



A true test of infrastructure's defensive characteristics

SEPTEMBER 2020

Introduction

Infrastructure investing is predicated on the basis that real assets provide essential services to the economy and society. It is characterised as generating long-term, stable and often inflation-linked cashflows that are resilient to economic fluctuations. Covid-19 and the resulting economic shutdown have been the ultimate test of infrastructure's defensive characteristics. Overall, the infrastructure asset class has proved to be highly pandemic resilient, with most sub-sectors largely immune to the impact.



To explore this proposition further, Foresight Group LLP ("**Foresight**"), a leading independent infrastructure and private equity manager, commissioned research to assess how resilient different infrastructure sub-sectors are to global pandemics, with significant emphasis placed upon the impacts of Covid-19 to date. The analysis, which considers 23 sub-sectors of economic and social infrastructure, highlights that although infrastructure has proved to be largely pandemic resilient, the results vary significantly by sub-sector.

Summary Findings

- Infrastructure has clearly demonstrated that it is highly pandemic resilient. Not all infrastructure sub-sectors are equally resilient.
- Strong revenues have proved to be the single most important factor in driving overall pandemic resilience.
- Costs have been predominantly stable for most sub-sectors during the pandemic, although the full implications of supply-chain disruptions may not yet have taken full effect.
- Sub-sectors with the greatest overall resilience to global pandemics were less likely to suffer lack of support from investment and credit committees when securing finance.
- Government support for infrastructure has been highly positive, with their backing of most sub-sectors during the pandemic.
- Generally, within infrastructure, operations was the area where the pandemic has had the most impact, but relative to other asset classes, infrastructure operations have proved to be less vulnerable. Improving Business Continuity Plans ("BCPs") is a key area for future action within infrastructure and highlights the need for a more active investment style.
- Sub-sectors such as fibre, data centres, primary care and offshore wind have proved to be the most pandemic resilient based on information to date.
 However, the manifestation of any future pandemic is largely unpredictable and may lead to the outperformance of different sub-sectors. Diversification within infrastructure should be actively pursued to mitigate pandemic risk further.



Defining Resilience

Foresight has adopted the following definition of resilience:

"Resilience is the ability of a system, community or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions."

The United Nations Office for Disaster Risk Reduction

Infrastructure Sub-sectors Considered

As the infrastructure sector matures, an increasing number of assets fall within its scope. There are many ways to segment these assets, such as by risk/return (e.g. core, core plus, value add and opportunistic), by revenue profile (e.g. demand-based and availability-based) or by geography. For the purpose of this research, infrastructure has been divided into two headline categories:

Economic infrastructure: an asset that directly facilitates the processes of production and distribution within an economy.

Social infrastructure: an asset that does not directly influence economic activity, but indirectly has an impact on the economy through achieving certain social objectives.

The assessment considers 23 sub-sectors within economic and social infrastructure. Economic infrastructure has been divided further into energy and utilities, telecommunications and transportation.

The assessment considers the resilience of infrastructure to global pandemics through **five** investment fundamentals:



For each investment fundamental, infrastructure sub-sectors have been awarded a score ranging from **+6 (most resilient) to -6 (least resilient)** using a proprietary pandemic resilience framework developed by Foresight.

ECONOMIC INFRASTRUCTURE

Telecommunications

Energy & utilities Bioenergy

Coal-fired power

Electricity transmission

Natural gas-fired power

Nuclear power

Offshore wind

Onshore wind (utility-scale)

Solar-PV (utility-scale) Water Utility

3

Cell towers

Data centres Fibre

Transportation

Airports Ports Railway rolling stock Toll roads

SOCIAL INFRASTRUCTURE

General elderly care homes General needs housing Primary care Private hospitals Purpose built student accommodation ("**PBSA**") - off campus*

Schools

Specialised supported housing & local authority housing ("**SSH** & **LAH**")

*'Off campus' PBSA is that where the rooms are rented directly by the students and the leases are typically one to two years long. A significant majority of UK PBSA is 'off campus'. 'On campus' PBSA is that where either all or a majority of the rooms are rented by the university under long-term nomination agreements where, typically, the university guarantees the rent regardless of room occupancy. This analysis considers 'off campus' PBSA exclusively. 'On campus' PBSA is expected to demonstrate much more resilient characteristics.

