condition for waste reduction and diversion.

The City also should develop an aggressive waste reduction strategy for its own operations. This initiative could inspire the broader community and help build the market for recycled and recyclable products. This would require direction from City Council and an investment in building the knowledge and capacity of City staff. Partnerships could be pursued with industry or other key institutions in a joint zero waste initiative that would share learning, costs, etc., and have a larger, more visible impact.

EASY ACCESS TO NATURE

2020 TARGETS: EVERY PERSON LIVES WITHIN A FIVE-MINUTE WALK (300 METRES) OF A PARK, BEACH, GREENWAY, OR OTHER NATURAL SPACE; PLANT 150,000 TREES

Long-term goal #6: Vancouver residents enjoy incomparable access to green spaces, including the world's most spectacular urban forest

Green spaces play a crucial role in supporting: urban ecological systems; people's health; wildlife habitat; storm-water run-off and infiltration of ground water; critical connections with nature, especially for children; places for diverse cultures to manifest themselves; and a sense of community. Of particular interest given rising health care costs and an aging population are the potential health benefits. Studies have found that access to nature contributes to healthier populations.⁶⁰ For example, contact with nature reduces blood pressure, cholesterol, and stress.⁶¹ Exercise is good for you, but exercise in pleasant natural spaces is even better.⁶² Contact with nature enhances child development.⁶³ And access to green space enables senior citizens to walk and socialize, resulting in longer, healthier lives.⁶⁴

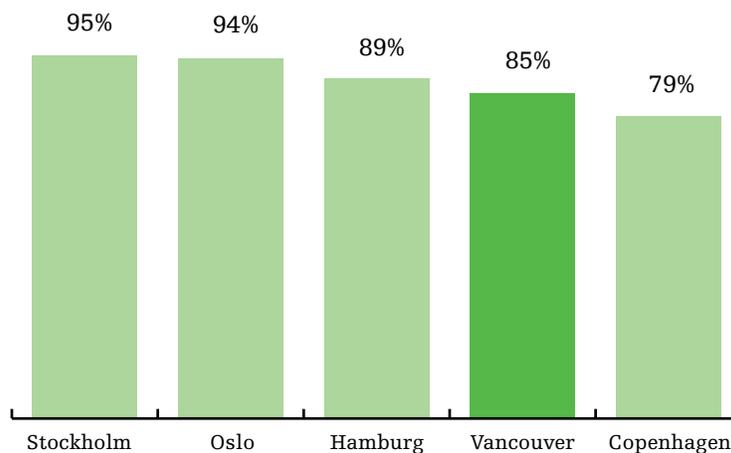
Although British Columbians are the healthiest people in Canada, and least likely to be overweight, nearly one out of two still forego the health benefits of regular physical activity.⁶⁵ Today, 71 per cent of Vancouver residents live within 300m of a park or beach, with the figure rising to 85 per cent if schoolyards are included. Some European cities have achieved rates of over 90 per cent. Sydney, Australia has a 2030 goal of enabling all residents to live within three minutes of greenways that connect to waterfront and parks. In order to achieve the 2020 target and keep up with world leaders, Vancouver will need to:

- add additional parks and green spaces;
- expand the greenways network;
- enhance connections between green spaces and greenways;
- add community gardens and orchards;
- add outdoor recreation facilities; and,
- increase access to the waterfront, particularly along the Fraser River

These steps become more important given that increasing density and a growing population are making existing green spaces busier than ever before. Vancouver also faces major barriers (geographical limitations and expensive real estate), so efforts to expand the green space network will require additional resources, creative thinking, and strategic partnerships with key organizations—e.g. the Nature Conservancy of Canada, Land Trust Alliance of BC, Evergreen Foundation, the Vancouver Foundation, Nature Trust of BC, and Vancouver Natural Heritage Society. Vancouver could also lobby the provincial government to raise the ceiling on parkland dedication (the amount of land a developer must convey to the city for parkland or other recreational purposes).⁶⁶ In BC, the ceiling is 5 per cent, while in other provinces, such as Nova Scotia, it is as high as 10 per cent.⁶⁷ Alternatively, Vancouver could make it a policy to negotiate higher density in exchange for greater dedications of public green space.

Vancouver could launch community consultations about a public spaces strategy that would inventory and examine existing public land use patterns and evaluate potential changes. New York City is upgrading schoolyards and turning them into public green spaces when not being used by children.⁶⁸

Percentage of population living within 300m of public green space



One of Vancouver's greatest natural assets is the system of waterfront parks and trails that runs from Coal Harbour to UBC and along the Fraser River. Vancouver should build on this legacy by creating public access where there are blockages. In particular, there are once-in-a-lifetime opportunities today as the area along the North Arm of the Fraser River undergoes a transition from its industrial past. Vancouver City Council passed a resolution earlier this year calling upon staff to "work proactively with the local community and nearby landowners to review, augment and implement policies to enhance public access to the Fraser River waterfront while balancing the needs of industry." Those words need to be backed up with an infusion of financial resources and translated into action.

Vancouverites also enjoy extraordinary outdoor recreation opportunities in close proximity —the North Shore Mountains, Howe Sound, Whistler/Blackcomb and the Southern Gulf Islands. Spectacular national, provincial, and regional parks as well as wilderness areas all lie within an hour's travel of the city. Vancouver should partner with TransLink and other transportation providers to ensure affordable and convenient access to these locations by public transit.

Spectacular Urban Forest

Slightly more than a century ago, Vancouver was blanketed by trees—towering giants of Western Red cedar and Coastal Douglas fir. These massive trees grew to a height of more than 300 feet, with one report from 1896 describing a fir felled in Kerrisdale that reached 400 feet. By comparison, Vancouver's Dominion Building, the tallest building in the British Empire when completed in 1910, is approximately 160 feet high. Stanley Park and Pacific Spirit Park offer a faint reminder of old-growth grandeur. But Vancouver continues to enjoy a temperate climate suitable to growing trees, and has the potential to be a global leader in urban forest management.

Trees provide an incredible array of environmental, social and economic benefits, including: cleaner air, lower temperatures (sunlight's heat is dissipated by active evaporation from leaves), stormwater absorption, reduced erosion, increased property values, habitat and food for wildlife, the production of oxygen, improved water quality, lower energy costs associated with heating and air conditioning, safer streets, neighbourhood pride, mitigation of noise and dust levels, protection from sun, wind, and rain, and

aesthetic value. Fruit and nut trees offer healthy local food, as well as valuable hardwoods when the time comes to replace them. Some studies show significantly lower rates of childhood asthma in areas with high levels of tree cover.⁶⁹ Trees represent a great investment because they increase in value as they age. A comprehensive study completed for Los Angeles indicated that over a period of 35 years the economic benefits of planting a million trees would range from \$1.6 billion to \$1.9 billion.⁷⁰

Trees also sequester carbon, offsetting some of society's greenhouse gas emissions. Given the importance of tackling climate change, adding trees to Vancouver's landscape can make a useful contribution.

The actual tree canopy cover (how much area trees cover) in Vancouver is not known, and the city lacks an urban forest management plan. It is estimated that there are 1.6 million trees in Vancouver today. The Vancouver Park Board looks after 130,000 street trees, with an estimated value of more than \$500 million, and the city has its own nursery, located in Langley.⁷¹ Despite Vancouver's natural history, other cities are moving ahead of us in forest stewardship. New York⁷² and Los Angeles⁷³ each have initiatives underway to plant a million trees. Chicago has planted over 400,000 trees in recent years, has 80 certified arborists on staff and a tree management budget of \$27 million per year.⁷⁴ Seattle,⁷⁵ Portland,⁷⁶ and Toronto⁷⁷ have comprehensive urban forest management plans. Victoria is just wrapping up a comprehensive public consultation process that will produce that city's first urban forest management plan.⁷⁸

The Greenest City Action Team's recommended goal of planting 150,000 additional trees by 2020 is based on one tree being planted for every four residents. The City of Vancouver will need to develop an Urban Forest Management Plan, in collaboration with the Parks Board, School Board, residents, businesses,

landowners, NGOs such as the Evergreen Foundation, and other institutions.⁸⁴ The Plan should establish tree canopy cover goals, as recommended by leading experts in the field:

- 15 per cent for commercial areas;
- 25 per cent for urban residential areas
- 60 per cent for suburban areas; and
- 40 per cent on average for the City.⁸⁹

The inventory, protection, and expansion of Vancouver's urban forest provides an opportunity to measure the contribution that trees can make to Vancouver's ambitious climate change goals. Native and drought-tolerant species should be given priority, along with fruit and nut trees that contribute toward local food objectives.

To reach the 150,000 tree goal, Vancouver could consider initiating or expanding programs for free or subsidized trees, adopt-a-tree programs, tree planting workshops, a festival that celebrates trees, and incentives for planting additional trees on private property. Maple Leaf Day is celebrated across Canada every September.⁸⁶ Seedlings for children could be distributed through the schools, so that every child in Vancouver has the opportunity to plant a tree and contribute to its growth. The Greenest City: Quick Start Recommendations suggested establishing community orchards of fruit and nut trees in selected parks, and this is currently underway. Vancouver could emulate Seattle's policy of planting two trees for every public tree removed.⁸⁷ There is ample opportunity for planting additional trees on public property, but partnerships with residents, businesses, and organizations like the Evergreen Foundation and the Canadian Urban Forest Network will be essential. The BC Ministry of Forests and forest companies could provide welcome expertise in identifying appropriate planting sites and species.

Restoring Ecological Services

One of the most inspiring news items in the past year was a report that herring, after years of absence, returned to spawn in False Creek. The return of herring, a vital link in the marine food web, indicates that water quality in False Creek is improving and that habitat restoration is succeeding. Salmon are also spawning once again in the Coquitlam River. Focusing on such examples of recovery and restoration can help transform the usually negative storyline of urban damage to nature into a narrative of hope.

