More than half of the world’s population lives in urban centres, including in North America where 80 percent of the population resides in cities. Overall, the pace of urbanisation is accelerating globally, with the equivalent of one new city of one million people being created every five days between now and 2050.

Rapid urbanisation is the defining trend of the 21st century. It is accompanied by the equally rapid proliferation of sophisticated technology and data analytics, and by burgeoning environmental pressures and priorities, which largely stem from urbanisation itself. When combined, these trends are shaking up old business models and changing the way we think about infrastructure design and delivery. They are also shifting the way we live, work and compete, and accordingly, the needs and expectations of our communities. As a result, new patterns of infrastructure demand and use are materialising, necessitating new ways of engaging with stakeholders and offering us the capacity to improve the quality of life in our cities.

Today, our countries and communities are more connected than ever before. While globalisation offers many benefits, the complexities we face in our cities – due to urbanisation, demographic shifts, climate change, and economic and social disparity – require solutions that are more local in scope. Infrastructure is fundamentally a story of evolution in response to emerging needs, human behaviour, and increasingly, digitalisation. Building, renewing and refurbishing our urban infrastructure to meet modern requirements, create new economic opportunities and position for a more sustainable future will entail thinking beyond convention and letting go of old ways of doing things. To quote Thomas Edison, there is a way to do it better – find it.

COMMUNITY-BASED ENERGY TRANSFORMATION

New energy solutions are arising to address aging transmission facilities, changes to the electricity supply mix, and the load growth associated with urbanisation. Yesterday’s century-old utility model focuses on transporting and delivering energy from centralised – and usually remote – power plants, making it vulnerable to disruption by natural disasters or cyber attack. In 2003, for example, an overgrown tree limb triggered the largest blackout in North American history, causing 50 million people to lose electricity.

The traditional model is slowly collapsing under shifting load patterns and the declining cost of energy storage and renewable energy infrastructure. As a result, localised microgrids, or distributed energy systems, and new district heating projects, particularly in the municipalities, universities, schools and hospitals (MUSH) sector, are presenting some intriguing and transformative investment opportunities.

Meeting the 21st century’s needs

Driven by technology, the move towards decentralisation is upending the traditional top-down model of infrastructure development, writes InstarAGF president and chief executive Gregory J. Smith.
They also have the potential to significantly reduce energy costs for consumers and help to address the energy reliability, security and sustainability needs of local communities.

Indeed, much of future energy development will be small scale, renewable, community-based and controlled locally, thereby creating new socio-economic opportunities. InstarAGF’s Okanagan Wind project in British Columbia, for example, has been developed in collaboration with local First Nations communities and will contribute to ongoing community progress through Impact Benefit Agreements and some permanent skilled jobs. Elsewhere in Canada, some communities, particularly in remote regions, are building microgrid renewable systems, including Colville Lake in the Northwest Territories, which has piloted a combined solar panel and battery unit that will enable the community to run entirely on the sun’s energy during the summer months.

Further, by generating and storing their own renewable energy, individuals and communities are directly entering the energy market as “prosumers” – revealing the limits of national or even regional energy policies.

**MOBILISING TRANSPORTATION INFRASTRUCTURE LOCALLY**

Although effective transportation infrastructure is critical to a city’s economic potential, many metropolitan centres are grappling with inadequate systems or poor connectivity, crowding, or, in some cases, underutilisation. Where transportation planning has traditionally been a top-down exercise, it is now increasingly more of a regional conversation, one that is largely facilitated by technology.

That is not to say that comprehensive planning is unnecessary: of the 225 metropolitan areas in the US with populations above 100,000, those that have made the most progress toward adopting multi-modal and alternative transportation systems are cities with a clear transportation vision. However, urban mobility today depends just as much on the citizens who use transportation infrastructure. This includes new transit alternatives arising from the availability of real-time data, ridesharing and sourcing tools, and multi-modal transportation apps such as Los Angeles’ new Go LA app that combines different modes of transportation along with quicker, cheaper and greener options for customised travel planning. Increasingly, transit authorities will partner with these alternative entities to evolve new business models and urban infrastructure solutions that would not have been possible just five or 10 years ago.