Overall Global Pandemic Resilience Scores

The assessment finds that the greatest resilience to global pandemics has been demonstrated by all of the telecommunications sub-sectors and the renewables sub-sectors within energy and utilities. Primary care also scores highly, although largely its resilience does not correlate with the rest of the social infrastructure sub-sectors. Generally public private partnerships ("**PPP**") have performed well during Covid-19, evidencing positive experiences of the private and the public sector working together to deal with the issues confronted. The sub-sectors that outperformed are the truest reflection of the defensive characteristics of infrastructure, evidencing stability when the lockdown of societies is significantly altering demand patterns, the global economy is in flux and supply chains are being stretched beyond original conceptions. The evidence for this and other findings are outlined in the pages that follow.

Key

Energy & Utilities
 Social
 Telecommunications
 Transportation

Infrastructure Sub-sector	Overall Global Pandemic Resilience Score
Fibre	15
Primary Care	14
Data Centres	13
Offshore Wind	11
Solar-PV (Utility-scale)	9
Cell Towers	8
Onshore Wind (Utility-scale)	8
SSH & LAH	5
Schools	3
Railway Rolling Stock	3
Bioenergy	2
Water Utility	2
Electricity Transmission	1
Natural Gas-fired Power	-1
General Needs Housing	-6
Ports	-7
Nuclear Power	-8
Private Hospitals	-10
Toll Roads	-13
General Elderly Care Homes	-16
PBSA (Off Campus)	-19
Airports	-21
Coal-fired Power	-24
	-30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 Least resilient to Global Pandemics Pandemics

Trends in Infrastructure's Resilience to Global Pandemics

Typically, infrastructure sub-sectors that evidenced the greatest overall resilience to global pandemics were positively correlated with a high degree of both revenue (0.87) and financial resilience (0.85).

Real asset owners that give the greatest weighting to revenue and financial investment fundamentals in their sub-sector risk assessments are more likely to outperform other less correlated infrastructure sub-sectors in their resilience to future global pandemics.

Operational resilience was the least correlated (0.60) with overall pandemic resilience. Operations was the investment fundamental that, within infrastructure sub-sectors, most frequently scored lowest for its pandemic resilience. However, relative to other asset classes, infrastructure's operations are generally considered to have been more robust to the pandemic. The general lack of operational preparedness in most businesses suggests the risk and potential operational impact of a pandemic was widely underestimated. For anecdotal context, Munich Re and Marsh, heavyweights of the global insurance industry, were the first to create business-interruption insurance for pandemics, launched 100 years after the last pandemic of such global scale - the Spanish Flu in 1918ⁱ. Very few organisations bought the insurance. Improved BCPs should be a key area of focus for all infrastructure sub-sectors.



	Resilience Score for each Investment Fundamental		Inv	vestment Fundamen	tal	
	Infrastructure Sub-sector	Revenue	Cost	Finance	Political & regulatory	Operations
Most	Fibre					
pandemics	Primary Care					
	Data Centres					
	Offshore Wind					
	Solar-PV (Utility-scale)					
	Cell Towers					
	Onshore Wind (Utility-scale)					
	SSH & LAH					
	Railway Rolling Stock					
	Schools					
	Bioenergy					
	Water Utility					
	Electricity Transmission					
	Natural Gas-fired Power					
	General Needs Housing					
	Ports					
	Nuclear Power					
	Private Hospitals					
	Toll Roads					
	General Elderly Care Homes					
	PBSA (Off Campus)					
Least resilient	Airports					
to Global pandemics	Coal-fired Power					
	Correlation with total resilience score	0.87	0.74	0.85	0.78	0.60

5

Revenue Resilience



Sub-sectors with the greatest overall resilience to global pandemics were most positively correlated with high revenue resilience.

Resilient revenues typically benefited from the least demand elasticity due to long-term, inflation-linked and availability-based cash flows with financially robust counterparties (e.g. primary care or SSH & LAH) or those that benefited from heightened demand due to the pandemic (e.g. data centres or fibre). Sub-sectors most exposed to the impact of the lockdown on demand had the poorest revenue resilience (e.g. airports and 'off campus' PBSA). During a future pandemic, different demand drivers might well lead to the outperformance of other sub-sectors.

