The Next Generation of Infrastructure: Three Themes Leading the Way

The essential services provided by infrastructure—utilities, energy infrastructure, communications and transportation—form the backbone of the global economy. The infrastructure universe is evolving, as technological innovation and consumer demands fuel three themes shaping the next generation of infrastructure investment. The electrification of the global economy is underway, data needs are increasing exponentially, and urban areas need innovative solutions to address congestion. We see these three themes creating exciting opportunities on the horizon.

THE ELECTRIFICATION OF THE GLOBAL ECONOMY IS UNDERWAY

RENEWABLES ARE ON TRACK TO REPRESENT THE MAJORITY OF GLOBAL POWER GENERATION

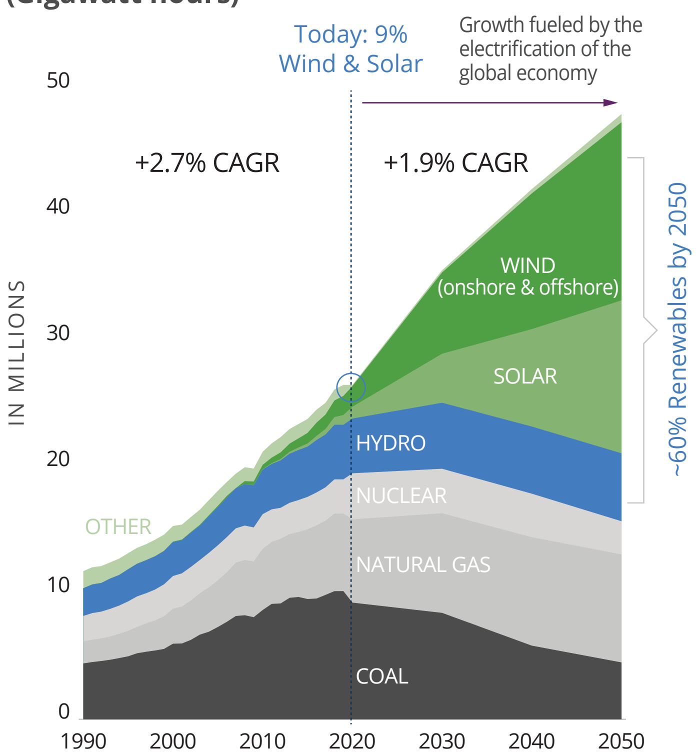
Renewables are rapidly disrupting traditional energy sources and are on track to represent the majority of the world's global power generation by 2050. We estimate that clean sources of energy will exceed 60% of the global generation mix in 2050, up from just 9% of the global power generation mix today. See the chart to the right.

A key reason renewables adoption is poised to accelerate: Clean energy sources have become the world's most cost-efficient providers of power generation. They no longer rely on public subsidies to compete with conventional power sources. Significant capital deployed into the renewables sector over the last decade has spurred technology innovations that have improved the economics of renewables, namely wind and solar, so that renewables are now the low-cost power sources.

The electrical grid—from power generation capacity to transmission & distribution capabilities to storage solutions—is evolving to meet growing renewables demand, and it requires substantial investment to do so. The International Renewable Energy Agency estimates that the total sum needed for investment in this grid of the future could be as much as $100 trillion globally over the next three decades.

RENEWABLES ARE EXPECTED TO BE THE FUTURE OF POWER GENERATION

Global Electricity Production by Fuel Type (Gigawatt hours)



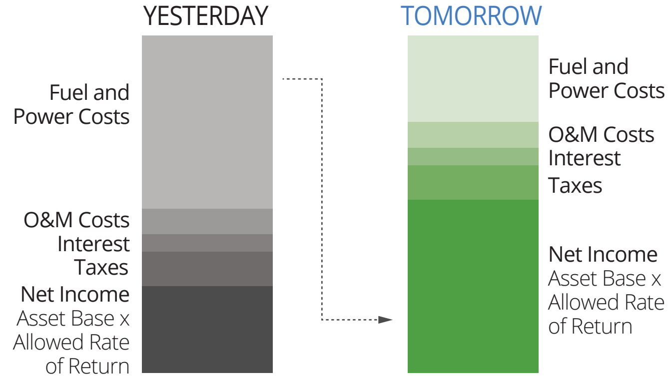
As of September 30, 2020. Sources: International Energy Agency, World Energy Council. Forward-looking statements are hypothetical in nature and not guaranteed. CAGR refers to Compound Annual Growth Rate. See disclosures for additional information.