Clearly, technology and innovation make transportation systems more flexible, environmentally friendly and responsive to user preferences and needs. They can also help to achieve other local mobility goals. In San Francisco, for example, Streetline, a smart parking company, has installed wireless sensors that detect the availability of parking spots. The information is available through a mobile app, which drivers can download to find the nearest available parking spot. Such technologies reduce congestion and gas emissions caused by the search for parking and optimise overall parking management.

High quality local transportation infrastructure also directly impacts a city’s ability to thrive. As the ninth largest airport in Canada, Billy Bishop Toronto City Airport is a critical urban transportation hub for the local area. It facilitates regional and cross-border connectivity with some of North America’s largest cities, and even within Toronto itself: 40 percent of travellers walk, bike or take public transit to the airport, which is the highest percentage of any airport in North America. This connectivity translates into the movement of people and goods and elevates the city’s intellectual and commercial capacity. In fact, Billy Bishop contributes value of more than $2 billion in total economic impact to the local area.
It is also the only airport in Canada to be entirely powered by green electricity.

LOCALISING AND RE-THINKING WATER INFRASTRUCTURE

Water is fundamental to the life and health of our communities. The growing need for it against the backdrop of increasing scarcity will be among the biggest challenges of the 21st century. Despite the essential nature of water infrastructure, in North America it suffers from significant underinvestment, putting both the safety and security of our water supply at risk. Water systems will increasingly need to rely on both centralised and decentralised distribution and treatment approaches to deliver economical, flexible and sustainable water services to communities.

Decentralised water infrastructure and systems, for example, can protect public health and the environment. These systems typically have lower capital and maintenance costs for communities and can be appropriate for a range of sites and ecological conditions. While decentralised approaches are traditionally associated with rural areas, distributed systems are increasingly being deployed in urban settings within specific neighbourhoods, green buildings or campuses, or to complement utility services. The Solaire high-rise apartment building in New York City, for example, has a wastewater plant in the basement and collects storm water from the roof. The building uses the treated wastewater and storm water for toilet flushing, irrigation and cooling.

Also, new and emerging technologies for wastewater treatment are accelerating innovation, lowering capital costs and delivering higher effluent quality. All of this creates the potential for greater re-use opportunities locally, which is particularly important given that about 75 percent of wastewater in North America is treated but only about 4 percent is re-used. Interestingly, water systems are also often overlooked components of energy management in cities, which makes optimising and digitising treatment plants and distribution networks an important aspect of both saving energy and reducing water losses locally.

COMMUNITIES INCREASINGLY EMPOWERED

All of these examples point to a common underlying element: the participatory nature of modern infrastructure development and the vital role of stakeholders in planning and managing infrastructure.

Social technologies are bringing infrastructure to life in an entirely new way, enabling citizens to directly express their views and demands, effect change in how infrastructure is developed and used, and to customise their personal experience. As a result, utilities, policymakers, developers and governments have been forced to re-think their relationships and how they engage with ratepayers, consumers and users of infrastructure. A range of stakeholder concerns and interests has been shown to correlate with maximising the long-term value of infrastructure. While cities are more than the sum of their infrastructure, how that infrastructure gets built or renewed effectively sets the stage for how, or whether, these communities will grow and prosper.

With the challenges – and opportunities – before us today, the question is clearly not if our cities will change, but how. Stakeholders have an increasingly powerful voice in defining what progress means, and how it will be accomplished locally.

THE POWER OF POSSIBILITIES

Infrastructure is a world of complex choices, where identifying new possibilities and approaches requires imagination and input from diverse audiences. While there is much to learn from infrastructure experiences and the exchange of knowledge globally, one size does not fit all.

Thinking locally, however, does not mean thinking small. It means thinking smarter. As Alexander Graham Bell noted, great discoveries and improvements invariably involve the co-operation of many minds. A city is inherently a form of co-operation, a repository of ideas and talent to foster environments that are more innovative, sustainable, inclusive and poised for economic growth. By abandoning convention and thinking more locally about our infrastructure, our cities are finding a better way to do it.