

LISTED INFRASTRUCTURE:

Electrification drives opportunities for listed infrastructure companies



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At-a-glance

- Electrification is at the core of the global energy transition. Electricity is likely to see the fastest demand growth of any major energy source in the coming decades.
- Listed infrastructure companies benefit from electrification, as a large proportion of the asset class comprises generators and distributors of clean energy. Their regulated and contracted business models mitigate the typical risks related to technology deployment.
- We expect the magnitude and financial benefits of electrification to increase rapidly.

Listed infrastructure companies benefit from electrification in multiple ways

Electrification is one of the largest components of the overall energy transition. It involves the increasing use of electricity as an energy source, motivated by the fact that electricity can generally be cleaner and more sustainable than the sources it replaces. Recent government policy has offered further support for electrification, most notably in the case of 2022's Inflation Reduction Act in the United States.

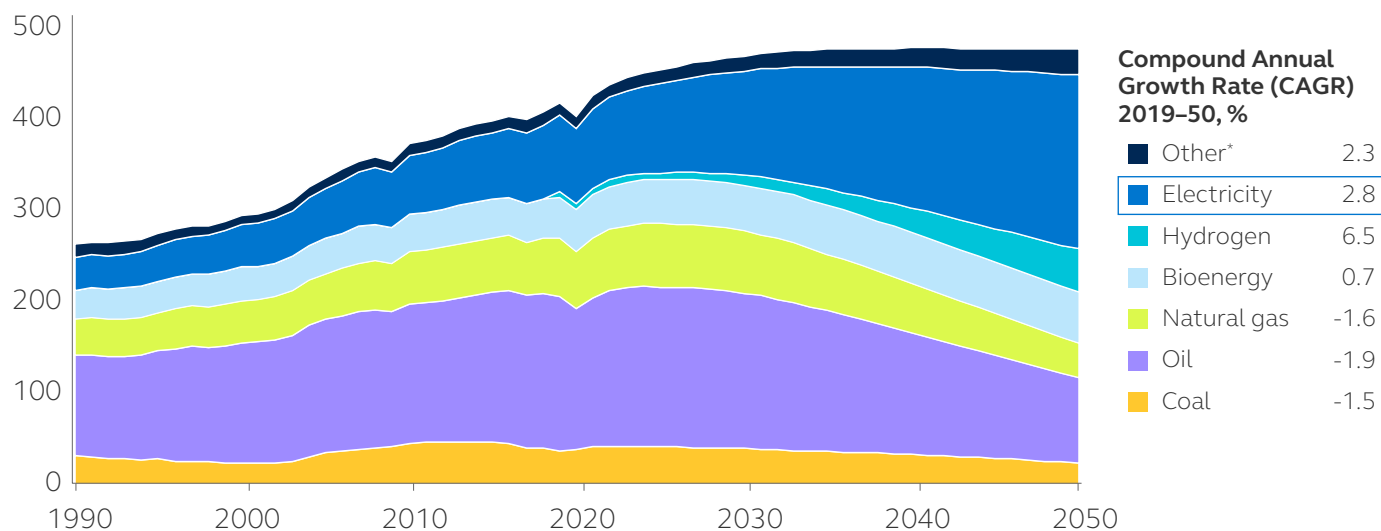
There are two aspects to the electrification opportunity for listed infrastructure companies: 1) the expected growth in electricity demand as a result of electrification and 2) the development of new clean power generation to supply that electricity. A large proportion of the listed infrastructure asset class comprises electric utilities that own power generation and the transmission and distribution grid.

Accessing the electrification opportunity via listed infrastructure companies offers the benefit of defensiveness in addition to steady secular growth. As listed infrastructure companies are generally enablers and deployers of new clean energy and not developers of such technology, the asset class is not subject to significant technology risk. Equally important, most listed infrastructure companies have regulated or long-term contracted business models under which they earn a regulated or contracted return on the capital they deploy. Thus, the companies' earnings and cash flows are primarily driven by the amount of capital invested in this growing opportunity.