Vancouver needs a comprehensive strategy to ensure that its green and blue natural spaces are protected and well managed. In part, the city should contribute to and influence the development of Metro Vancouver's Regional Biodiversity Strategy, emphasizing:

- guidelines to attract and sustain songbirds;
- the protection and recovery of endangered species and ecosystems;
- creating or re-establishing connections between green spaces (wildlife corridors);
- the restoration and protection of wetlands, streams, and riverbanks (particularly along the Fraser River); and,
- a program to monitor and control harmful invasive species.

Working in concert with researchers at universities, colleges, the BC Institute of Technology and non-government organizations such as the David Suzuki Foundation, Vancouver could be a pioneer in identifying, monitoring, protecting, and enhancing urban ecosystem services.⁸⁸ San Francisco and other cities already have regulations protecting endangered species and their habitat.

Bright Green Idea

DEVELOPING CAMPUS-CITY CONNECTIONS

Vancouver is fortunate to be home to some of the finest post-secondary learning institutions in the world, including the University of British Columbia, Simon Fraser University, Langara College, the BC Institute of Technology, Emily Carr University of Art + Design, and Vancouver Community College. There is great potential for closer ties between academic experts and their students working on various aspects of sustainability and the City. More structured relationships—especially between academic experts conducting research in areas directly relevant to the greenest city and city staff—are desirable.

A possible model is the Urban Alliance between the City of Calgary and the University of Calgary.⁸⁹ The purposes of this collaborative project are to:

- develop excellent solutions to complex problems facing Calgary;
- foster world class research and innovation;
- help create a more sustainable urban form;
- develop highly qualified personnel;
- establish flexible, cross-disciplinary approaches;
- energize the relationship between University & City staff;
- facilitate continuity of corporate memory, wisdom and experience;
- help realize Calgary's long term priorities and the imagineCALGARY vision;
- nurture a long term partnership between the City & University; and,
- foster both leading edge innovative thinking and pro-active implementation.

Senior management from one or more academic institutions and the city would need to begin a process to explore a more intentional relationship.

Examples of potential pilot projects in Vancouver include:

- an assessment of green infrastructure opportunities at UBC;
- designing training programs for green jobs;
- inventorying and estimating the value of ecosystem services in Vancouver; and,
- exploring best practices and policy innovations for a range of urban environmental subjects.

The sky is the limit for a collaborative model that taps into the energy and expertise of the institutes of advanced education in ways that address the needs of City staff and management. The mutual benefits, as well as the opportunities to involve students in meaningful, cutting-edge research, are potentially enormous. This kind of program would also assist Vancouver in continuing to cultivate its reputation as a hub for sustainability education.

LIGHTER FOOTPRINT

2020 TARGET: REDUCE PER CAPITA ECOLOGICAL FOOTPRINT BY 33 PER CENT

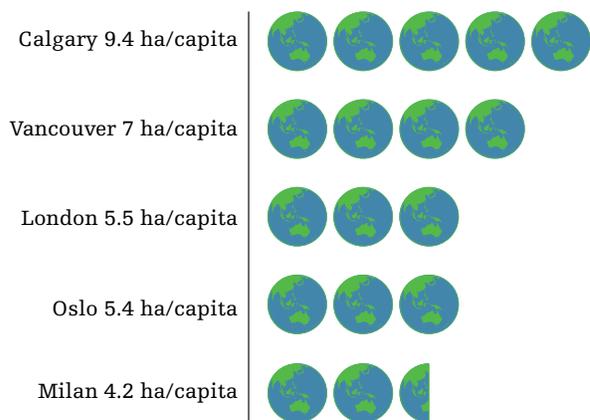
Long-term goal #7: Achieve a one-planet footprint, requiring a 75 per cent reduction from today's per capita footprint

The ecological footprint is a globally renowned means of estimating our overall impact on the planet. Pioneered by Professor Bill Rees and Mathis Wackernagel at the University of British Columbia, the ecological footprint is being used as a communication and performance measurement tool by over 100 cities around the world, from Calgary and Marin (California) to Cardiff and Milan.⁹⁰ Technically speaking, the ecological footprint is an index that measures how much of the regenerative capacity of the Earth is used by human activities.⁹¹ Based primarily on UN statistics, the ecological footprint is defined as “the area of biologically productive land and water required to produce the resources consumed and to assimilate the wastes generated by humanity, under the predominant management and production practices in any given year.”⁹²

Calculations of the ecological footprint include the area of land and water needed to produce crops, livestock, fish, wood and paper products, and energy, as well as the area needed to absorb the carbon dioxide produced by burning coal, oil, and natural gas. An ecological footprint is calculated in hectares, and can be applied to a product, individual, household, school, business, city, region or country. Footprints are generally compared with biological capacity to determine whether a nation is living within its means or whether the Earth can sustain a particular nation's or individual's level of impact.

Today, the average ecological footprint of Vancouver residents exceeds seven hectares per person. Since there are only 1.8 hectares available per capita glob-

The Ecological Footprint of Cities



ally, the implication is that it would take almost four Earths for all humans to live the way Vancouver residents do. Therefore, our long-term goal is to reduce the average footprint by about 75 per cent. While this may seem daunting, the conservative Organization for Economic Cooperation and Development concludes that it would be “relatively easy” through technological improvements and behavioral changes.⁹³ For example, a laptop computer can use up to 80 per cent less energy than a desktop.⁹⁴ A compact fluorescent light bulb uses 75 per cent less energy than a regular incandescent bulb and can last up to ten times as long. An energy efficient fridge today uses less than one-quarter of the energy of a fridge made in 1975. Printing on both sides of the page reduces paper use by 50 per cent. A recycled aluminum can uses 5 per cent of the energy of a new can. And so on.

BENCHMARKS

Calgary aims to reduce its ecological footprint 30 per cent by 2036.⁹⁵ Ottawa, Edmonton, and Toronto are all working with Zerofootprint to reduce residents' carbon footprints.⁹⁶ Marin, California has a long-term goal of cutting its ecological footprint in half, down to the size of Western European cities.⁹⁷

Many of the recommendations set forth in this report will contribute to reducing Vancouver's ecological footprint, such as cutting greenhouse gas emissions and water use by one-third by 2020. However, the City of Vancouver should regularly measure the footprints of its citizens, and incorporate the concept as part of a broader Greenest City social marketing campaign. These efforts could be done in cooperation with local universities and/or groups such as the Global Footprint Network. The City has many opportunities to communicate the messages of "living better, using less" and "One Planet Living" both through its own efforts and through strategic partnerships.

As well, the City needs to demonstrate leadership by systematically striving to reduce the ecological footprint of municipal operations. The City already has demonstrated leadership in some areas, such as high green standards for new municipal buildings and the early adoption of clean vehicle technologies. More could be done, and a greater effort should be made to communicate these successful policies, programs, and practices to inform and inspire others. Two main actions are suggested: the development of a comprehensive environmental sustainability policy for City operations; and the creation of an advanced communications program focusing on community-based social marketing.

Comprehensive Environmental Sustainability Framework

To ensure leadership across all departments, the City needs a unified sustainability framework for its own operations: a strategy that establishes priorities, creates the basis for evaluation of progress, aligns efforts, builds momentum, improves communication (both internally and with the community), and establishes indicators, targets, and accountability points to measure progress. The ten goals in this report or the ten principles used by One Planet Communities could provide a helpful overarching framework.⁹⁸

To fulfill its growing set of responsibilities, such as overseeing implementation of many of the recommendations in both Greenest City: Quick Start Recommendations and Vancouver 2020: A Bright Green Future, the City's Sustainability Group will need a substantial infusion of additional human and financial resources.

Other suggestions include:

- Explore eco-budgeting, as recommended by ICLEI (Local Governments for Sustainability).⁹⁹ Used extensively by leading European cities, eco-budgeting provides a systematic means of measuring urban impacts upon natural resources and ecosystems, providing information to elected officials, city staff, and the public;
- Create a green technology advisory group with international scope to advise the City about new technologies, enabling Vancouver to become an early adopter;
- Monitor international leaders on urban environmental issues; evaluate pros and cons of adapting and implementing policies that succeed elsewhere to Vancouver's context;
- Every staff report should detail how the report/action will move the organization or commu-

nity towards greenest city goals and how it affects specific targets;

- Initiate a departmental Greenest City ambassadors program. Eager and committed people would work to embed Greenest City actions into their department or service area. The City's Sustainability Group could provide support in the form of education, information, co-learning opportunities, and resources;¹⁰⁰
- projects in communities by overcoming bureaucratic roadblocks; and,
- Make every "default option" green, for both internal city operations (e.g. double-sided printing) and service provision to the public (e.g. paperless e-billing).

Communication

The City's communication efforts—such as "One Day Vancouver"—need to be taken to the next level, promoting the goal of becoming the world's greenest city and engaging citizens to participate in the endeavour. This will require a broad community engagement strategy, including community-based social marketing, lectures, community events, and social media. Community-based social marketing that involves direct contact with people is increasingly recognized for its ability to bring about lasting behavioural changes.¹⁰¹

Communications should be based on the idea of becoming a One-Planet City. A key element involves raising awareness of the fact that beyond a fairly modest level of material needs, consumption of additional "stuff" contributes little to human happiness, well-being, and fulfillment.¹⁰² Scientific research confirms what many people already sense, that relationships, community, trust, and having a sense of purpose in life are the real source of happiness.¹⁰³ This is great news from an environmental perspective because the activities that make us happy—spending time with family and friends, outdoor activities,

The future belongs to the nation that best educates its citizens. US President Barack Obama

If we want our children to flourish, to become truly empowered, then let us allow them to love the earth before we ask them to save it. David Sobel, writer and pioneer of place-based education

music, dance, literature, and all kinds of artistic passions, creative hobbies, and lifelong education—generally have modest ecological impacts. There is a virtuous circle, as happy people tend to focus on relationships, personal growth, and community involvement, paying less attention to money and material possessions. People who deliberately spend less time working, shopping, and watching television report marked improvements in happiness and overall life satisfaction.

