Lazard
Perspectives

The Pivotal Role of Infrastructure in a Sustainable Future

We view infrastructure investment as vital to the creation of a more sustainable society. Investor sustainability awareness may be a relatively recent phenomenon, but infrastructure companies have embraced sustainability for a number of years. In this ***Perspectives***, we argue that infrastructure companies are the cornerstone of energy transition; the critical enablers. We also explore new challenges that extend beyond environmental considerations. Social concerns weigh heavily when large investments lead to higher customer bills and affordability becomes an issue. While sustainability trends present tremendous investment opportunities, risks arise if a fundamental and integrated framework is not an integral part of the investment process.

LAZARD
ASSET MANAGEMENT

Introduction

Infrastructure often conjures images of concrete, pipes, and wires—things that do not have an obvious place in the stereotypical picture of sustainability. However, infrastructure companies are key to governments' ability to carry out their own sustainability policies and indeed often act as the delivery mechanism for those policies.

From a sustainability perspective, we are focusing on four material issues that we believe infrastructure investors need to consider in portfolios:

- The lowering of emissions through more efficient use of electricity
- The role of gas as a transition tool and the emergence of hydrogen technology
- The importance of effective water and waste management by infrastructure companies
- The delivery of affordable power for consumers

In this *Perspectives*, we also look at the sustainability investment risks that are arising, specifically:

- Avoiding devastating technology displacement risks
- Market valuations not fully accounting for sustainable pricing

We view infrastructure as an important part of building a more sustainable world and that this can translate into long-term sustainable returns for fundamental investors.

The lowering of emissions through more efficient use of electricity

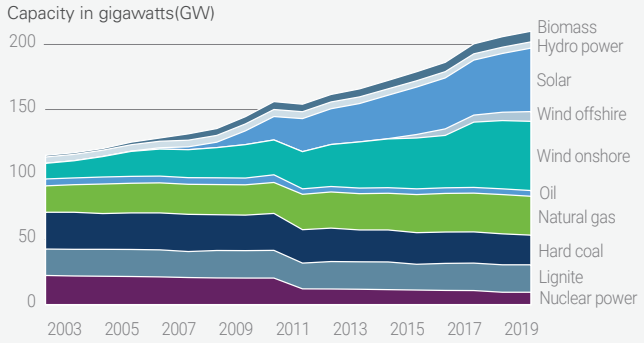
Wind farms, batteries, and solar panels are not the only requirements for a transition toward a greener energy mix; to ensure reliable and resilient electrical service, infrastructure companies must also manage an increasingly complex transmission grid.

For example, ten years ago, an electricity transmission grid in a country such as Italy had to balance about 1,000 power generation units to deliver reliable electricity. Today, the number is close to 1 million. The complexity goes some way toward explaining the rising investment opportunities presented to many utilities. Italian utility Terna recently presented a five-year investment plan that includes capital expenditure of close to €8.9 billion. This compares with €3.2 billion that was included in the 2015-2019 plan. One of the main reasons for the increase in investment is linked to sustainability and reducing emissions.

While the trend toward net zero carbon is accelerating, reducing emissions is far from a new development for infrastructure companies. Germany's power generation, for example, saw a meaningful inflection point in 2011(Exhibit 1). While Europe has led the energy transition to date, rapid progress is now occurring in other parts of the world as well.

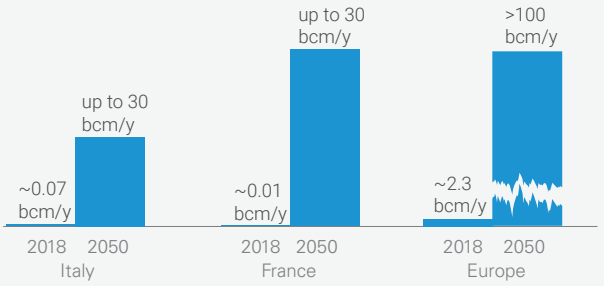
Exhibit 1
Growing Energy transition in Germany

Over Installed net power generation capacity in Germany 2002-2019.