Global electricity consumption is likely to accelerate materially

Major global energy studies indicate that the rate of growth in global electricity demand could more than double in the coming decades. The International Energy Agency (IEA) expects global electricity demand to increase at a 2.2%–2.7% annual growth rate between 2021 and 2030 if countries follow through on their stated targets. This expectation is more than double the 2012–2022 growth rate of 0.9%.^{1,2} Likewise, a major global consulting firm projects a 2.8% annual growth rate in electricity demand to 2050, while conventional fuel consumption declines over time, as shown in the figure below.

EXHIBIT 1: Final energy consumption by fuel, millions terajoules



*Includes heat and synthetic fuels.

Source: Global Energy Perspective 2022, McKinsey & Company, April 2022 (Analysis done before the conflict in Ukraine)

Government incentives enhance economics for enablers of electrification

Governments have been at the forefront of driving electrification as a primary means to decarbonize. The “carrots” take the form of tax incentives for carbon free generation, which have direct benefits for companies’ cashflows. The “sticks” take the form of mandates to deploy a certain proportion of renewables within a set timeframe. The U.S. Inflation Reduction Act of 2022 contained the most comprehensive set of incentives, but other countries and jurisdictions also provide financial benefits to facilitators of decarbonization.^{3,4} Listed infrastructure companies are direct beneficiaries of these incentives.

¹ IEA (2022), World Energy Outlook 2022, IEA, Paris

² Energy Institute, 2023

³ U.S. Environmental Protection Agency, June 2023

⁴ NREL, Spring 2023

Refer to the table for a summary of selected provisions of recent clean energy legislation across the globe relevant to electrification and decarbonization. In addition, national and regional governments have set minimum standards for renewable penetration. For example, 31 U.S. states and the District of Columbia have enforceable renewable portfolio standards (RPS) which require electricity suppliers to provide a minimum share of electricity from renewable sources within a defined timeframe.⁵

Governments globally are incentivizing the investments required to make electrification happen and many of these measures improve project economics and lower risks for listed infrastructure companies.

	Relevant to electrification	Relevant to other decarbonization measures
U.S. Inflation Reduction Act (2022)	<ul style="list-style-type: none"> • Extension of investment (ITC) and production tax credits (PTC) for wind and solar. Solar now eligible for PTC. Bonuses for domestically manufactured content and location in “energy communities” that might lose conventional energy jobs • Nuclear generation PTC • Storage ITC separate from generation • Easier monetization of tax credits (“transferability”) • Modification and extension of electric vehicle (EV) tax credit 	<ul style="list-style-type: none"> • PTC for green hydrogen • Increase and expansion in tax incentives for carbon capture and storage (CCS)
Canada (2023 budget)	<ul style="list-style-type: none"> • 15% refundable tax credit for investment in non-emitting generation equipment 	<ul style="list-style-type: none"> • 30% refundable tax credit on cost of machinery and equipment to manufacture or process clean technologies, or critical minerals • 15-40% tax credits for qualifying green hydrogen investments
U.K. (Powering Up Britain)	<ul style="list-style-type: none"> • Continued incentives for renewable generation, including GBP 160 million of new funding to develop the supply chain for floating offshore wind • Increased incentives for heat pump adoption and manufacturing • Created independent body responsible for driving new nuclear projects including small modular reactors (SMR) • Mandated additional investment in EV charging infrastructure • Raised the mandate for percentage of new car sales that are zero emission in 2024 • Updated grid planning and delivery procedures 	<ul style="list-style-type: none"> • Extending energy efficiency support to more households • GBP 240 million government funding for upfront green hydrogen investment • Funding for early deployment of carbon capture, utilization at storage (CCUS)
European Union (Green Deal Industrial Plan, Net-Zero Industry Act and related proposals)	<ul style="list-style-type: none"> • Increased mandate for percentage of electricity generation that must come from renewables in 2030 • Enabled fast-tracked permitting for renewable energy and related production facilities • Increased funding to REPowerEU, which mobilized EUR 300bn for investment in renewables and diversifying the EU’s energy supply when announced in 2022 • Adopted new incentives and targets for deployment of EV charging infrastructure 	<ul style="list-style-type: none"> • Grants for electrolysis capacity and planned incentives for green hydrogen production • New mandates for deploying hydrogen refueling stations • Planned support for scaling up CCUS technologies
Australia	<ul style="list-style-type: none"> • Credit trading system under which renewable power generators create and sell credits based on their output • State level incentives for home electrification 	<ul style="list-style-type: none"> • Funding for early-stage hydrogen and CCS projects
Japan	<ul style="list-style-type: none"> • Subsidized pricing for renewable energy producers 	<ul style="list-style-type: none"> • Subsidies for hydrogen projects that ship to Japan • Subsidies for battery energy storage systems