Key Energy & Utilities Social Telecommunications Transportation

Infrastructure Sub-sector	Revenue Resilience Score
Data Centres	5
Primary Care	4
SSH & LAH	4
Fibre	3
Railway Rolling Stock	2
Schools	2
Cell Towers	1
Offshore Wind	0
Onshore Wind (Utility-scale)	0
Bioenergy	-1
Natural Gas-fired Power	-1
Solar-PV (Utility-scale)	-1
Electricity Transmission	-2
Nuclear Power	-2
Water Utility	-2
Private Hospitals	-4
General Elderly Care Homes	-5
General Needs Housing	-5
Airports	-5
Ports	-5
Toll Roads	-5
Coal-fired Power	-6
PBSA (Off Campus)	-6
	-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
	Least Most resilient resilient to Global to Global Pandemics Pandemics

Revenue Resilience

Data Centres:

Covid-19 has accelerated macro-economic drivers, such as e-commerce and cloud computing, that were already heightening the demand for data centresⁱⁱ. This exponential growth in the use of internet-based services has been underpinned by the increasing use of data centres to store computing power and data. In spite of Covid-19 the US data centre Real Estate Investment Trusts ("**REITs**") have reported Q2-20 revenue growth of 4% - 21% vs. Q1-20ⁱⁱⁱ,^{iv}. Lease payment defaults due to Covid-19, although not widely reported by data centre operators, are expected to be offset by rising demand. Long-term revenue growth is forecast due to strong sector tailwinds caused by the pandemic, which is anticipated to change permanently the way homes and businesses use the internet^v.

Primary Care:

Long-term, inflation-linked, Government-backed rent makes primary care lease revenue some of the most secure in UK real estate, with revenue much less prone to tenant financial stress resulting from pandemics. The London Stock Exchange ("**LSE**") listed primary care REITs have collected 98%+ of H1-20 rent^{vi}. Covid-19 has further confirmed that primary care is crucial to meeting the UK's future healthcare needs and this will require larger, more flexible and higher-quality facilities. This will create new investment and revenue opportunities for primary care investors, reinforcing the sector's positive outlook.

Airports:

In April and May Covid-19 led to a 97% - 99% year-on-year decline in passengers at leading UK airports such as Heathrow, Stansted and Manchester, with similar impacts observed elsewhere globally^{vii}. In the first half of 2020 Heathrow's revenue fell by 51% reflecting reduced aeronautical and retail revenue^{viii}. Revenue from cargo flights is expected to be immaterial in compensating for lost passenger traffic. The International Air Travel Association ("**IATA**") expects a 55% decline in passenger volumes this year for most regions, with a return to pre-Covid-19 levels expected in three to five years. By way of comparison there was a 10% decline following the 2008 financial crisis, but passenger volumes had recovered to pre-crisis levels by the first half of 2010^{ix}.

In spite of Covid-19 the US data centre Real Estate Investment Trusts have reported Q2-20 revenue growth of 4% - 21% vs. Q1-20.

Long-term, inflation-linked, Government-backed rent makes primary care lease revenue some of the most secure in UK real estate.

Cost Resilience



full effect.

Costs have been predominantly stable for most sub-sectors during the pandemic, although the full implications of supply-chain disruptions may not yet have taken Often costs suffered most negative impact due to putting in place measures to comply with social distancing, either as a result of extra spend (e.g. costs of protective equipment) or reduced capacity (e.g. increasing cost per head due to reduced capacity in transportation infrastructure).

Certain sub-sectors' costs have been improved by the pandemic, such as utility-scale solar-PV (solar cell module prices have fallen 3% - 18% YTD depending on module type)^x. The analysis does not consider the effect of the pandemic's potential second wave, which could affect costs greatly for different sub-sectors depending on the geography infected and the extent of any ensuing lockdowns. As a future mitigant, real asset owners might consider diversifying supply chains (e.g. localised vs. global) and maintaining greater inventories.

Key **Energy & Utilities** Social Telecommunications Transportation

Infrastructure Sub-sector	Cost Resilience Score
Data Centres	2
Fibre	2
Primary Care	2
Electricity Transmission	2
Natural Gas-fired Power	2
Water Utility	2
Cell Towers	1
General Needs Housing	1
Solar-PV (Utility-scale)	1
Ports	1
Toll Roads	1
Schools	0
SSH & LAH	0
Railway Rolling Stock	0
Bioenergy	0
Nuclear Power	0
Offshore Wind	0
Onshore Wind (Utility-scale)	0
Coal-fired Power	-3
PBSA (Off Campus)	-3
Private Hospitals	-3
Airports	-4
General Elderly Care Homes	-5
	-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
	Least Most resilient resilient to Global to Global Pandemics Pandemics

Infrastructure Pandemic Resilience: A Foresight white paper

Cost Resilience

Fibre:

The cost per property passed ("**CPPP**"), a key metric for fibre operators, is expected to be stable under Covid-19. Constructing a fibre network is highly capital intensive, most notably digging up roads, which is why historically operators have laid excess fibre across their networks to meet future demand increases without significant further CAPEX^{xi}. Limited construction delays due to Covid-19 have been reported, reducing the cost impact of project overruns. With many fibre operators having strong financial backing to fund expansion and rising demand, the sector is well positioned to meet ongoing costs.