RENEWABLES ADOPTION POSITIONS UTILITIES FOR EARNINGS GROWTH

Investing in renewables represents an opportunity for utilities to increase their profitability, in our view. If a utilities company decommissions its old coal plants over time and increases its reliance on renewables, it is buying less coal and not facing a similar cost from renewables. This is because the sources of wind and solar energy—wind and sunshine—are free.

Companies should be able to translate such cost savings directly to their bottom line. And the more utilities invest in renewables, the more they can convert old coal purchases that did not offer returns into renewables infrastructure that does offer a return. Put simply, from an investor's perspective, renewables are not just about cleaner air or political agendas: they are about accelerating earnings growth.

WE BELIEVE FORWARD-THINKING UTILITIES THAT INVEST IN RENEWABLES CAN MAXIMIZE AND GROW PROFIT



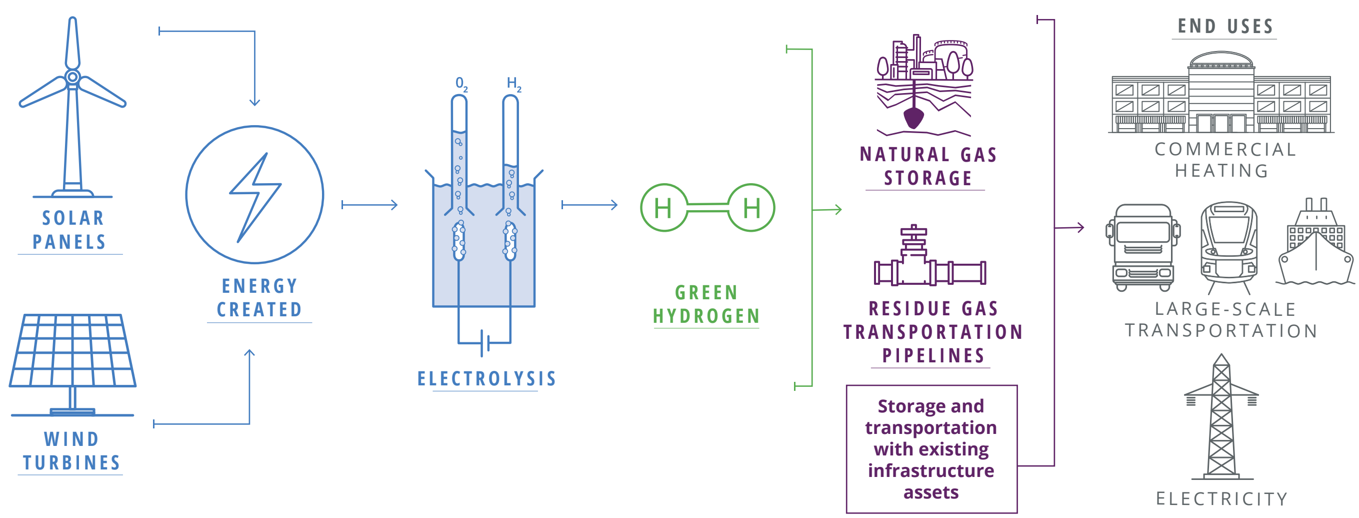
As of November 31, 2020. Source: Brookfield Public Securities Group LLC research and estimates. For illustrative purposes only. Forward-looking statements are hypothetical in nature and not guaranteed. See disclosures for additional information.

CLEAN HYDROGEN MAY BE A SILVER BULLET FOR A ZERO-CARBON ECONOMY

Renewables are often critiqued for their intermittency–the sun does not always shine and wind does not always blow. But the opposite can also be true: Sometimes there is too much wind or sun, especially as the best locations for wind and solar energy are often sparsely populated and have low electricity demand. As such, the grid can have the problem of what to do with excess electricity, since renewables energy currently lacks storage solutions.