Source: NREL, Spring 2023 and U.S. Energy Information Administration, February 2022

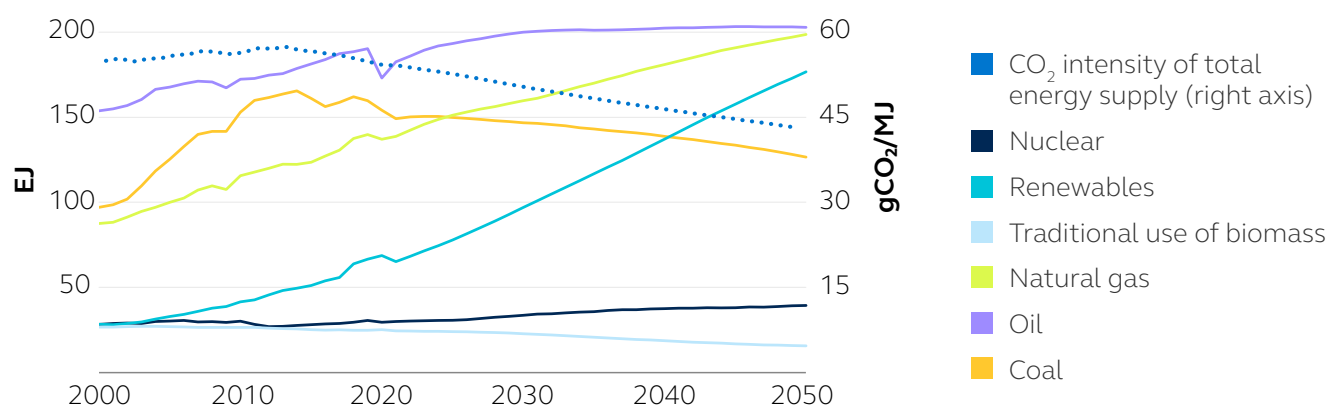
⁵U.S. Energy Information Administration, February 2022

Renewable generation fuels momentum for electrification

Electrification is driven by the desire to decarbonize, which requires investment in renewable generation. Electric utilities benefit both from the growth in renewable energy capacity and the need to connect it to the grid.

Stated government decarbonization targets require a rapid increase in renewable generation. The IEA has produced estimates of the total energy consumption implied by current government targets and legislation, estimating an 80% increase in electricity demand from 2020-2050 with the majority of this growth in supply coming from renewables. In fact, even more growth is expected compared to the IEA's estimates if the Paris agreement's 1.5 degree target by 2050 were to be realized.