Coal-fired Power:

Low electricity demand due to Covid-19 led the UK to be coal-free for over two months from April to June, a new record since the industrial revolution. Low production and high fixed costs (c.30% - 40% of OPEX) have a significant impact on the financial viability of coal-fired power^{xii}. The costs of keeping coal generation compliant with environmental regulation continue to rise. The price of the European Emission Allowance (contracts acquired to offset Carbon emissions) has increased 15% YTD, partially due to the EU's plans for a green Covid-19 recovery^{xiii}. Seaborne coal prices have remained stable (fuel accounts for c.60% of OPEX), with future price volatility likely influenced by Asia-Pacific supply/demand imbalances.

General Elderly Care Homes:

The 'opco-propco' model means that investors are not directly exposed to care homes' spiralling operational costs due to Covid-19, which have reached unsustainable levels. Personal Protective Equipment ("**PPE**") costs have risen twelve-fold and 10% staff absenteeism has led to high staff agency costs (agency workers are some 3x more expensive)^{xiv}. This, combined with a c.22% decline in occupancy, means that care homes may struggle to service their debt obligations^{xv}. Industry leverage is high (average gearing of the largest 26 providers was 578% of assets in Q4-19) and so there is concern that some care home providers will default despite the Government's £600 million Infection Control Fund^{xvLxvii}.

With many fibre operators having strong financial backing to fund expansion and rising demand, the sector is well positioned to meet ongoing costs.

Sub-sectors with the greatest

Financial Resilience

£

overall resilience to global pandemics were less likely to suffer lack of support from investment and credit committees when securing finance.

The ability of telecommunications, renewables and primary care to secure finance has proved to be resilient during Covid-19. For example, at the height of lockdown in April, Assura PLC became one of the few LSE-listed REITs to raise equity following its market leading Q1-20 rent collection of 98% (by way of comparison, shopping centre REITs Intu Properties PLC and Hammerson PLC collected just 29% and 35% of rents respectively)^{xviii}. Similarly, 2020 could be a record year for deployment into the European data centre market and of UK fibre, two sub-sectors that have benefited from huge increases in demand during the pandemic.

Energy & Utilities Social

Key

Telecommunications

Transportation

Infrastructure Sub-sector	Financial Resilience Score
Data Centres	5
Fibre	5
Offshore Wind	5
Solar-PV (Utility-scale)	4
Primary Care	3
Onshore Wind (Utility-scale)	3
SSH & LAH	2
Cell Towers	1
Water Utility	1
Railway Rolling Stock	1
Electricity Transmission	0
Schools	0
Bioenergy	0
General Elderly Care Homes	-1
General Needs Housing	-1
PBSA (Off Campus)	-2
Toll Roads	-2
Airports	-2
Ports	-3
Private Hospitals	-4
Nuclear Power	-4
Natural Gas-fired Power	-4
Coal-fired Power	-6
	-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
	Least Most resilient resilient to Global to Global Pandemics Pandemics

Financial Resilience

Fibre:

Foresight expects 2020 to be a strong year for UK fibre deals, possibly surpassing the c.£2.25 billion of disclosed transactions in 2019 (a record). Despite Covid-19, there has been robust demand for this utility-like sector, particularly amongst infrastructure funds, with c.£1.27 billion of deals announced in the first five months of 2020. Historically, most UK fibre transactions have been equity financed, but lenders have been particularly active this year, reflecting an increasingly diverse pool of capital available to fund fibre businesses. Most notably this included a £525 million loan in April to Gigaclear, a UK fibre business, from a consortium of four banks^{xix}.