Clean hydrogen—a fuel that can travel by pipeline—may be the silver bullet for a zero-carbon economy, in our view. It produces zero emissions and could be a method for storing and transporting renewables using existing natural gas infrastructure assets. The diagram below illustrates how excess wind and solar energy can be converted into clean hydrogen by a process called electrolysis, where excess electricity is run through water to split water (H20) into hydrogen (H2) and oxygen (O). This "green hydrogen," created from green energy, could then be stored to burn later or transported elsewhere, all using existing natural gas storage and pipeline infrastructure. The diagram also shows green hydrogen's potential end uses for difficult-to-decarbonize industries, such as commercial heating, large-scale transportation and electricity.

CLEAN HYDROGEN IN ACTION



As of November 31, 2020. Source: Brookfield Public Securities Group LLC. See disclosures for additional information.

DATA NEEDS ARE INCREASING EXPONENTIALLY

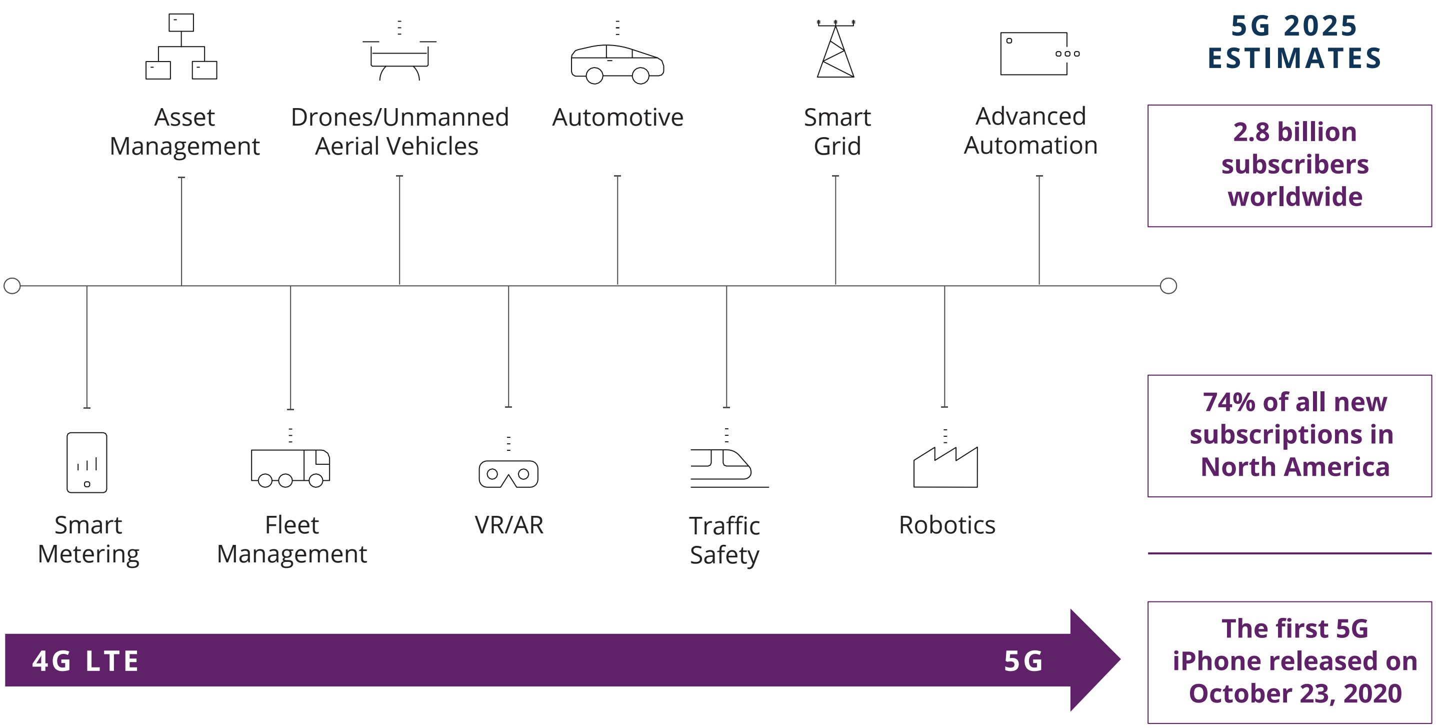
THE PANDEMIC ACCELERATED EXISTING DATA RELIANCE TRENDS

The COVID-19 pandemic accelerated a trend already underway: increasing reliance on data in our everyday lives for everything from remote work and home exercise to online shopping and telehealth. We believe people will return to the office and to travel, but we see the trend of increasing data consumption further accelerating, in large part due to the growing availability and adoption of the fifth-generation mobile network and wireless standard (5G).

This technology is not just about increased speed, but also about the network's ability to handle far more devices through increased bandwidth. Think about it like a highway: the speed of the road is increasing and additional lanes are being added to accommodate traffic. An expansion of connected devices under 5G will allow for new applications, such as those depicted in the image below, that are behind our expectations for billions of 5G subscribers globally by 2025.

5G IS A SOURCE OF FUTURE GROWTH

Many avenues of data growth are possible through cellular internet-of-things applications



As of September 30, 2020. Sources: Brookfield Public Securities Group LLC; Ericsson Mobility Report, June 2020. Forward-looking statements are hypothetical in nature and not guaranteed. See disclosures for additional information.