EXHIBIT 2: Fuel mix projections to meet stated government targets (IEA)⁶



EJ = exajoules, MJ = megajoule, TES = total energy supply
 Source: International Energy Agency, Net Zero by 2050 Special Report, October 2021

In the U.S., renewables contributed 14% of total electricity generated in 2022, and this share is expected to increase rapidly as solar and wind represent a large majority of capacity additions—76%–77% in 2022 and 2023.⁷ New generation, primarily renewables, represented 24% of capex for U.S. investor-owned electric utilities in 2022, with generation capex growing 10% from the prior year.⁸ Capital expenditures (capex) have a direct relationship to earnings and cash flow because of the regulated and contracted models of listed infrastructure companies. Therefore, the potential financial opportunity is very large. For example, the largest contracted renewables developer in the U.S. estimates a \$2 trillion total investment opportunity from decarbonizing the U.S. power generation sector, and \$4 trillion for the whole economy.⁹

Though investment in renewable generation is already driving growth for listed infrastructure companies, there is further opportunity as this growth needs to accelerate further to decarbonize the economy in line with current global policies.

⁶ International Energy Agency, Net Zero by 2050 Special Report, October 2021
⁷ American Public Power Association, 2023
⁸ EEI, 2022
⁹ NextEra Energy, 2022

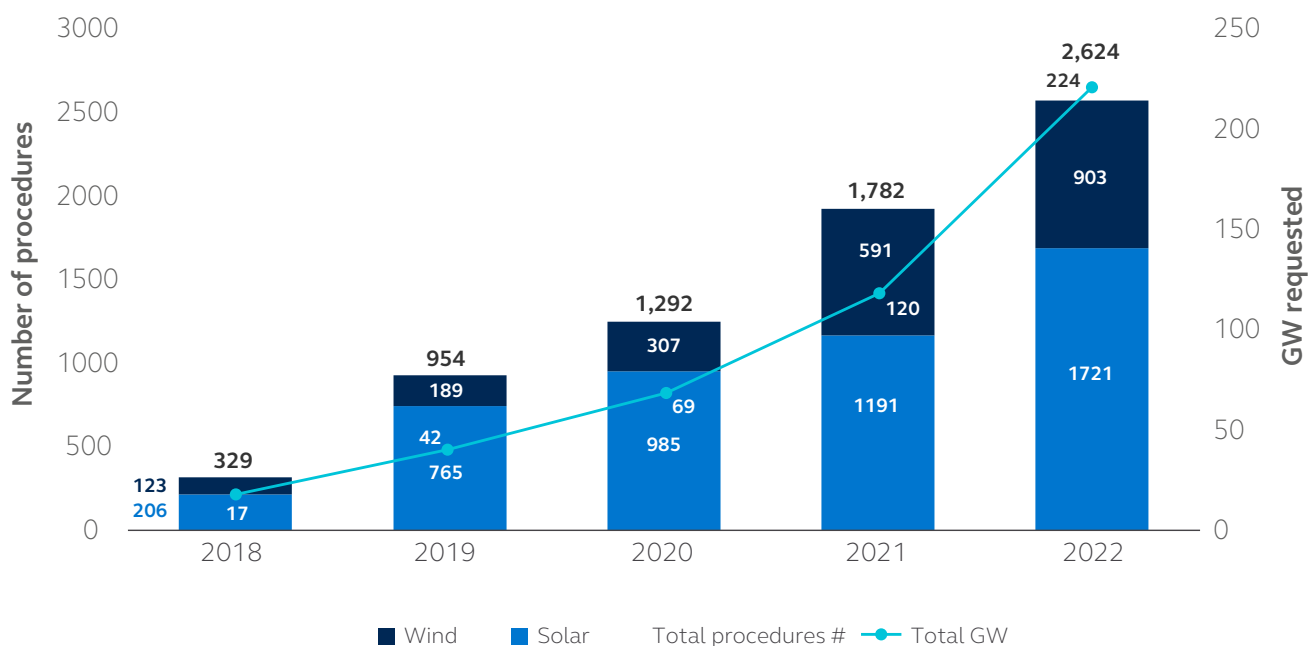
Increasing grid investment is required for electrification to work

The growth in renewable generation necessitates an increase in investment in the grid. Grid investments represented over 50% of U.S. investor-owned utilities’ total capital investments over the past three years.⁸ Electrification cannot happen without a stronger grid.