Reducing our ecological footprint doesn't mean making sacrifices or decreasing our quality of life. In fact, it's just the opposite. Research indicates that smaller footprints can lead to higher levels of happiness. Costa Rica, with a per capita ecological footprint of 2.3 hectares, recently finished in first place globally in a comparison based on the ecological footprint, self-reported levels of happiness, and life expectancy.¹⁰⁴ Costa Ricans enjoy the second longest life expectancy in the New World (just behind Canada) and report the highest life satisfaction of any people on Earth—all with a footprint that is less than one-third of the average Vancouver resident.

Canadian governments at all levels need to begin tak-

ing these facts into consideration, and move towards public policies that place a higher priority on wellbeing and happiness rather than on GDP growth, which is increasingly viewed as an inadequate and even counterproductive means of measuring progress.¹⁰⁵

Ecological Literacy

We are halfway through the UN Decade of Education for Sustainable Development (2005-2014), yet less than half of Canadians are able to identify greenhouse gas emissions as a cause of climate change.¹⁰⁹ Similarly, one in seven Americans believe the oceans are a source of fresh water and only 12 per cent can pass a basic energy test. Studies indicate that raising the ecological literacy of Americans could save \$75 billion annually on energy, water, and health care.¹¹⁰ To overcome the environmental challenges of the future, we need ecologically literate citizens, businesses, and governments.

We need to transform our education system to place ecological literacy on par with reading, writing, and arithmetic.¹¹¹ The transformation needs to be

structural and pervasive, including preschool, kindergarten, primary and secondary schools, trade and apprenticeship programs, colleges, universities, continuing education, and professional development programs. American research proves that environmental education is, above all, good education. Students' academic performance in reading, writing, math, and science and their level of engagement rise when learning occurs in an environmental education program.¹¹²

In 2007, the Government of Ontario appointed a blue-ribbon panel, led by Canadian astronaut Roberta Bondar, to produce a set of recommendations regarding environmental education. The panel reviewed best practices in Canada and around the world before producing 32 wide-ranging recommendations that will make Ontario a global leader in environmental education.¹¹³ The provincial government embraced the recommendations in their entirety.

Vancouver should urge the provincial government to establish a similar panel, with a mandate to deliver recommendations for putting ecological literacy at the very heart of our education system and putting our province in the vanguard internationally. Partnerships with the Vancouver School Board, colleges, universities, the B.C. Teachers' Federation, and others will be vital.

Sustainability World

Vancouver could be the home of a new "Sustainability World," a sister facility to Science World, and similar to the proposed Oregon Sustainability Centre (a world-class centre of excellence in sustainability that celebrates and nurtures the values and strengths of Oregon's leadership in climate change, land use planning, smart growth, green building, environmental stewardship, civic engagement and social justice). Sustainability World could become a world-class ecological education centre and tourism destination with a cutting-edge virtual component so that people anywhere on Earth can visit without having to burn fossil fuels to get here. Sustainability World could highlight exciting new technologies and cradle-to-cradle products; collaborate with communities, businesses, and residents on demonstration projects; host provocative discussions with leading thinkers and practitioners; and offer space for community dialogue. This facility could be housed in a building that meets the Cascadia Green Building Council's Living Building standard (stronger than existing LEED standards), or it could also be the focus of a comprehensive green makeover of the existing Science World.

Bright Green Idea

PLANTING GREEN SEEDS AND GROWING GREEN NEIGHBOURHOODS

A Green Seeds Fund would provide funding for up to 100 citizen-led demonstration or engagement projects annually. The purpose is to stimulate bold experiments, test and evaluate new ideas, and tap into the tremendous energy and creativity of Vancouver residents. Projects will be selected based on innovation, cost-effectiveness, and ability to engage the diverse communities in Vancouver, as well how well they align with Greenest City targets. In order to receive full funding, project leaders would need to demonstrate behavioural changes, citizen engagement, and progress toward green goals. Project ideas may come from the City as well as from citizens, and requested funding amounts can be adjusted following a cost-benefit analysis.

The Green Neighbourhoods program would work with a handful of communities to create showcase zero-carbon demonstration projects throughout Vancouver. Neighbourhoods could propose a variety of energy, land-use, transportation, and educational programs. The City would provide financial and technical assistance to build upon these ideas, perhaps with input from local businesses, academics, and other advisors. Efforts and results would be closely monitored and successes quickly replicated.

The Green Seeds Fund is like the scattering of seeds wherever they might take root within the City, while the Greenest City Showcase Neighbourhoods program involves planting multiple seeds with serious fertilizer for more careful study, cross-pollination/synergy possibilities, and to push the bounds of what can be done. The former is more hands off from City staff, while the latter likely would need more City staff involvement.

Connected to these initiatives would be a new platform for documenting, sharing, and improving best ideas and lessons learned from pilot and demonstration projects. For example, it could be a review panel including City staff and citizens to review Green Seeds and Greenest City Showcase Neighbourhoods outcomes. Or, it could be a wiki site where people upload their own stories and thoughts in an ongoing and evolutionary way. Melbourne successfully used a wiki site to engage citizens in discussions about the city's future.¹⁰⁶

As noted in *Greenest City: Quick Start Recommendations*, both San Francisco and Toronto have successful green neighbourhood grant programs, supporting a wide range of creative projects including geothermal energy systems for older buildings, net-zero energy retrofits, rooftop gardens, urban beehives, and community greenhouses.¹⁰⁷ Another inspiring example is the City Repair Project: citizen-led neighbourhood scale projects in Portland and beyond.¹⁰⁸

THREE

Human Health

CLEAN WATER

2020 TARGETS: ALWAYS MEET THE STRONGEST OF BRITISH COLUMBIA, CANADIAN, AND WORLD HEALTH ORGANIZATION DRINKING WATER STANDARDS. REDUCE PER CAPITA WATER CONSUMPTION BY 33 PER CENT.

Long-term goal #8: Vancouver will have the best drinking water of any city in the world

Water is a defining feature of Vancouver's landscape. Aside from receiving ample rainfall, Vancouver is bounded by the Fraser River, the Strait of Georgia, and Burrard Inlet, making us a blue-green city. Healthy waterways provide an expansive array of ecological services, recreational opportunities, and economic benefits. Salmon are a cultural icon.

Vancouver is extremely fortunate that its water supplies in the North Shore mountains are 100 per cent protected, a legacy reflecting the determined work of local citizens over many decades. Metro Vancouver owns some of the land while the majority is held under 999-year leases with the province, signed as early as 1927.¹¹⁴ Almost 600 square kilometres of mountainous terrain is closed to public access in order to protect the reservoirs that are the source of the city's drinking water. The Capilano, Seymour, and Coquitlam Reservoirs each supply one-third of Metro Vancouver's water supply.

Vancouver's water is tested more than 25,000 times each year. In recent years, Vancouver has consistently met all BC and Canadian health-based standards for drinking water, with the exception of the boil water advisory of 2006. That advisory was caused by high levels of turbidity resulting from intense winter storms. Health experts have expressed concerns about gastrointestinal illness linked to microbiological organisms introduced to Vancouver's water supply by wildlife in the North Shore watersheds.¹¹⁵ Recent surveys indicate that up to 20 per cent of Vancouver residents drink primarily bottled water

because of concerns related to the taste, odour, or quality of tap water.¹¹⁶

A number of actions are already underway or in the planning stages that will further increase the security and quality of Vancouver's drinking water. Old roads in the watersheds that are no longer required are being deactivated to minimize the risk of landslides and erosion and reduce long-term maintenance costs.¹¹⁷ The completion of the \$600 million Seymour/Capilano Filtration Plant, which includes using ultraviolet light (UV) for disinfection, should help eliminate turbidity problems and reduce the use of chlorine. Combined with ozone, UV disinfection is more effective than chlorine in reducing the risks from protozoa and viruses that may contaminate the water supply, and reduces health concerns associated with disinfection byproducts in drinking water. There are also plans to use UV disinfection at the Coquitlam and Capilano Reservoirs with construction beginning in 2010. The estimated cost of the upgrade to UV disinfection at the Coquitlam Reservoir is \$110 million. Metro Vancouver has requested federal infrastructure funding to help defray the cost.

These improvements will usher in an era of outstanding drinking water quality for the residents of Vancouver. By vigorously promoting the quality of its drinking water, Vancouver can help put an end to the wasteful trend toward increasing consumption of bottled water. Bottled water wastes energy and resources and contributes to pollution and solid waste. Vancouver's tap water costs about \$0.00065 per litre whereas buying a one-litre bottle of water can cost as much as \$1.75, more than 2,500 times the price.

Vancouver recently phased out the sale of bottled water at City Hall and other civic facilities, as recommended in the Greenest City: Quick Start Recommendations report. To speed up the decline of bottled water, the City of Vancouver should expand the existing network of public water fountains so that there

is easy access to clean water, particularly in schools and near recreational facilities, beaches, and parks. Adding water fountains could be financed by an additional surcharge on bottled water.