As of 31 December 2019
Source: Clean Energy Wire

Exhibit 2
Increase in Biomethane Production



As of 31 December 2020
Source: EurEau data 2017 ,"Europe's Water in Figures"

The role of gas as a transition tool and the emergence of hydrogen technology

Of the total energy that households consume in Europe, gas represents 60% of the calorific value. As a result, a sudden move away from gas would be complex and costly. From a practical standpoint, gas offers a highly flexible source of energy, capable of responding to demand fluctuations and readily stored and transported.

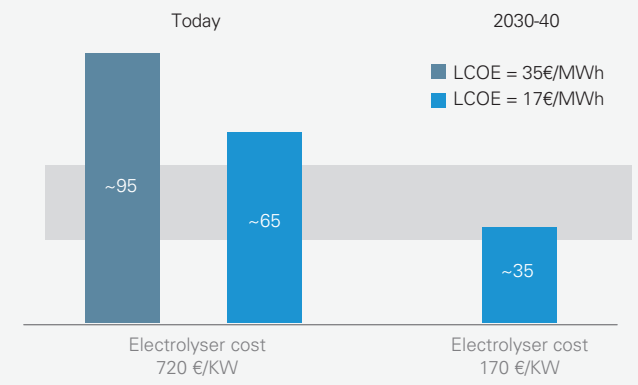
Adapting to fluctuating demand is an important consideration. Solar panels produce their maximum amount of power in summer months, when gas demand for home heating is lowest.

In that context, a number of countries have concluded that their decarbonisation strategy will have to involve gas. This will include the growing share of biomethane and ultimately green hydrogen. The European Union has made the most progress, and the recently announced Green Agenda in the United Kingdom follows in

Europe's footsteps. Biomethane production in Italy, France, and Europe is expected to increase dramatically (Exhibit 2).

Infrastructure companies are taking a leading role in developing biomethane and green hydrogen, and making solid technological progress in transporting and delivering zero carbon fuels. This can explain why Italian infrastructure company Snam bought a 33% stake in De Nora, a global leader in the electrodes necessary for manufacturing hydrogen. Costs are falling rapidly in two of the key components in manufacturing of green hydrogen manufacturing: electrolysers and a renewable source of generation, namely wind or solar photovoltaic (Exhibit 3).

Exhibit 3
The cost of manufacturing green hydrogen is falling



As of 31 December 2020
LCOE = Levelised Cost of Energy
Source: Italgas

The importance of effective water and waste management by infrastructure companies

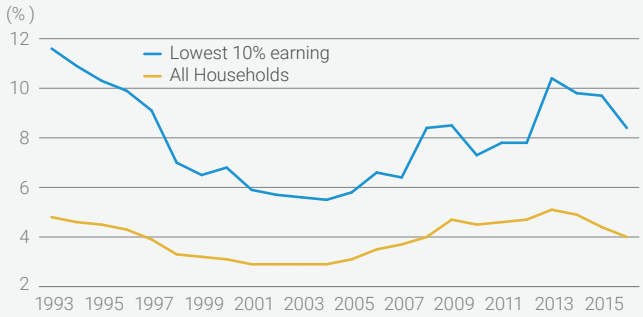
While the energy transition may be the most widely discussed topic in terms of how infrastructure can affect sustainability, sectors outside the energy industry such as water and waste management also figure in a more sustainable future. For years now, water companies have been investing significant capital in sustainability, both on their own and in response to regulatory policies. Some of those policies have been in place for a considerable length of time. The EU Water Framework Directive was adopted in 2000 to address several critical issues, including integrated river basin management. Water companies were forced to consider critical aspects of biodiversity following a directive of the European Parliament in September 2006 on the protection and improvement fresh water quality to support fish life.

Companies have also taken the initiative. Because water distribution and wastewater treatment is highly energy intensive, water companies have developed their own renewable sources of energy and technological innovations to improve the water treatment process. One water service company in the UK, Severn Trent, is engaging with farmers to limit the use of pesticides in order to reduce river pollution, rendering water treatment meaningfully cheaper. It has also committed to enhancing the biodiversity of 5,000 hectares of land-1% of the entire British government's overall target-by 2027.