COMMUNICATION TOWERS ARE POISED TO BENEFIT FROM DATA GROWTH

The underlying tower infrastructure is key for mobile data. Given our expectation for growing data needs, we believe communication towers have one of the strongest business models and growth outlooks across all the sectors in which we invest.

The table below shows the hypothetical economics of a tower business and how data growth could benefit its return on investment. As you add a tenant, moving to the right across the table, there is no incremental capital investment, and only slightly more operating expense. This means the operating leverage drives considerable return improvement. As the tower operator adds tenants, it can potentially start to realize attractive margins and return on investment. Presently, we estimate that average tower tenancy in the U.S. is around 2.1 per tower. However, with increased data needs requiring denser networks, communication towers could see meaningful return improvement, as evident in the table's third column.

COMMUNICATION TOWERS ARE POISED TO BENEFIT

Towers are vital for mobile data; growth drives increasingly favorable economics

	$ One Tenant	$$ Two Tenants	$$$ Three Tenants	$$$$ Three Tenants with Lease Amendments
Construction Costs	$275,000	$275,000	$275,000	**$275,000**
Tenant Revenue	$20,000	$50,000	$80,000	**$100,000**
Operating Expenses	$12,000	$13,000	$14,000	**$14,000**
Gross Margin	$8,000	$37,000	$66,000	**$86,000**
Gross Margin %	40%	74%	83%	**86%**
Return on Investment	3%	13%	24%	**31%**

As of September 30, 2020. Sources: Brookfield Public Securities Group LLC. For illustrative purposes only. Numbers are hypothetical in nature. Lease amendments refer to modifications to equipment, such as antennas and radios, that the tenants add and then pay for the associated costs. See disclosures for additional information.

URBAN AREAS NEED INNOVATIVE SOLUTIONS TO FIGHT CONGESTION

MANAGED LANES OFFER OPPORTUNITY FOR TOLL ROAD OPERATORS TO MAXIMIZE REVENUE

Road congestion is a major problem in U.S. urban areas, and U.S. governments have been turning to the private sector for help. More than $50 billion of total investment has been used to improve U.S. road infrastructure—much of that over the past decade—with participation from the private sector.