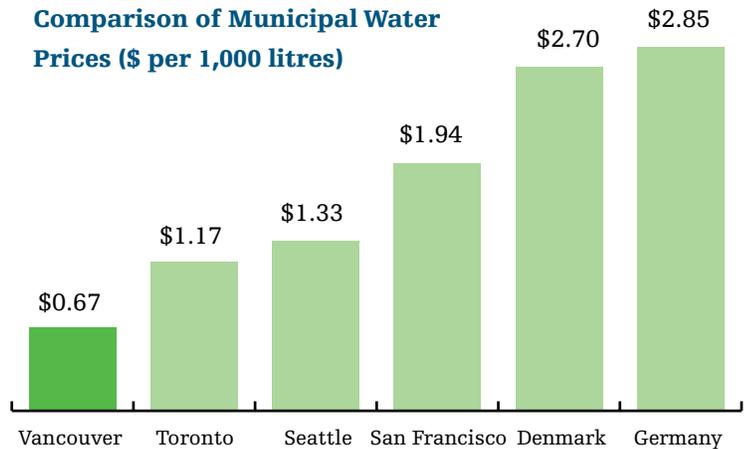
Metro Vancouver has a Tap Water Campaign, launched in 2008, that aims to reduce bottled water sales 20 per cent by 2010. Residents can take the Metro Vancouver tap water pledge here: www.metrovancouver.org/region/tapwater/Pages/TapWaterPledge.aspx

Water Conservation and Stewardship

Perhaps because water is everywhere, Vancouver has taken it for granted. Its average per capita water use – more than 320 litres per day – is fourth highest among Canada’s 20 largest cities and more than double the consumption of leading European cities.¹¹⁸ Vancouver’s water price is one of the lowest in the industrialized world.¹¹⁹ On the pollution side, inadequate sewage treatment, combined sewer overflows, and urban runoff are contaminating the marine environment, leading to beach closures, harm to fisheries, and other adverse environmental effects.

To celebrate water’s place in our region and our lives, Vancouver will have to increase conservation and efficiency, raise the price of water (with mechanisms to safeguard the interests of low-income residents), and reduce pollution. The first step is to adopt the provincial Living Water Smart target of using water 33 per cent more efficiently by 2020.¹²¹ Over the longer term, Vancouver should adopt a goal of fulfilling 100 per cent of its water requirements from existing sources. This means accommodating the demands of population growth through conservation and efficiency gains – a much less expensive alternative to expanding supply.¹²²

Comparison of Municipal Water Prices (\$ per 1,000 litres)



Vancouver needs to develop a comprehensive Water Conservation and Stewardship Strategy. Key elements of the Strategy to reduce water consumption by 33 per cent should include:

- Universal water metering and volume-based pricing;
- Strengthening water efficiency requirements in the Vancouver Building Code (for both new construction and renovations):
 - tested and approved high performance water-saving technologies; and,
 - purple pipes (a second set of plumbing that uses rainwater and recycles water from dishes, washing, and showers) in all new buildings;¹²³
- Rebates for the purchase of water-efficient fixtures;
- Increased social marketing and public education;
- Greater use of rainwater;
- Water efficiency audits, including a proactive leak detection program; and,
- Increased enforcement of water conservation bylaws, including sprinkler restrictions.

FIXING LEAKS IN HALIFAX, NOVA SCOTIA

Using an integrated approach to detect leaks, including noise-mapping surveys and a computerized monitoring system, the Halifax Regional Water Commission (HRWC) can pinpoint problems and immediately dispatch repair crews. Between 1998 and 2004, the HRWC reduced water leakages in the Dartmouth and Halifax systems by 27 million litres of water a day, saving \$500,000 annually.

Actions to address water stewardship should include:

- Innovative stormwater management, including green roofs, infiltration bulges, pervious materials for bike paths, sidewalks and roads, and bio-swales that allow water to flow into the ground where it can be slowly filtered, instead of rushing straight into storm drains and creeks, causing damage and pollution; and,
- On-site rainwater capture and re-use.

As well, Greenest City: Quick Start Recommendations included the following water stewardship actions

- Restoration of shoreline (particularly along the Fraser River) and inter-tidal zones;
- Advocacy for federal and provincial assistance to improve water quality in English Bay, Burrard Inlet, the Strait of Georgia, and the Fraser River; and,
- Advocacy for expedited upgrades to the Iona and Lion's Gate wastewater treatment plants, and incorporating integrated resource recovery into those projects.

WORLD LEADER

In Australia, the Queensland Water Commission's "Target 140" water saving campaign ran from March 2007 until July 2008 with a goal of reducing the region's average residential consumption to 140 litres per day. Facing drought conditions, residents averaged consumption of 129 litres per person a day compared with 300 litres during the previous year.

Bright Green Idea

UNIVERSAL WATER METERING AND VOLUME-BASED PRICING

Metering water use is one of the most important best-management practices for encouraging water conservation.¹²⁴ It fosters awareness and accountability for water use and is a prerequisite to the adoption of volume-based pricing. Universal (100 per cent) water metering is a standard practice in water-wise cities around the world—Los Angeles has had 100 per cent residential metering since 1905. The City of Calgary recently moved to universal metering and has observed that “metered customers use 60 per cent less water on average than customers on a flat rate because they are more conscious of where and how water is used.”¹²⁵

Today, only 14 per cent of water customers in Vancouver are metered, including commercial, industrial, and multi-family units. The rate of metering is the lowest of any major Canadian city.¹²⁶ The 86 per cent that are not metered are predominantly single and two-family residences. Residents without water meters pay a fixed, flat rate, no matter how much water they use. Like an all-you-can-eat buffet, the flat rate contributes to over-consumption. The combination of a low price and a flat rate provides no incentives for conservation or efficiency. And because households that waste water pay the same as those that conserve, the system is unfair, as well as inefficient and unsustainable.

Under volume-based pricing, residents pay for what they use. Those who conserve water will enjoy lower bills than those who waste water. Canadians paying flat rates use an average of 74 per cent more water than Canadians under volume-based pricing structures.¹²⁷ As a result, fewer than 30 per cent of Canadians are still billed using Vancouver’s archaic approach.¹²⁸

The advantages of metering and volume-based pricing include

- fairness in billing;
- an incentive to conserve;
- energy conservation and reduced greenhouse gas emissions (water heating is the number two use of energy in the average home after space heating);
- savings on infrastructure and operating costs for both drinking water treatment and wastewater treatment (lower demand means lower treatment costs, lower pumping costs, and in the case of future infrastructure investments, lower capital costs); and,
- improved system information (allowing more targeted demand management programs, detection of leaks in the system, etc.)

CLEAN AIR

2020 TARGET: ALWAYS MEET WORLD HEALTH ORGANIZATION RECOMMENDATIONS FOR AIR QUALITY, WHICH ARE STRONGER THAN CANADIAN GUIDELINES

Long-term goal #9: Vancouver will have the cleanest air of any major city in the world

Like water, clean air is essential to life and good health. Vancouver already enjoys relatively clean air compared to most major cities, thanks to effective public policies as well as geography. However, further improvements to air quality have the potential to prevent premature deaths from heart and lung disease.¹²⁹ UBC researchers have linked air pollution in Vancouver to increased risk of premature birth and low birth weight as well as childhood respiratory illnesses including asthma, bronchiolitis, and middle ear infections.¹³⁰ Pregnant women, children, and older adults face heightened health risks because of air pollution.¹³¹

The main threats to air quality in Vancouver include motor vehicles (both passenger and freight), on-site construction sources, ships, and older woodstoves/fireplaces. Vehicle exhaust is a witches' brew of pollutants including many of the same toxic substances found in tobacco smoke.¹³² Exhaust from diesel vehicles is particularly problematic, and is regarded as a probable human carcinogen.¹³³

Many of the actions aimed at making Vancouver one of the world's first fossil-fuel free cities also will have positive effects on air quality. Smart land-use decisions, increases in walking, cycling, and public transit use, as well as a shift towards cleaner fuels, cleaner and more efficient vehicles, and greater use of rail will all decrease air pollution. To demonstrate global leadership in air quality, Vancouver will have to measure its performance against World Health Organization guidelines for air quality rather than the relatively weak Canadian guidelines (see Table

below).¹³⁴ Metro Vancouver's Ambient Air Quality Objectives are closer to the World Health Organization guidelines than the weak Canadian guidelines (with the exception of ozone).¹³⁵

Higher concentrations of hazardous air pollutants exist near major roadways, particularly in the first 150-200 metres from the roadside, but as far as 750 metres from major truck routes. Therefore Vancouver should implement policies recognizing that land use decisions can play a significant role in protecting at-risk groups such as children and the elderly. California offers the strictest protection in the US, with a law prohibiting the siting of new schools within 500 feet of freeways and other busy traffic corridors.¹³⁷ The BC Ministry of Environment recommends—but does not require—that schools, daycare centres, long-term care facilities, hospitals and residences be located at least 150 metres from busy roads (those with traffic volumes averaging more than 15,000 vehicles/day).¹³⁸

Research indicates that new high-performance diesel engines reduce the emission of criteria air contaminants (particulate matter, sulphur dioxide and nitrogen oxides) by as much as 99 per cent. Vancouver should require that heavy vehicles and construction equipment (e.g. forklifts, tractors, backhoes, cranes and excavators) meet specific emission standards by 2020. Berlin has restricted travel in its inner city Environmental Zone to low emission vehicles since 2008. Stockholm requires the rationalization of heavy truck traffic before it enters the city centre. To demonstrate leadership, Vancouver should replace any older diesel vehicles in its municipal fleet with new models at the earliest opportunity.

Vancouver should press for expedited implementation of the proposed actions in the Metro Vancouver Air Quality Management Plan that have not yet been completed.¹³⁹ Vancouver could also advocate for a federal-provincial "cash for clunkers" program targeting older diesel vehicles and a new program

Comparison of Canadian, World Health Organization, and Metro Vancouver Air Quality Rules.¹³⁶

	CANADA	WHO	MV
Ozone (8 hour, parts per billion)	65	50	65
Fine Particulate (24 hour, micrograms per cubic metre)	30	25	25
Sulphur dioxide (24 hour, ppb)	115	8	48
Nitrogen dioxide (Annual, ppb)	53	21	21
Carbon monoxide (8 hour, ppm)	13	9	9

for upgrading heavy trucks (e.g. using the successful technology of local company Westport Innovations). The City should also phase out the use of leaf-blowers and gas lawnmowers, which cause both air and noise pollution.