As far as waste management companies are concerned, most of them do not meet our preferred infrastructure criteria as their business models tend to rely on low-margin, highly competitive collection contracts. However, two of our investments, Hera in Italy and Pennon in the United Kingdom, have been involved in waste infrastructure businesses and have invested heavily in energy recovery plants and anaerobic digestion plants.

Hera, a Bologna-based utility, now recycles well over 60% of its urban waste volumes, the industry's best in class. Meanwhile, the transformation of Pennon's Viridor waste business into a waste infrastructure business, thanks to the large emissions reductions

Exhibit 4
Power bills weigh on low income households in UK



Source: Ofgem, 2018

fund programme, was a win-win. Not only did Viridor deliver this ambitious programme, but Pennon's shareholders were rewarded. Management sold the company for £4.2 billion in July 2020, a price above our assessment of the business' value and well above consensus value.

Ultimately, we expect regulation will require a higher proportion of waste to be recycled. This is already the case in the United Kingdom, where our investment in Severn Trent could benefit from a pending mandate to segregate food waste. Food scraps can "feed" anaerobic digestion assets, which extract the calorific content to generate energy.

Leakage reduction is an important source of water resources conservation. Here, the situation varies per country. However, in Europe, an average of 23% of water is lost through leakage every year. This is why this issue has become more prominent with companies and regulators. Indeed, UK Water regulator Ofwat has

set a 50% leakage reduction by 2050 for the sector, with 16% to be achieved over the 2020-2025 time frame. In the US, the leakage ratio varies from 20% to 50%.

The delivery of affordable power for consumers

The energy transition will require considerable investment, especially now, at a time of secular reinvestment in infrastructure assets built just after World War II. This spending is likely to pressure utility service prices, making the affordability of the energy transition a stress point. As UK energy regulator Ofgem noted, "Energy is an essential service required for health and well-being. Consuming below the level of accepted thermal comfort may have serious health consequences, while worrying about how to meet fuel bills can also have psychological effects."

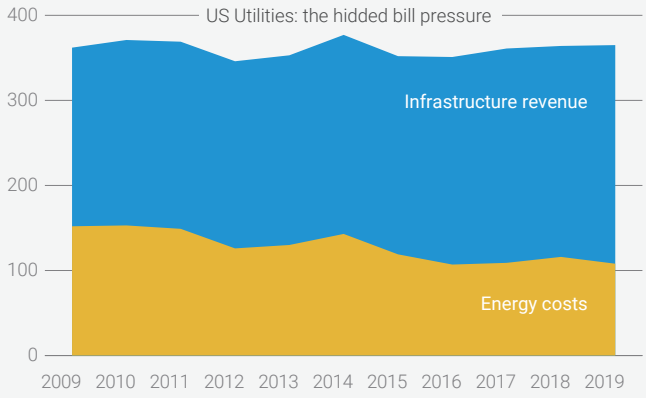
In our view, the energy transition will only be deemed a success if it helps to reduce the number of people who have to live without adequate fuel, water, or both. When analysing investment opportunities, our investment team has continuously adopted a holistic approach to environmental, social, and governance (ESG) factors, as we believe that they are interlinked.

In order to place the affordability question in context, Ofgem analysis shows the percentage of UK household spending that goes to the electricity and gas bill over time (Exhibit 4). The ratio is presented for the average household and for the 10% of households with the lowest income. The low-income households spend twice as much in percentage terms on their utility bills as the average households. As the energy transition moves along, this kind of squeeze will make it difficult for regulators to strike the right balance between the interests of consumers and those of capital providers.

We see a similar picture in the United States. However, the country's energy consumers have benefited more than others from falling commodity prices, as the rapid development of shale gas helped push power prices down (Exhibit 5). The commodity component of sector revenues fell almost 30%, while the infrastructure part of revenues increased 22%. As a result, consumers' energy bills stayed mostly the same.