Solar-PV (Utility-scale):

Global investment in renewables is expected to decline 10% in 2020 due to the pandemic, but the effect on utility-scale solar-PV is expected to be much less due to its declining levelised cost of electricity ("**LCOE**")^{xx}. There have been c.£414 million of disclosed UK solar-PV deals YTD, with total volumes expected to be in line with 2019 (c.£680 million) despite Covid-19^{xxi}. The pipeline of utility-scale solar-PV in the UK has grown significantly this year, with 2.6GW added in H1-20 (2.9GW was secured in all of 2019), which includes large-scale funding commitments from institutions and utilities such as Macquarie's Green Investment Group^{xxii}.

General Needs Housing:

Investment in UK general needs housing was £4.7 billion in H1-20, with Q2-20 investment down 47% from December 2019 due to Covid-19^{xxiii}. Declining deployment reflects housing associations' efforts to preserve liquidity and to protect credit ratings, which is key considering the use of significant leverage across the sector^{xxiv}. Housing associations are expected to maintain enough liquidity via the Bank of England's Covid Corporate Financing Facility, undrawn Revolving Credit Facilities ("**RCFs**") that were secured ahead of Brexit and bond issuance^{xxv}. £1.4 billion of bonds were issued in April/May, some oversubscribed, showing good investor demand^{xxvi}.

Foresight expects 2020 to be a strong year for UK fibre deals, possibly surpassing the c.£2.25 billion of disclosed transactions in 2019 (a record).



There have been c.£414 million of disclosed UK solar-PV deals YTD, with total

volumes expected to be in line with 2019 (c.£680 million) despite Covid-19.



Political & Regulatory Resilience



Government support for infrastructure has been highly positive, with their backing of most sub-sectors during the pandemic, with toll roads, airports and coal-fired power notable exceptions.

The Government has injected into the economy, including infrastructure, in excess of £100 billion of grants and subsidies already, with the Covid-19 stimulus estimated to cost £300 billion by April 2021^{xxvii}. However, Government support has not reached all sub-sectors evenly, for example within transportation the response has been notably absent for airports and toll roads in comparison to the 'nationalisation' of train operating companies ("**TOCs**") by the Department for Transport on the first day of lockdown (23rd March) to protect TOC finances.

Key

Energy & Utilities Social Telecommunications Transportation

Infrastructure Sub-sector	Political & Regulatory Resilience Score
Primary Care	6
Offshore Wind	6
Onshore Wind (Utility-scale)	6
Solar-PV (Utility-Scale)	6
Fibre	5
Private Hospitals	5
Bioenergy	4
Cell Towers	4
Ports	4
General Needs Housing	4
Schools	4
SSH & LAH	4
Railway Rolling Stock	3
Water Utility	2
Electricity Transmission	2
Data Centres	0
Natural Gas-fired Power	0
General Elderly Care Homes	-1
PBSA (Off Campus)	-3
Nuclear Power	-3
Toll Roads	-4
Airports	-5
Coal-fired Power	-6
	-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
	Least Most resilient resilient to Global to Global Pandemics Pandemics

Political & Regulatory Resilience

Private Hospitals:

Covid-19 had a severe impact on private hospital revenue. Many have cancelled operations due to staff availability, travel restrictions have hit the supply of lucrative overseas patients and NHS-funded operations have been largely suspended. In March-20, the NHS seconded most UK private hospital capacity in response to Covid-19. Although private hospitals will not profit from the arrangement, the Government will pay their operating costs, overheads, use of assets, rent and interest (in effect a bailout). The crisis is expected to lead the Government to increase its use of private hospital capacity to reduce NHS waiting lists, which are at record levels due to Covid-19xxviii.

Onshore Wind (Utility-scale):

The UK Government is under pressure to ensure a green recovery from Covid-19. Key to this is their re-inclusion of onshore wind and solar in the UK's Contracts for Difference ("CfD") scheme from 2021; onshore wind is expected to be the main beneficiary due its low LCOE (stimulating 1GW of new investment p.a.)^{xxix}. The European Commission has placed its European Green Deal ("**EDG**") at the core of its €750 billion EU Covid-19 recovery package. The EDG, amongst other objectives, aims to stimulate clean energy investment and emphasises the importance that both onshore and offshore wind will play in Europe's energy mix^{xxx}.

Railway Rolling Stock:

To protect TOC finances, which have been severely impacted by Covid-19, the Government has taken control of TOCs until March 2022. This includes the payment of rolling stock leases, with the Government acting as the 'TOC of last resort'xxxi. The sector's UK outlook hinges on the strategy that the Government implements to end the UK's twenty-four year old rail franchising system (announced in September) and the result of the Williams Review (a Government-commissioned report on UK rail). Due to Covid-19 and the EGD, the European Commission has said that 2021 should be the 'European Year of Rail', stimulating a post-pandemic shift from air to train travel and reflecting the sustainability and safety benefits of rail^{xxxii}. Rolling stock firms and rail freight companies stand to profit should traveller behaviours change accordingly and should there be a move towards sustainable transport and logistics in the post-Covid-19 era.