It is well within Vancouver’s reach to achieve the best air quality of any major city in the world—ending the periodic air quality advisories warning residents to restrict their outdoor activities.¹⁴⁰ It would mean that tens of thousands of residents who suffer from asthma and other respiratory ailments could breathe easier. It would mean that parents would no longer have to fear for the well-being of their children’s developing lungs. It would reduce the incidence of premature and low birth weight babies.

LOCAL FOOD

2020 TARGET: REDUCE THE CARBON FOOTPRINT OF OUR FOOD BY 33 PER CENT PER CAPITA

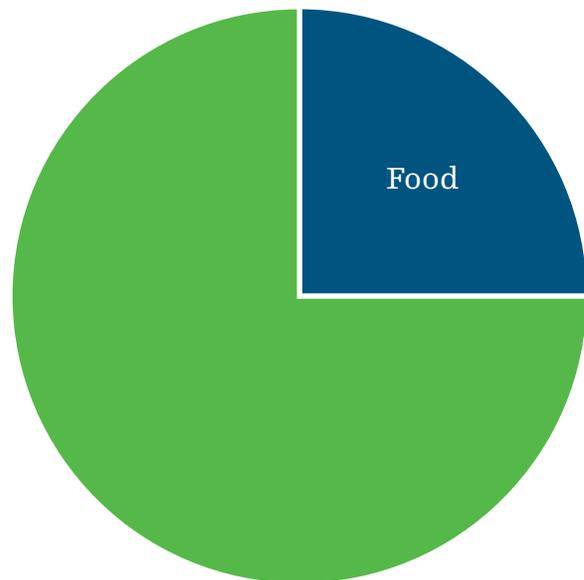
Long-term goal #10: Vancouver will become a global leader in urban food systems

The provision of food creates 20-25 per cent of the carbon emissions of the average urban resident, although many of these emissions are not captured in urban emission calculations because they occur at the production and distribution stages.¹⁴¹ Major emission sources include livestock, energy-intensive production practices, long-distance transportation, the heavy use of synthetic fertilizers and pesticides, processing, storage, and packaging. The UN estimates that the global livestock industry is responsible for more greenhouse gas emissions than transportation, leading experts to suggest that people cut back on their meat consumption.¹⁴²

Local food can be a powerful economic driver, supporting farmers, processors, and retailers, and keeping money circulating in the local economy. Eating local food reduces your ecological footprint, decreases the need for packaging, supports the preservation of diverse heirloom and heritage varieties, and reduces concerns about food safety. Local food is also fresher, more nutritious, and better tasting.

Vancouver already supports and promotes local food through farmers markets, community gardens, and events that connect producers and consumers. The Greenest City: Quick Start Recommendations called for planting an organic garden at City Hall, allocating additional land for community gardens, creating community orchards, additional support for farmers' markets, and a landscaping policy of planting trees, bushes, and other plants that produce fruit, nuts, herbs, and other edible products.

Food contributes 25% of the average resident's carbon footprint



Growing agricultural products in the city is actually a small part of the sustainable urban food system. The significant majority of economic value, climate emissions, and social and cultural experience come from the dimensions of the food system after the raw agricultural ingredients have been produced. With this in mind, the strategy to make Vancouver a world leader in sustainable local food should include an overall commitment to raising the profile of sustainable food in the city for maximum economic, social and environmental benefit, building on the Vancouver Food Charter.¹⁴³

Vancouver's role in building sustainable urban food systems

While there are many stakeholders involved in a sustainable local food system, the City can play a key role through: coordination and partnerships; policies and regulations; education and promotion; and grants.

1. Coordination and partnerships

The City of Vancouver can both lead and contribute to a wide range of sustainable food system initiatives by:

- Creating partnerships to promote healthy, low-carbon diets;
- Developing a volunteer corps and public non-profit partnerships to assist city landscapers in harvesting and distributing edible landscaping produce to low-income communities and food banks;
- Identifying a location and facility for a Vancouver food hub in collaboration with local organizers and businesses;
- Supporting existing social service providers that connect to low-income residents (e.g. meal programs, ensuring high-quality food recovery programs, land and water for additional community garden projects, or relaxing by-laws to allow sales of cut flowers grown on vacant land);
- Using social marketing programs to encourage the conversion of lawns into gardens; and,
- Co-hosting one community food celebration per year.

2. Policies & Regulations

Taking urban food systems to the next level will require innovative new policies and experimentation. Other local governments have been successful in policy reform to address carbon emissions from food. Albuquerque offers recommendations for incorporating low-carbon food actions in every city department.¹⁴⁴ San Francisco recently passed an impressive suite of food policies focused on health and sustainability.¹⁴⁵ The City of Vancouver should focus policy and regulatory resources on the following key areas:

- Green roofs, which can be used to grow food and provide many other environmental benefits, require supportive policies and regulations.¹⁴⁶ Toronto recently passed a bylaw requiring up to 50 per cent green roof coverage on new multi-unit residential dwellings over six floors, schools, non-profit housing, commercial and industrial buildings.¹⁴⁷ Chicago has created millions of square feet of green roofs through generous subsidies;
- Institutional low-carbon purchasing policy for Vancouver and City events; Building on Vancouver's ethical purchasing policy, the development of a low-carbon purchasing policy that includes food would boost demand for low-carbon products and invest in the local economy;
- Advocating for the preservation of agricultural lands in Metro Vancouver and the Fraser Valley;
- Development requirements for community garden set-asides, food processing and storage (e.g. community kitchens), and small-scale food retail in new and retrofit developments; and,
- Edible landscaping policy requiring City facilities to include at least 25 per cent edible landscaping (on green roofs, for example).

3. Education and promotion

Although there is increasing public awareness of the connections between local food and a healthy environment, more needs to be done, including:

- Education and incentives for water conservation to ensure that residents use water efficiently, including drip irrigation techniques;
- Community education around multiple stages of food. Workshops on drying, canning, pickling and preserving local food are growing in popularity;
- Promotion of Small Plot Intensive Farming,¹⁴⁸ which allows urban farmers to grow food on under-used land (through rental or barter arrangements with property owners); and,
- Promotion of a low-carbon diet¹⁴⁹ through a public launch, website development, labeling campaign, and partnering with local businesses to increase awareness and availability of low-carbon food choices.¹⁵⁰

4. Grants

Investing in urban food projects that meet multiple goals—such as employment, poverty reduction, and environmental protection—is an excellent method of maximizing the effects of scarce resources. The City should seek funding from the province, federal government, private sector, and foundations. Potential areas for focused funding are:

- Resource centre or non-profit organization for urban farmers, processors, and distributors that would provide training and resources for the effective implementation and scaling-up of a citywide urban agriculture effort (e.g. techniques for safely keeping bees and chickens in backyards);
- Land and facilities for local infrastructure such as food processing, storage, distribution, and purchasing hubs;
- Construction costs for greenhouses and urban aquaculture pilot projects;
- Seed money for capacity-building urban agriculture projects in low-income neighbourhoods; and,
- Funding for neighborhood houses, community centres, and others that offer meal programs, gardening seminars, and food preservation classes.

CONCLUSION

Making Vancouver the greenest city in the world will require harnessing the city's greatest resources—its people, businesses, NGOs, schools, and institutions. All hands on deck are needed to help achieve the transformation into a one-planet city. The City's role is to demonstrate leadership and empower citizens, businesses, and other organizations as never before.

We recognize that not all of the ideas offered in this report will come to fruition exactly as we envision, nor will all of them be implemented immediately. The world is changing rapidly, and Vancouver is at the mercy of economic conditions, demographic changes, senior government policies, and other factors beyond its control. Additional bright green ideas may arise from residents, businesses, other constituents, and from the cities with whom we are competing in this race for environmental sustainability. For these reasons, the Greenest City Action Team recommends the creation of an advisory body to monitor progress on an annual basis and, if necessary, to recommend additional actions to meet the 2020 targets. In keeping with Vancouver's Open City initiative, the evaluation and review process should be open and transparent. Whistler's online 2020 Explorer tool is a useful model for making information about sustainability accessible.¹⁵¹

It is essential that responsibility for achieving the goals and targets set forth in Vancouver 2020: A Bright Green Future be clearly assigned within City Hall, so that work plans are generated and City Council and the public receive regular progress reports. Annual reports should highlight successes, identify lessons learned and areas needing improvement, and set forth plans for staying or getting on course to meet targets. Vancouver 2020: A Bright Green Future will need to be incorporated into the CityPlan process in 2010.

The actions recommended in this report are good investments in the future of the city, with dividends in the form of better health, a more resilient economy, and a vibrant environment. The air will be cleaner, our homes more comfortable, and it will be easier to get around town. Everyone who lives, works, plays, studies in or visits Vancouver will share the benefits. All programs and policies intended to achieve the 2020 targets must be effective and efficient, but also fair, so that costs and benefits are equitably distributed, the interests of lower-income residents are protected, and everyone does their share.¹⁵²

Vancouver residents are already the healthiest people in North America. Achieving the targets set forth in this report—for walking, cycling, access to green spaces, clean air, clean water, and a low-carbon diet—could make us the healthiest people in the world. Residents will live longer, healthier lives, and will have a heightened sense of fulfillment, satisfaction, and happiness. Living better, while using less.

By sparking a global competition for the title of Greenest City, we hope to inspire not only Vancouverites but also the citizens and governments of cities around the world to join our efforts. Remember the peregrine falcon—we all really do have the capacity to change our habits in ways that restore the natural world and in turn enrich our lives.