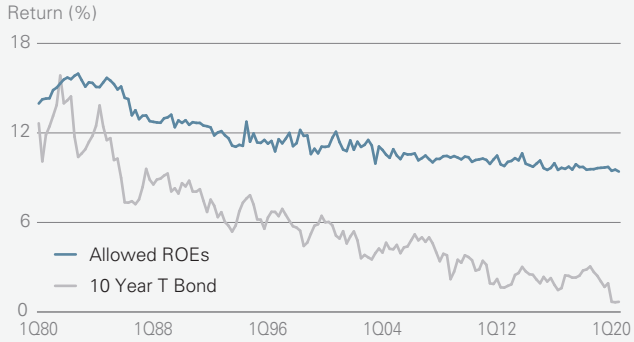
However, US utilities have stepped up capital expenditure to address network resilience issues that resulted from an extensive period of underinvestment from the 1980s to the early 2010s. At the same time, state regulators have largely embraced the energy transition and are demanding substantial new investment. We think the increases required could pressure on customer bills and as a result threaten the sustainability of returns for US utilities.

Exhibit 5
US Utilities: The investment gap could put pressure on consumer energy prices



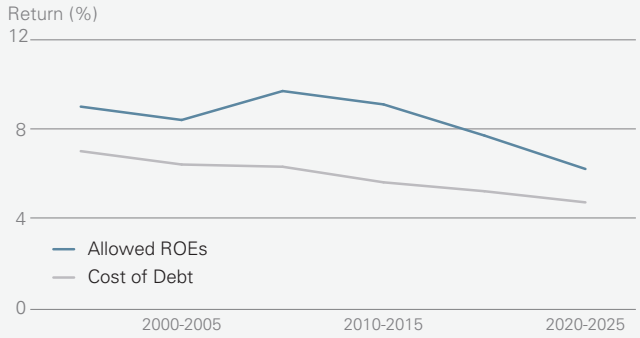
As of 31 December 2020
Source: Lazard Asset Management

Exhibit 6
Allowed Returns of Utilities - Spread Widening



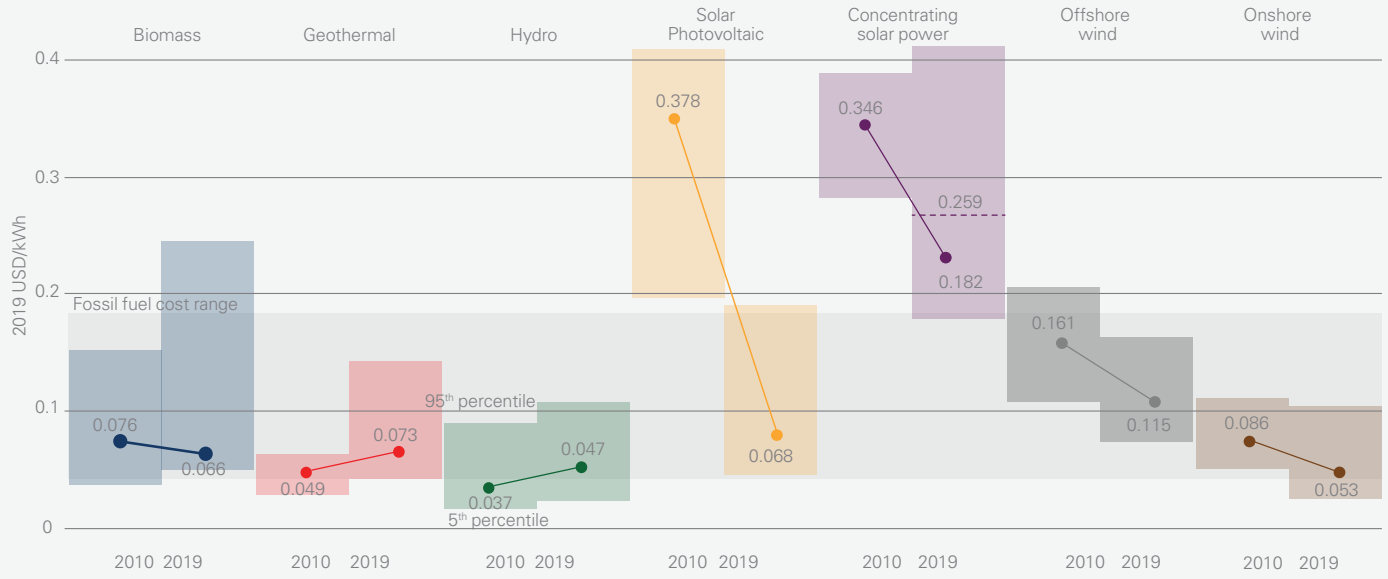
As of 31 March 2021
Past performance is not a reliable indicator of future results.
Source: RRA, Lazard