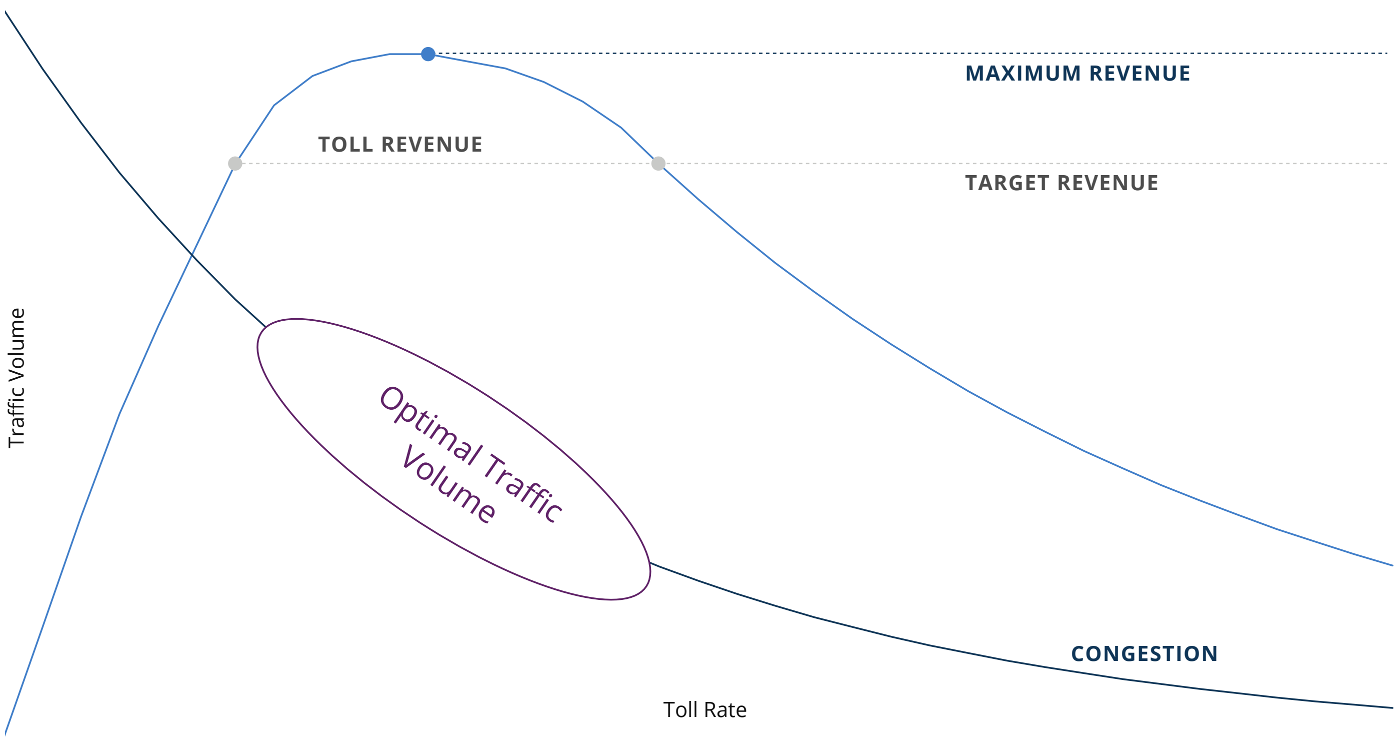
One innovative congestion solution where we see opportunity: so-called "managed lanes" that operate like a toll road within a highway. These managed lanes are structured as concessions that are bid, constructed and operated for several decades by a private company. The private company handles maintenance via toll revenue.

In managed lanes, drivers can periodically move from a free highway lane into a toll road adjacent to the highway, and the amount of the toll paid depends on congestion levels. As traffic levels rise (the dark blue line in the chart below), the toll rises to keep traffic volume at an optimal level to avoid traffic jams. Managed lanes allow toll road operators to maximize revenue by setting toll prices such that traffic flows smoothly.

A MANAGED LANE IS A HIGHWAY WITHIN A HIGHWAY

These serve as a 'relief valve' for hyper-congested traffic corridors

MANAGED LANE STRATEGY



As of September 30, 2020. Source: Texas A&M Transportation institute and Texas Department of Transportation. For illustrative purposes only. See disclosures for additional information.