We invite you to be a part of this transformative endeavour. Vancouver 2020: A Bright Green Future is a blueprint for a prosperous and sustainable economy, a healthier planet, and happier people.

APPENDIX A:

Greenest City Action Team: Quick Start Recommendations

I. JOBS AND THE ECONOMY

Green Economy

1. Create a Green Economic Development Strategy
2. Establish the Greenest City Action Fund
3. Commission a Green Tape Review
4. Adopt and Leverage a Green Procurement Strategy
5. Revitalize the False Creek Sustainability Precinct

Green Jobs

6. Implement a Green Jobs Pilot Project
7. Require Green Building Retrofits
8. Create Solar Thermal Hot Water Pilot Projects
9. Advocate for Federal and Provincial Stimulus for the Green Economy

Energy Efficiency and Renewable Energy

10. Engage Large Emitters in Reducing Greenhouse Gas Emissions
11. Develop an Integrated Energy Strategy
12. Pursue an Adaptive LED Street Light Project
13. Provide Priority Permitting for Green Buildings
14. Take a Leadership Role on Climate Policy Advocacy

II. GREENER COMMUNITIES

Greener Neighbourhoods

15. Offer Greenest City Neighbourhood Grants
16. Sponsor a Greenest Neighbourhood Vision Contest
17. Co-sponsor a Children's Greenest City Art Contest
18. Re-establish the Mayor's Greenest City Awards
19. Re-invigorate the One Day Vancouver Social Marketing Program

Nature and Greenspace

20. Encourage Landscaping with Native Plants
21. Increase Public Access to Green Space
22. Restore Shoreline and Inter-tidal Zones
23. Advocate for a Healthy Pacific Ocean

Mobility

24. Make Streets Safer for Pedestrians and Cyclists
25. Create a Public Bike Sharing Program
26. Enable Zero-Emission Mobility: The Future of Clean Transportation
27. Build on Olympic Transportation Initiatives

28. Conduct Car-Free Vancouver Trials
29. Advocate for Immediate Investments and Improvements in Public Transit

Clean City

30. Implement City-wide Composting
31. Shift to Biweekly Garbage Collection
32. Tackle Packaging Waste
33. Keep Vancouver Spectacular All Year Around
34. Advocate Waste Reduction Laws and Policies

III. HUMAN HEALTH

Clean Water

35. Expand the Distribution of Water Saver Kits
36. Promote Tap Water and Discourage the Use of Bottled Water
37. Advocate Expedited and Integrated Wastewater Treatment

Local Food

38. Plant the City Hall Organic Community Garden
39. Allocate Additional Land for Community Gardens and Orchards
40. Support Farmers' Markets
41. Create an Edible Landscaping Policy

Protecting Human Health from Environmental Hazards

42. Map Toxic Hotspots
43. Enact a Toxics "Right to Know" Bylaw
44. Strengthen Protection from Pesticides

NOTE: The full version of Greenest City: Quick Start Recommendations is available at <http://vancouver.ca/greeneestcity/greenteam.htm>

ENDNOTES

- 1 J. Punter. 2003. *The Vancouver Achievement: Urban Planning and Design*. Vancouver: UBC Press. M. Harcourt, K. Cameron, and S. Rossiter. 2007. *City-Making in Paradise: Nine Decisions that Saved Vancouver*. Vancouver: Douglas & McIntyre.
- 2 For example, in July 2009 London Mayor Boris Johnson pledged to make London the “cleanest and greenest city in the world.” www.london.gov.uk/mayor/publications/2009/docs/leading-greener-london-300709.pdf
- 3 See www.regeringen.se/sb/d/5775
- 4 T. Jackson. 2009. *Prosperity without Growth: The Transition to a Sustainable Economy*. London: Sustainable Development Commission. www.sd-commission.org.uk/publications.php?id=914 P. Victor. 2008. *Managing Without Growth: Slower by Design, Not Disaster*. Edward Elgar.
- 5 United Nations Environment Programme and International Labor Organization. 2008. *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World* New York: UNEP/ILO.
- 6 UN Environment Programme. 2008. *Green Jobs: Towards decent work in a sustainable, low-carbon world*. www.unep.org/labour_environment/features/greenjobs.asp
- 7 Pew Charitable Trusts. 2009. *The Clean Energy Economy: Repowering Jobs, Businesses, and Investments Across America*. www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf
- 8 City of San Jose. 2007. *San Jose’s Green Vision*. San Jose, CA: City of San Jose.
- 9 City of San Jose. 2009. *San Jose’s Green Vision: Annual Report*. San Jose, CA: City of San Jose, p. 20.
- 10 Metro Vancouver. 2008. *Our Livable Region 2040: Metro Vancouver’s Growth Strategy*. Preliminary Draft: Sept. 30, 2008, p. 24.
- 11 See www.sfgreenbiz.org and www.green500.co.uk/cms/
- 12 See www.sfgreenbiz.org/green-your-business/why-go-green/
- 13 UN Environment Programme and New Energy Finance. 2009. *Global Trends in Sustainable Energy Investment 2009*. http://sefi.unep.org/fileadmin/media/sefi/docs/publications/UNEP_SEFI_Global_Trends_Report_2009_f.pdf
- 14 New Energy Finance. 2009. *Green Investing: Towards a Clean Energy Infrastructure*. World Economic Forum. www.newenergyfinance.com/free-publications/presentations/
- 15 See www.torontodiscoverydistrict.ca
- 16 See www.marsdd.com/MaRS-Home.html
- 17 See www.bcic.ca and www.bctia.org
- 18 See www.newventuresbc.com
- 19 See <http://www.sarta.org/go/cs/about/>
- 20 For further details of this innovative Swiss program: www.venturekick.ch
- 21 City of Copenhagen. 2009. *Copenhagen Climate Plan*. www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/DesignedForLife/~/_media/F14B427B54874117A430DE1AD08B3879.ashx
- 22 City of Copenhagen. 2009. *Copenhagen Climate Plan*. www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/DesignedForLife/~/_media/F14B427B54874117A430DE1AD08B3879.ashx

- 23 City of Stockholm. 2009. The City of Stockholm's Climate Initiatives. www.stockholm.se
- 24 City of Portland. 2009. Climate Action Plan. www.portlandonline.com/bps/index.cfm?c=49989&a=240682
- 25 D. Farr. 2007. *Sustainable Urbanism: Urban Design With Nature*. New York: Wiley.
- 26 See www.oneplanetcommunities.org
- 27 For a useful primer on the social price of carbon, see R. Price, S. Thornton, and S. Nelson. 2007. *The Social Cost of Carbon and the Shadow Cost of Carbon: What They Are and How to Use Them in Economic Appraisal in the UK*. <http://www.defra.gov.uk/environment/climatechange/research/carboncost/pdf/background.pdf>
- 28 See www.newrules.org/environment/rules/light-pollution
- 29 M.C. Caballero. 2004. "Academic turns city into social experiment," *Harvard University Gazette*. www.news.harvard.edu/gazette/2004/03.11/01-mockus.html
- 30 M. Wong, D. Suzuki, M. Harcourt, D. Boyd, et al. 2009. "It's Time to Put the Planet Before Politics," *The Globe and Mail*, May 9, 2009. For the full article and list of signatories: www.bcsea.org/learn/news/2009/05/09/its-time-to-put-planet-before-politics
- 31 R. Haas, W. Eichhammer, C. Huber et al. 2004. "How to Promote Renewable Energy Systems Successfully and Effectively," *Energy Policy* 32(6): 833-39.
- 32 Extensive information available from the Passivhaus Institute: www.passiv.de
- 33 Details on California's pioneering zero emissions vehicle regulations available from the Air Resources Board. www.arb.ca.gov/msprog/zevprog/zevprog.htm An assessment of the ZEV programs impact is available from the Union of Concerned Scientists at www.ucsusa.org/clean_vehicles/solutions/advanced_vehicles_and_fuels/californias-zero-emission-2.html
- 34 T.J. Courchene. 2007. *Global Futures for Canada's Global Cities*. Montreal: Institute for Research on Public Policy. Conference Board of Canada. 2007. *Mission Possible: Successful Canadian Cities*. Ottawa: Conference Board. External Advisory Committee on Cities and Communities. 2006. *From Restless Communities to Resilient Places: Building a Stronger Future for All Canadians*. Ottawa: Infrastructure Canada.
- 35 See www.nyc.gov/html/planyc2030/downloads/pdf/greener_greater_buildings.pdf
- 36 See www.greenlabelspurchase.net/Energy-Labeling-of-Buildings.html
- 37 Green Energy and Green Economy Act, S.O. 2009, C. 12.
- 38 B.C. Climate Action Team. 2008. *Meeting British Columbia's Targets: A Report from the B.C. Climate Action Team*, p. 23.
- 39 See International Living Building Institute, <http://ilbi.org/>
- 40 R. Peters, Horne, M. and Whitmore, J. 2005. *Using Local Improvement Charges to Finance Energy Efficiency Improvements: Applicability Across Canada*. The Pembina Institute, Prepared for the federal Office of Energy Efficiency. http://pubs.pembina.org/reports/LIC_per_cent20Report_per_cent20ENGLISH.pdf
- 41 See www.pacenow.org See also the guide for municipalities interested in PACE financing prepared by the University of California at Berkeley: <http://pace-now.org/documents/FullerKunkelKammen-MunicipalEnergyFinancing2009.pdf>
- 42 City of Berkeley, California www.cityofberkeley.info/ContentDisplay.aspx?id=26580
- 43 M. Fuller, Portis, S. and Kammen, D. 2009. "Toward a Low-Carbon Economy: Municipal Financing for En-

