



Vancouver: one of the greenest cities in North America

# The infrastructure revolution

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Can a net zero-carbon world exist as demand for energy continues to grow? InstarAGF president and CEO Gregory Smith looks at the potential for sustainable infrastructure to deliver triple bottom-line results: value for the environment, the economy and the community

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**I**n 2019, we are on the cusp of the greatest transition ever undertaken by humankind, one that demands a staggering global effort: building an environmentally sustainable economy.

For the past 200 years, our prosperity has been driven largely by fossil fuels, which today provide 80 percent of human energy needs. Cleaner energy sources, such as wind and solar power, have expanded rapidly, but not enough

to tamp down greenhouse gas emissions, which continue to escalate in North America and globally.

A report late last year by the United Nations Intergovernmental Panel on Climate Change (IPCC) suggested global warming must not exceed 1.5 degrees Celsius – less than the 2 percent rise agreed by signatories to the Paris Climate Agreement – if we are to limit the intensity and frequency of extreme climate events and scarcity impacts on resources,

ecosystems, biodiversity, food security and cities to merely moderate levels. According to the IPCC, achieving this target will entail a shift to net-zero emissions across the world by 2050.

Two hundred years ago, the Industrial Revolution launched an era of accelerated change that continues to shape human society. We are in the midst of what the World Economic Forum refers to as the Fourth Industrial Revolution, a digital phase that is rapidly and dra-

matically fusing the physical, digital and biological spheres.

Accomplishing net-zero emissions over the next 30 years would represent a global transition that is faster and more profound *than any other* in human history. Although a zero-carbon economy is technically feasible to attain, the larger question is whether we are collectively willing to do what it takes to get there. It is an effort that will demand nothing less than an “infrastructure revolution”: an unprecedentedly massive, immediate transformation in our energy, transport and community infrastructure.

### **CITIES HAVE THE POWER TO CHANGE THE WORLD**

The largest 250 urban centres in the US generate almost 85 percent of the country’s gross domestic product and account for 70 percent of its carbon emissions. Because most economic activity is concentrated in urban areas, cities are necessarily at the forefront of the global energy and low-carbon transition.

Cities have an enormous climate footprint. However, they are also integral to fostering innovation, collaboration and new economic opportunities, and are already addressing climate change in a number of ways.

According to the Carbon Disclosure Project, more than 100 cities globally, including several in the US, now receive all their electricity from renewables. At least 100 others receive around 70 percent of their power from clean sources. The C40 initiative connects 94 of the world’s largest cities – representing more than 700 million citizens and a quarter of the global economy – as part of an effort to take bold action on climate change in line with the most ambitious goals of the Paris Agreement.

Transitioning to a net zero-carbon world will require a combination of myriad drivers to cultivate synergies and collective impact, and that will be accelerated by governments, the private sector

and cities themselves. Urban energy innovation in grid decarbonisation, energy efficiency in buildings and next-generation mobility is vital to North America’s long-term environmental and economic viability. Where there is a will, there is clearly a way.

Advances in renewable power generation and distribution, storage and energy

“In the US, transportation emits more carbon than any other sector of the economy, which means electric transport must become ‘the new normal’”

management make a shift to clean electricity possible for nearly all uses. While utilities and regulators will play a key role in the expansion of renewables, cities have a vital part to play by setting clear decarbonisation goals, aggregating demand for renewables, promoting energy efficiency and shifting more urban energy consumption to electricity. Strategies and tools available to cities include predictive energy monitors, pricing incentives and technologies such as battery storage, microgrids, smart grids and analytics software, all of which can help customers to better manage their energy-use patterns.

At the heart of grid decarbonisation is wider adoption of district energy to reduce the loads of our urban centres and shrink our carbon footprint while creating new economic opportunities. District energy systems deliver reliable, cost-effective

and often renewably sourced electricity that attracts new businesses and development to given areas while lessening demand on the overall grid. Mandating environmental and resilience goals tends to spur the adoption of district energy and can be a catalyst for more integrated sustainable infrastructure planning and investments.

Greater adoption of district energy helps to mitigate the impact from the single largest contributor to a city’s carbon footprint: the built environment. Buildings account for about a third of energy use and about a quarter of greenhouse gas emissions, yet their carbon-reduction potential remains largely untapped. More stringent energy efficiency, net zero-carbon codes and standards for new buildings, and the retrofitting of existing buildings need to be major policy priorities.

### **BUILDINGS COULD HAVE TRANSFORMATIVE EFFECT**

More efficient buildings effectively support the transformation of the entire energy system. The International Energy Agency has estimated that the rapid deployment of high-efficiency lighting, cooling and appliances, for example, could save the equivalent of 75 percent of today’s global electricity demand by 2030. Such upfront investments pay for themselves over time while reducing the cost of energy and increasing the energy efficiency of the economy.