Exhibit 7
UK Water Utilities - Spread Tightened



As of 31 March 2021
Past performance is not a reliable indicator of future results.
Source: Ofwat, Lazard

Exhibit 8
Not all cost curves evolve at the same pace
Global weighted average levelised cost of electricity from utility-scale renewable power generation technologies, 2010 and 2019



As of 31 March 2021
Source: International Renewable Energy Agency. " Renewable power generation costs in 2019"

Sustainability Risks—US Utility Earnings

We do not believe it is viable over the longer-term for utility companies to over-earn, particuarly if this comes at the expense of affordability for the consumer. This is now a real risk to returns, particularly if those returns are viewed as excessive in the current context of record low interest rates. Indeed, regulators can reduce the level of returns utilities are allowed to earn as a means of easing rate pressure on consumers. We have had less exposure over the last few years to US regulated utilities, as we considered their returns less sustainable than their global peers, in contrast to their high market valuations.

The UK has moved to close the gap in allowed returns and the risk free rate or cost of debt much more quickly than the US (Exhibit 6 and 7). The UK's United Utilities applied a 10.5% rate reduction partly because the regulator chose to return to customers the benefit of low interest rates, reasoning that there should be no windfall gain for investors. US utilities to date have not faced rate reductions, but investors should not assume US regulators will not use them to limit energy bill increases.

Sustainability Risk—Technology

The investment into the energy transition has opened investment opportunities across capital markets. However, these opportunities need careful consideration as the pace of technological change also brings risk. There will be winners, but there is no certainty as to which technology will produce the best returns. The International Renewable Energy Agency has produced consistent analyses of the cost of renewable energy over many years, as highlighted in Exhibit 8. Lazard's annual Levelized Cost of Energy ("LCOE") analysis also examines this dynamic in detail (Exhibit 9). Lazard's unsubsidized LCOE analysis indicates significant historical cost declines for utility-scale renewable energy generation technologies driven by, among other factors, decreasing capital costs, improving technologies and increased competition. More broadly, we believe there are several conclusions from both reports.

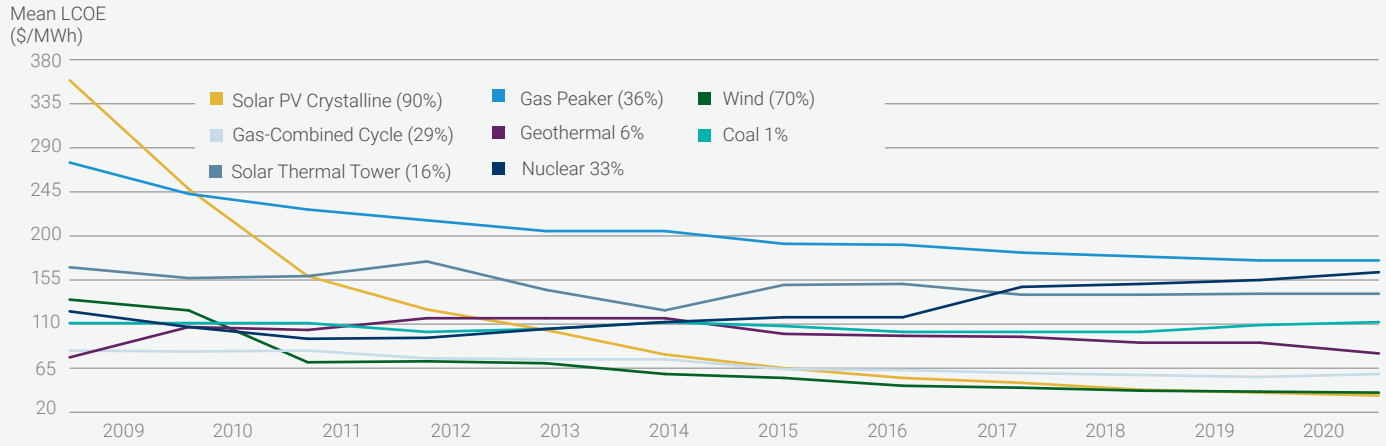
Costs have fallen quicker than initially anticipated.