- ergy Efficiency and Solar Power," *Environment Magazine*, Jan-Feb. 2009. [www.environmentmagazine.org/Archives/Back per cent20Issues/January-February per cent202009/FullerPortisKammen-full.html](http://www.environmentmagazine.org/Archives/Back%20per%20Issues/January-February%202009/FullerPortisKammen-full.html)
- 44 California Statewide Program - CaliforniaFIRST: www.renewfund.com/cityfirst/statewideprogram [www.greencapitalalliance.org/docs/Mimi per cent-20Frusha.pdf](http://www.greencapitalalliance.org/docs/Mimi%20Frusha.pdf)
- 45 The following states have recently passed enabling legislation: Colorado, Illinois, Louisiana, Maryland, Nevada, New Mexico, Ohio, Oklahoma, Oregon, Texas, Vermont, Virginia, and Wisconsin, and legislation is pending in Arizona and New York. Florida and Hawaii have existing ability to launch PACE programs. See www.pacenow.org
- 46 See www.cleanenergyworksportland.org/index.php
- 47 Manitoba Hydro has a interesting program that uses on-bill financing, although it is not transferable. Manitoba Hydro Power Smart Residential Loan Program: www.hydro.mb.ca/your_home/residential_loan.shtml
- 48 See <http://vancouver.ca/parks/activecommunity/pdf/WalkabilitySurface.pdf>
- 49 P. Jacobsen. 2003. "Safety in numbers: more walkers and bicyclists, safer walking and bicycling," *Injury Prevention*, 9: 205-209.
- 50 C.E. Staunton, Hubsmith D, and Kallins W. 2003. "Promoting safe walking and biking to school: the Marin County success story," *Am J Public Health*. 93(9):1431-1434.
- 51 See <http://origin.tfl.gov.uk/assets/downloads/Ex-post-evaluation-of-quantified-impacts-of-original-scheme-07-June.pdf>
- 52 New York City. 2008. PlaNYC: Open Spaces. www.nyc.gov/html/planyc2030/downloads/pdf/report_open_space.pdf
- 53 City of Sydney. 2008. Sustainable Sydney 2030: The Vision. <http://cityofsydney.nsw.gov.au/2030/>
- 54 See www.nytimes.com/2009/06/11/world/europe/11paris.html
- 55 See <http://vancouverpublicspace.ca/index.php?page=wts>
- 56 City of San Francisco. 2007. Food Service Waste Reduction Ordinance. Compliance data at www.sfenvironment.org/our_programs/interests.html?ssi=3&ti=4&ii=127
- 57 City of San Francisco. 2009. Universal Recycling and Composting Ordinance. www.sfenvironment.org/downloads/library/sf_universal_recycling__composting_ordinance.pdf
- 58 For details about Portland's ReBuilding Center, see www.rebuildingcenter.org
- 59 Royal Commission on Environmental Pollution. 2007. *The Urban Environment*. London: TSO.
- 60 S. De Vries, Verheij R, Grenewegen P, and Spreeuwenberg P. 2003. "Natural environments – healthy relationships? An exploratory analysis of the relationship between and health," *Environment and Planning A*, 35: 1717-1731. J. Pretty, Peacock J, Hine R, Sellens M, South N, and Griffin M. 2007. "Green exercise in the UK Countryside: Effects on Health and Physiological Well-Being, and Implications for Policy and Planning," *Journal of Environmental Planning and Management*, 50(2): 211-231.
- 61 C. Maller, Townsend M, Ptyor A, Brown P, and St Leger L. 2005. *Healthy nature healthy people: "Contact with nature" as an upstream health promotion intervention for populations*. Oxford: Oxford University Press.
- 62 J. Pretty, Peacock J, Sellens M, and Griffin M. 2005. "The mental and physical health outcomes of green exercise," *International Journal of Environmental*

- Health Research. 15(5): 319-337.
- 63 R. Louv. 2005. *Last Child in the Woods: Saving Our Children from Nature-deficit Disorder*. Chapel Hill, NC: Algonquin.
- 64 T. Takano, Nakamura K, and Watanabe M. 2002. "Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces," *Journal of Epidemiology and Community Health*, 56: 913-18.
- 65 R. Colman and S. Walker. 2004. *The Cost of Physical Inactivity in British Columbia*. Victoria: Ministry of Health Services.
- 66 Evergreen Foundation. 2005. *Keeping It Green: A Citizen's Guide to Urban Land Protection in Canada*, p. 26. www.evergreen.ca/en/cg/keepingitgreen.pdf
- 67 Evergreen Foundation. 2004. *Green Space Acquisition and Stewardship in Canada's Urban Municipalities: Results from a Nation-wide Survey*, p. 6. www.evergreen.ca/en/cg/cg-parkland.pdf
- 68 New York City. 2008. *PlaNYC: Open Spaces*. www.nyc.gov/html/planyc2030/downloads/pdf/report_open_space.pdf
- 69 G.S. Lovasi, J.W. Quinn, K.M. Neckerman, M.S. Perzanowski, and A. Rundle. 2008. "Children living in areas with more street trees have lower prevalence of asthma," *Journal of Epidemiology and Community Health* 62: 647-649.
- 70 G. McPherson, J. Simpson, Q. Xiao, and C. Wu. 2007. *Los Angeles One Million Tree Canopy Cover Assessment Final Report*. See www.fs.fed.us/psw/programs/cufr/products/psw_cufr689a_MillionTree-sLA_final_web.pdf
- 71 Vancouver Park Board. No date. *Facts and Figures about Vancouver's Trees*. <http://vancouver.ca/parks/trees/factsnfigures.htm>
- 72 See www.milliontreesnyc.org
- 73 See www.milliontreesla.org
- 74 US Conference of Mayors. 2008. *Protecting and Developing the Urban Tree Canopy: A 135-City Survey*. <http://www.usmayors.org/trees/treefinalreport2008.pdf>
- 75 See www.seattle.gov/trees
- 76 Portland Parks and Recreation. 2007. *Portland's Urban Forest Canopy: Assessment and Public Tree Evaluation*.
- 77 See www.toronto.ca/trees/
- 78 Gye and Associates. 2009. *City of Victoria Draft Urban Forest Master Plan*. www.victoria.ca/cityhall/departments_compar_rbnfrs.shtml
- 79 See www.seattle.gov/trees
- 80 See www.toronto.ca/trees/
- 81 See www.milliontreesla.org
- 82 See www.milliontreesnyc.org
- 83 Portland Parks and Recreation. 2007. *Portland's Urban Forest Canopy: Assessment and Public Tree Evaluation*.
- 84 A. Bardekjian Ambrosii. 2006. *Compendium of Best Management Practices for Canadian Urban Forests*. www.treecanada.ca/programs/urbanforestry/cufn/resources_bmp.html
J.R. Clark, N.P. Matheny, G. Cross, and V. Wake. 1997. "A Model of Urban Forest Sustainability," *Journal of Arboriculture* 23(1): 17-30. www.treecanada.ca/programs/urbanforestry/cufn/Resources_Canadian/ModelUFsustainability.pdf
See also the Center for Urban Forest Research, www.fs.fed.us/psw/programs/cufr/
- 85 These figures are based on widely circulated

- recommendations made by a respected organization called American Forest. www.americanforests.org/resources/urbanforests/treedeficit.php
See also C. Kollin. 2006. "How green infrastructure measures up to structural stormwater services," *Stormwater* 7(5): 138–144.
- 86 See www.mapleleafday.ca and www.treecanada.ca
- 87 See www.seattle.gov/trees/ufmpoverview.htm
- 88 Such a project would build on earlier research: N. Olewiler. 2004. *The Value of Natural Capital in Settled Areas of Canada*. Published by Ducks Unlimited Canada and the Nature Conservancy of Canada. www.ducks.ca/aboutduc/news/archives/pdf/ncapital.pdf
- 89 See www.urban-alliance.ca See also www.municipalaffairs.gov.ab.ca/documents/LGS/City_of_Calgary_The_Urban_Alliance.pdf
- 90 Global Footprint Network. 2009. Case Stories. www.footprintnetwork.org/en/index.php/GFN/page/case_stories/ See also M. Wackernagel et al. 2006. "The Ecological Footprint of cities and regions; Comparing resource availability with resource demand," *Environment and Urbanization*. 18(1): 103–112.
- 91 M. Wackernagel and W.E. Rees. 1996. *Our Ecological Footprint: Reducing Human Impact on the Earth*. Gabriola Island: New Society Publishers.
- 92 M. Wackernagel, Schulz, N.B., Deumling, D., Callejas Linares, A., Jenkins, M., Kapos, V., Monfreda, C., Loh, J., Myers, N., Norgaard, R. and Randers, J. 2002. "Tracking the ecological overshoot of the human economy," *Proc. Natl. Acad. Sci USA*, 99(14): 9266–71.
- 93 Organization for Economic Cooperation and Development. 1998. *Eco-Efficiency*. Paris: OECD, p. 71.
- 94 European Union. Energy Star Program, "Desktop vs Laptop," http://www.eu-energystar.org/en/en_022p.shtml
- 95 City of Calgary. 2009. *Ecological Footprint Baseline Report 2008*. www.calgary.ca/docgallery/bu/environmental_management/ecological_footprint/2008_foot_baseline_report.pdf
- 96 See www.zerofootprint.net <http://edmonton.zerofootprint.net/> <http://ottawa.zerofootprint.net> and <http://toronto.zerofootprint.net>
- 97 Marin County. 2007. *Sustainable Marin : Nature,Built Environment, and People* www.co.marin.ca.us/depts/cd/main/fm/cwpcodes/CWP_ExecSum.pdf
- 98 See www.oneplanetcommunities.org
- 99 See www.ecobudget.com
- 100 See www.sustain.ubc.ca/sustainable_u/ambassadors.htm
- 101 See www.cbsm.com
- 102 M. Anielski. 2007. *The Economics of Happiness: Building Genuine Wealth*. Gabriola Island: New Society Publishers.
- 103 R. Layard. 2005. *Happiness: Lessons from a New Science*. London: Allen Lane. D. Nettle. 2005. *Happiness: The Science Behind Your Smile*. Oxford: Oxford University Press.
- 104 New Economics Foundation. 2009. *The Happy Planet Index 2.0: Why Good Lives Don't Have to Cost the Earth*. www.happyplanetindex.org/
- 105 T. Jackson. 2009. *Prosperity without Growth: The Transition to a Sustainable Economy*. London: Sustainable Development Commission. www.sd-commission.org.uk/publications.php?id=914 P. Victor. 2008. *Managing Without Growth: Slower by Design, Not Disaster*. London: Edward Elgar. J. Stiglitz, A. Sen and J.-P. Fitoussi. 2008. *Issues paper – Commission on the Measurement of Economic Performance and Social Progress*. www.stiglitz-sen-fitoussi.fr/en/index.htm
- 106 See www.futuremelbourne.com.au/wiki/view/FMPlan For an evaluation of the wiki's success, see