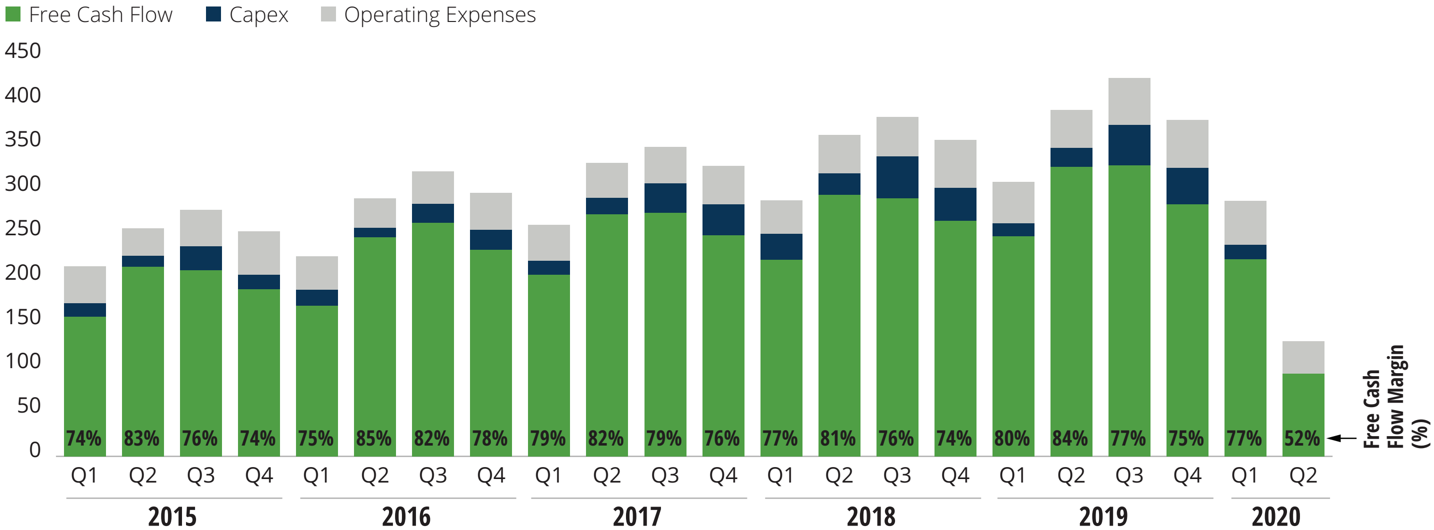
A MANAGED LANE IN ACTION: THE 407-ETR IN TORONTO

The 407-ETR, a managed-lane toll road in Toronto operated by a listed infrastructure company, provides a nice real-world example of how a managed lane can generate cash flows even during difficult periods such as the COVID-19 pandemic. As Toronto has gotten busier over the last five years, the cost of a trip on the 407-ETR has risen from a little over Can$8 to around Can$12.

The overall level of annual traffic on the road was generally stable until the second quarter of 2020, when traffic declined amid the impacts of COVID-19. Yet even in the second quarter of 2020, the asset generated more than Can$100 million in revenue and Can$50 million in cash flow, as evident in the chart below. The sum of the three colors in each bar is total revenue for the quarter. If you subtract the operating expenses in gray and the capital expenditures in blue, you can see the power of this asset to generate cash flow in green. While traffic decreasing did result in much lower cash flow than in previous periods, the asset was still making money, and at a decent margin.

407-ETR SELECTED FINANCIAL METRICS

Even during an economic shutdown, this asset generated over Can$100 million in revenue during Q2 2020



As of June 30, 2020. Sources: Company filings, Brookfield Public Securities Group LLC. "Can$" stands for Canadian dollars. Presented for illustrative purposes only. See disclosures for additional information.

CLOSING THOUGHTS

Governments are seeing budget crunches at the same time that infrastructure capital requirements are growing substantially. We believe that the private sector will play a critical role in infrastructure development going forward. While the next generation of infrastructure investment is still in its early innings, the themes fueling it are already creating exciting potential long- term opportunities in listed infrastructure that can be measured in decades, not years or quarters, in our view. The electrification of the global economy, exponentially increasing data needs, and innovative congestion solutions are behind the opportunities we see in listed utilities, communication towers and toll roads.

Capturing these potential opportunities requires an active approach, in our view. At Brookfield, our investment process for listed infrastructure securities is aligned with our owner-operator heritage. We focus on long-term, risk-adjusted returns, and put considerable weight on capital preservation and capital protection.

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