Wind and solar costs have fallen to such an extent that renewable technologies may no longer need subsidies. This also suggests that in the future renewable energy companies may be less likely to enter into long-term revenue contracts and that returns will transition toward market-driven supply and demand.

Not all cost curves evolve at the same pace.

Exhibit 9 not only shows a welcome and drastic decline in renewable technology costs, but also how different the pace of decline is for each individual technology. This should remind investors of the risks involved in investing in rapidly evolving technologies at a time when lower costs may force companies to compete without subsidies.

Exhibit 9
Renewable Energy Prices Falling Fastest
Selected Historical Mean Unsubsidized LCOE Values[1]



As of 31 March 2021

1 Reflects the average of the high and low LCOE for each respective technology in each respective year. Percentages represent the total decrease in the average LCOE since Lazard's LCOE—Version 3.0.

Source: Lazard estimates

The deployment of electric vehicles offers an example. The bankruptcy of battery-changing and charging company, Better Place, which had invested in the development of battery-swapping stations at a time when fast charging was not possible, is a reminder that technology displacement can take place quite rapidly. As charging technology improved dramatically, the cumbersome process, once deemed the ultimate solution to range anxiety, became rapidly obsolete.

The UK National Grid is in discussions with the government about developing a national network of fast charging stations for electric vehicles that would address "range anxiety," or the fear of running out of battery mid-road trip. In such a context, National

Grid would provide the infrastructure to set up charging stations and earn a regulated return on the investment. In effect, this means they would not assume any technology risk in operating of the charging stations; their returns are guaranteed through the regulated return.

While it is easy to see that the energy transition is happening quickly, investing in speculative technologies can be highly risky. Our preferred infrastructure companies will remain at the other lower end of the energy transition risk spectrum as a defense against the risk of stranded assets.

The Sustainable Opportunity in Preferred Infrastructure

The energy transition is creating opportunities for infrastructure companies to invest in their networks, improve efficiency, and generate better outcomes for their customers and the environment. However, investing in the transition calls for careful analysis. We believe that a thematic approach without deep fundamental analysis could lead to investors taking more risk than they intended.

We see the current investor emphasis on sustainability as consistent with the team's longstanding approach to identifying predictable streams of cash flows, where the assessment of sustainability is an integrated part of the decision process.

The acceleration of carbon reduction policies brings new challenges that extend beyond environmental considerations. Provision of affordable and reliable power is, in our view, also a sustainable investing issue that must be considered in a fundamental framework.

We believe, investors need to see beyond simple stories and thematics and do deep fundamental analysis if they are to capitalize on the sustainability opportunity in infrastructure.

About the Team

Our Global Listed Infrastructure strategy is managed by a team of highly experienced investors. With experience in global portfolio management, listed equity analysis (including infrastructure analysis), and benchmark-agnostic portfolio management, the team has the key skills we believe are required to successfully manage a global listed infrastructure strategy. Lazard has assembled a team of five investment analysts with complementary skills and experience. The team is also supported by Client Portfolio Manager, Edward Keating. With its long history of successfully investing in infrastructure assets, depth of skills, and global execution capabilities, our Global Listed Infrastructure team combines a disciplined process focused on active, high-conviction management within a Preferred Infrastructure universe of listed infrastructure.

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