The need for transmission and distribution investment is demonstrated by the effect of the current inadequacies in the grid. Bottlenecks in transmission and delays in getting new resources connected are among the most important limiting factors on the rollout of clean generation. These are most serious in the U.S. For example, a recent report by the U.S. federal government’s Energy Information Administration highlighted grid congestion costs of over \$1 billion per annum in Texas each year from 2018. Furthermore, this is estimated to increase to \$2.5 billion by 2035.¹⁰ New transmission interconnections in the U.S. have been shown to take an average of over four years to complete, which has doubled over the last decade. Studies estimate that an emissions-free electricity sector in the U.S. would require 2-5x the transmission capacity we have today.¹¹ The queue of proposed solar and wind projects requesting to connect to the grid in the U.S. is greater than the current installed base of generation capacity.¹² Though not all of these projects will be completed, the shortage of transmission capacity is clear. There are two implications: first, listed infrastructure companies’ cash flows can benefit as this large backlog of new projects are brought online; second, the challenges of realizing a project are often better overcome by knowledgeable and experienced local electric utilities than new entrants.

The need for transmission is a global issue. As an example of the magnitude of investment required, the UK’s leading transmission operator is expected to build over 5x the onshore capacity by 2030 than it has built in the past 30 years.¹³ Likewise, the Italian transmission grid operator has seen grid connection requests from renewable facilities accelerate in recent years, with 2022’s level representing 8x that of 2018.¹⁴

EXHIBIT 3: Rapid growth in Italian new grid connection requests for renewable facilities¹⁴



Source: Terna, December 2022

¹⁰ U.S. Energy Information Administration, July 2023

¹¹ Harvard Kennedy School Belfer Center, February 2022

¹² Berkeley Lab, April 2023

¹³ National Grid, May 2023

¹⁴ Terna 2023

Distributed generation such as rooftop solar is a partial solution to some of the issues highlighted, but we do not see this as a major threat to the medium-term outlook for electric utilities because of the need for a distribution network connection in order to sell excess power back to the grid (net metering). The fixed connection charge makes up a material proportion of the revenues for some electric utilities.

Grid investment is just as important as generation investment in enabling electrification and listed infrastructure companies are the major drivers of this growth.

The importance of energy storage

Renewable generation is not perfect, largely because of the intermittency caused by inconsistency in wind or solar resources. Energy storage is increasingly being deployed in order to smooth the valleys in renewable output. Utilities' investment opportunity in storage, and thus its materiality as a growth driver, is lower versus generation or grid investment. However, investment in storage is increasingly required to facilitate investment in renewable generation.

In the best global regions for renewable generation, such as Chile, there is the opportunity for renewables and storage to supply power needs for 24 hours. The country has plans to build storage capacity representing over 17% of its year end 2021 total generation capacity by 2028, and major players have been accelerating investment plans.¹⁵ As more countries follow suit and build storage capacity in order to advance the energy transition, another growth opportunity develops for listed infrastructure.

Conclusion

Electrification is one of the most material secular growth drivers for many listed infrastructure companies. Electricity demand growth is likely to accelerate, while the generation fleet is simultaneously being transitioned to clean sources and the need for transmission and distribution infrastructure is increasing. All of this adds up to an increasing opportunity set and increasing growth potential for much of the listed infrastructure asset class.

¹⁵ International Trade Administration, September 2022

Risk Considerations

Past performance does not guarantee future results. Investing involves risk, including possible loss of principal. Infrastructure companies may be subject to a variety of factors that may adversely affect their business, including high interest costs, high leverage, regulation costs, economic slowdown, surplus capacity, increased competition, lack of fuel availability, and energy conservation policies. Foreign securities involve special risks, including currency fluctuation and lower liquidity. Some global securities may represent small and medium-sized companies, which may be more susceptible to price volatility than larger companies. Inflation and other economic cycles and conditions are difficult to predict and there is no guarantee that any inflation mitigation/protection strategy will be successful.

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