Future Melbourne Wiki: Post Implementation Review www.futuremelbourne.com.au/wiki/pub/FMPlan/WebHome/Future_Melbourne_Wiki_Post_Implementation_.pdf

107 See www.toronto.ca/livegreen/inspired_grantsrecipients.html

108 See <http://cityrepair.org/>

109 McAllister Opinion Research. 2009. The Environmental Monitor. Only 38 per cent of Canadians were able to identify carbon dioxide emissions as the primary cause of global warming.

110 K. Coyle. 2005. Environmental Literacy in America. Washington: National Environmental Education & Training Foundation.

111 D.W. Orr. 2004. Earth in Mind: Education, Environment, and the Human Prospect. Washington, D.C.: Island Press. See also Center for Eco-Literacy www.ecoliteracy.org

112 G.A. Lieberman and L.L. Hoody. 1998. Closing the Achievement Gap: Using the Environment as an Integrated Context for Learning. San Diego: State Education Roundtable.

113 R. Bondar et al. 2007. Shaping Our Schools, Shaping Our Future: Environmental Education in Ontario Schools. www.edu.gov.on.ca/curriculumcouncil/shapingSchools.pdf

114 Greater Vancouver Regional District. 2002. Five Year Implementation Plan for the Capilano, Seymour and Coquitlam Reservoirs. www.metrovancouver.org/about/publications/Publications/WSMP-5YearImplementation.pdf

115 J. Aramini, M. McLean, J. Wilson, J. Holt, R. Copes, B. Allen, and W. Sears. 2000. "Drinking water quality and health-care utilization for gastrointestinal illness in greater Vancouver," *Can Commun Dis Rep.* 26(24): 211-14.

116 Ipsos-Reid. 2008. Drinking Water Survey for Metro Vancouver. www.metrovancouver.org/region/tapwater/Documents/2008DrinkingWaterSurvey.pdf

117 Greater Vancouver Regional District. 2007. Progress Report for the Drinking Water Management Plan. www.metrovancouver.org/about/publications/Publications/DWMPPProgressReport2007.pdf

118 The average residential water consumption in the City of Vancouver for the ten years from 1996-2005 was 324 litres per capita per day. Metro Vancouver. 2008. Water: GVWD and Municipal Water Demand by Sector. Vancouver: Metro Vancouver. The inter-city comparison is based on data from Environment Canada. 2008. Municipal Water Use Database. www.ec.gc.ca/Water/en/manage/use/e_data.htm

119 Environment Canada. 2008. Municipal Water Use Pricing Database. www.ec.gc.ca/Water/en/manage/use/e_data.htm

120 City of Vancouver. 2006. Waterworks Long Range Plan, p. 90: <http://vancouver.ca/engsvcs/watersewers/pdf/waterworksLRP.pdf>

121 BC Ministry of Environment. 2008. Living Water Smart: British Columbia's Water Plan. www.livingwatersmart.ca/docs/livingwatersmart_book.pdf

122 O.M. Brandes, T. Maas, and E. Reynolds. 2006. Thinking Beyond Pipes and Pumps: Top 10 Ways Communities Can Save Water and Money. Victoria: University of Victoria POLIS Project on Ecological Governance. See www.waterdsm.org

123 The provincial government promises to make this a legal requirement by 2010. BC Ministry of Environment. 2008. Living Water Smart: British Columbia's Water Plan, p.77. www.livingwatersmart.ca/docs/livingwatersmart_book.pdf

124 Organization for Economic Cooperation and Development. 1987. The Pricing of Water Services. Paris: OECD, p. 111.

- 125 CBC News (2009). City fast tracks mandatory meter conversion. See www.cbc.ca/canada/calgary/story/2009/03/25/cgy-calgary-water-meters.html
- 126 Environment Canada. 2008. Municipal Water Use Database. www.ec.gc.ca/Water/en/manage/use/e_data.htm
- 127 O.M. Brandes, T. Maas, and E. Reynolds. 2006. Thinking Beyond Pipes and Pumps: Top 10 Ways Communities Can Save Water and Money. Victoria: University of Victoria POLIS Project on Ecological Governance, p. 18. See www.waterdsm.org
- 128 Environment Canada. 2008. 2008 Municipal Water Pricing Report. http://www.ec.gc.ca/Water/en/manage/data/e_MUP2008.pdf
- 129 Canadian Medical Association. 2008. No Breathing Room: National Illness Costs of Air Pollution. www.cma.ca/index.cfm/ci_id/86830/la_id/1.htm
- 130 Centre for Health and Environmental Research (UBC). 2008. Summary Findings from the Border Air Quality Study. www.cher.ubc.ca/UBCBAQS/Reports/BAQS_Summary_Mar08.pdf
- 131 World Health Organization. 2005. Health effects of transport-related air pollution. Denmark: WHO. www.euro.who.int/document/e86650.pdf
- 132 T. Tamminen. 2006. Lives Per Gallon: The True Cost of Our Oil Addiction. Washington, D.C.: Island Press.
- 133 International Agency for Research on Cancer. 1989. Diesel and Gasoline Engine Exhausts. Vol. 46, p. 41. www.inchem.org/documents/iarc/vol46/46-01.html
- 134 D.R. Boyd. 2006. The Air We Breathe: An International Comparison of Air Quality Standards and Guidelines. www.davidsuzuki.org/health
- 135 Greater Vancouver Regional District. 2005. Clean Air, Breathe Easy: Air Quality Management Plan. www.metrovancouver.org/about/publications/Publications/AQMPSeptember2005.pdf
- 136 Sources: Canada-Wide Standards are set by the Canadian Council of Ministers of the Environment www.ccme.ca and National Ambient Air Quality Objectives are jointly set by Health Canada and Environment Canada www.hc-sc.gc.ca and www.ec.gc.ca World Health Organization. 2005. WHO Air Quality Guidelines Global Update. www.who.int
- 137 State of California. 2003. Senate Bill 352, Chapter 668, Statutes of 2003. www.cde.ca.gov/lr/fa/sf/sb352.asp
- 138 BC Ministry of Environment. 2006. Environmental Best Management Practices for Urban and Rural Land Development in British Columbia: Air Quality BMPs and Supporting Information. www.env.gov.bc.ca/air/airquality/pdfs/aqbmps_feb16_06.pdf
- 139 Metro Vancouver. 2008. Air Quality Management Plan Progress Report. www.metrovancouver.org/services/air/management/Documents/AQMP-Progress_Report_2008.pdf
- 140 In other words, every day, the City of Vancouver will enjoy air quality that is “low risk” as measured by the Air Quality Health Index at www.airhealthbc.ca
- 141 Intergovernmental Panel on Climate Change. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: IPCC. www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm UN Food and Agriculture Organization. 2006. Livestock's Long Shadow: Environmental Issues and Options. Rome: FAO. <http://www.fao.org/docrep/010/a0701e/a0701e00.htm> D. Pimentel. 2009. “Energy Inputs in Food Crop Production in Developing and Developed

Nations,” *Energies* 2(1): 1-24.

142 UN Food and Agriculture Organization. 2006. *Livestock’s Long Shadow: Environmental Issues and Options*. Rome: FAO. <http://www.fao.org/docrep/010/a0701e/a0701e00.htm>

143 See http://vancouver.ca/COMMSVCS/SOCIAL-PLANNING/initiatives/foodpolicy/tools/pdf/Van_Food_Charter.pdf

144 City of Albuquerque. 2009. “Local Food and Agriculture,” in *City of Albuquerque Climate Action Plan*, pp. 38-41. www.cabq.gov/cap/strategies/local-food-and-agriculture/CAPREV08forWEBLFA.pdf

145 Office of the Mayor, San Francisco. 2009. *Executive Directive 09-03. Healthy and Sustainable Food for San Francisco*. www.sfgov.org/site/uploadedfiles/sffood/policy_reports/MayorNewsomExecutiveDirectiveonHealthySustainableFood.pdf

146 See www.greenroofs.org

147 *Bylaw to Require and Govern the Construction of Green Roofs*. www.toronto.ca/legdocs/mmis/2009/pg/reports/2009-05-06-pg25-cr.htm

148 See www.spinfarming.com

149 L. Stec. 2008. *Cool Cuisine: Taking the bite out of global warming*. Utah: Gibbs Smith.

150 For example, consider liaising with the Green Table Sustainable Food Service, a home-grown business that rates the sustainability of Vancouver’s restaurants. See www.greentable.net

151 For information on Whistler’s sustainability process, plans, and progress, see www.whistler2020.ca

152 UK Sustainable Development Commission. 2006. *I Will if You Will: Towards Sustainable Consumption*. www.sd-commission.org.uk/publications/downloads/I_Will_If_You_Will.pdf