By setting net zero-carbon construction and development goals and requiring the renovation of existing structures so they can import energy from renewable sources and be more efficient, our cities can chart a new course and achieve important resiliency outcomes. Over the next 20 years, more than 60 percent of the world’s total building stock is projected to be built or rebuilt in urban areas. This will provide cities with an unprecedented opportunity to phase out carbon emissions by 2050.

In the US, transportation emits more carbon than any other sector of the econ-

omy. This means that electric transport must become “the new normal” if there is to be greatest possible reduction in overall carbon emissions.

Solutions in the transport sector are accelerating. The long-term trend towards electric vehicles means power utilities have a significant market opportunity as demand moves away from petrol. However, capturing the benefits of this transition will also require low-carbon power generation. New partnerships across cities, and involving power providers and vehicle manufacturers, can help to ensure that the shift towards electric vehicles also means a move towards clean mobility.

Global sales of electric automobiles jumped in 2018, according to Bloomberg, while advisory Energy Innovation projects the sector will represent about 65 percent of light-duty vehicle sales in the US by 2050.

### NEXT-GENERATION MOBILITY

Innovation and electrification within transport, including the evolution of driverless vehicles, is about more than new technology. Next-generation mobility has the potential to redraw city boundaries and enhance quality of life by facilitating a shared system that offers improvements in accessibility, affordability, sustainability and travel times.

Overall, the International Energy Association estimates that re-orienting urban transport systems to encourage walking, cycling and public or shared transit could save \$21 trillion in energy costs by 2050, while helping to alleviate the impact of climate change.

Beyond cities, the key to creating a net zero-carbon world lies within the industrial sector, which contributes about 30 percent of greenhouse gas emissions globally, according to McKinsey. Decarbonising the planet by 2050 will also depend on the ability of the power and utilities sector to substantially reduce its own emissions. It will need to do so even as demand for power rises and as other sectors make the transition from fossil

#### IPCC REPORT: FIVE KEY FIGURES

# 1.5C

Maximum temperature increase to avoid worst of climate change

# 12 years

Span of time to avoid temperature increase above 1.5C

# 45%

Cut in CO2 emissions from 2010 levels needed by 2030

# 85%

Amount needing to be generated from renewables by 2050 to keep temperature increase to 1.5C

# 91

Number of authors who prepared IPCC report

fuels to electricity in order to reduce their own carbon emissions. Managing this balance will require a multi-faceted approach, including improvements in end-use efficiency; continued substitution of zero or lower-emission power sources; better grid flexibility and storage; and the use of carbon capture on remaining fossil fuel-based power generation.

The net zero-carbon endeavour will also depend on cross-sectoral and governmental and private-sector partnerships and community engagement to help harness climate action as a driver of innovation, competitiveness, risk management and growth. It will involve establishing clear, long-term signals and supportive government policies to set the required pace and scale, and to encourage the

investment, creativity and community perspective that will help to design an inclusive, zero-emissions future while avoiding stranded assets and poor investments.

In North America and beyond, the Global Commission on the Economy and Climate suggests that achieving greater sustainability and lowering carbon by 2030 could deliver \$26 trillion in economic benefits and improve the quality of growth while reducing the social cost of carbon.

Studies show that directing investments into low-carbon infrastructure projects in cities delivers greater returns more quickly than conventional infrastructure, including by improving economic productivity, creating jobs and reducing health and energy costs. Such initiatives most positively affect lower-income citizens by elevating overall quality of life, and thereby contributing to more equal cities.

Although the IPCC report underscores the need to manage our “carbon budget” and sets a ceiling, both the panel and the Paris Agreement are silent on specific timelines for collectively cutting emissions. Mitigation is occurring, but there is a pressing need to accelerate innovation in policy development, national and international cooperation, the deployment of technology, and input and action at the local level.

### COLLABORATION AND BOLDNESS KEY TO CARBON REDUCTION

Fundamentally, the key drivers for a net zero-carbon world in the 21st century are collaboration and boldness. Many questions remain, including how to meld innovation with behavioural changes, how to overcome political and economic entrenchment, and how to integrate energy transition goals with urban and social infrastructure planning. It is possible that many of the best tools to accelerate the new energy transition and tackle climate change have yet to be invented.

But one thing is clear: the “infrastructure revolution” must be accomplished in a manner that energises, “greens” and grows our economies to create opportunity for everyone. Whether time will prove to be an ally or an enemy, it is certain that the time for this revolution is now. ■

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