The crisis is expected to lead the Government to increase its use of private hospital capacity to reduce NHS waiting lists.

The European **Commission has** placed its European Green Deal at the core of its €750 billion EU Covid-19 recovery package.



The European **Commission has** said that 2021 should be the 'European Year of Rail', stimulating a postpandemic shift from air to train travel.

Operational Resilience

Generally, within infrastructure, operations was the area where the pandemic has had the most impact, but relative to other assets classes, infrastructure operations have proved to be less vulnerable.

This shows the extent that the infrastructure industry misjudged the probability and implications of a global pandemic, with the last that occurred on such a global scale being the Spanish Flu epidemic in 1918. Few sub-sectors have demonstrated that their BCPs could deal with pandemic risk. Typically, the most resilient sub-sectors were those that required minimal human intervention for continued operation. Improved BCPs should be a key area of focus for real asset owners in the future. Active investors that focus portfolio companies on developing more robust BCPs will likely outperform during any second wave of Covid-19 or for future pandemics more generally.

Energy & Utilities
 Social
 Telecommunications
 Transportation

Key

Infrastructure Sub-sector	Operational Resilience Score
Natural Gas-fired Power	2
Cell Towers	1
Data Centres	1
Nuclear Power	1
Fibre	0
Offshore Wind	0
Bioenergy	-1
Electricity Transmission	-1
Onshore Wind (Utility-scale)	-1
Primary Care	-1
Solar-PV (Utility-scale)	-1
Water Utility	-1
Coal-fired Power	-3
Railway Rolling Stock	-3
Schools	-3
Toll Roads	-3
General Elderly Care Homes	-4
Private Hospitals	-4
Ports	-4
Airports	-5
General Needs Housing	-5
PBSA (Off Campus)	-5
SSH & LAH	-5
	-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
	Least Most resilient resilient to Global to Global Pandemics Pandemics

Operational Resilience

Data Centres:

Crisis-resilient BCPs are key to data centre design to maintain uptime at 99.67% - 99.99% (uptime dependent on data centre tier classification)^{xxxiii}. Existing data centres are reported to be operating without interruption despite increased demand due to Covid-19 and rota working on site to limit the risk of infection. Most greenfield sites have remained open, with some temporary closures at the operator's discretion (e.g. Facebook in Ireland). The greatest risk is to the supply of materials and equipment for construction and new capacity fit outs^{xxxiv}. Most operators/manufacturers had three to six months of material and equipment going into the crisis, so supply-chains could be tested if lockdowns are reinstated in certain countries^{xxxv}.

Electricity Transmission:

Grid inertia, the ability of electricity transmission networks to balance supply and demand, is typically lower in smaller networks. The inertia of the UK's medium-sized network is being tested greatly by Covid-19 due to low power demand and high renewables penetration (the variability of renewable generation due to natural forces such as wind speeds and irradiation levels reduces grid inertia)^{xxxvi}. To date the network has proved resilient due to grid inertia measures implemented by National Grid following a 2019 blackout in London. Whilst works to protect grid reliability have been prioritised, it could take up to a year to catch up on backlogged maintenance due to human, capital and resource constraints^{xxxvii}.

General Needs Housing:

Greenfield projects have been disrupted since lockdown began, with sites closing for one to three months due to difficulties maintaining social distancing, despite Government guidance that they could remain open. The long-term construction outlook is likely to be impeded by housing associations' capital preservation measures, with national targets unlikely to be met this year or the next. A significant backlog of maintenance has accrued on existing housing stock, with services temporarily restricted to urgent emergency and safety repairs due to supply-chain issues and to protect tenants' social distancing^{xxxxviii}.



Data centres are specifically designed with inbuilt operational

resilience to deliver up to 99.99% uptime. This and highly effective BCPs make data centres a market leader in operational resilience to pandemics.

Closing Statement

Foresight's research and assessment have clearly demonstrated that UK infrastructure is pandemic resilient, but also that there are substantial differences in the performance of various infrastructure sub-sectors.

Strong revenue resilience has proved to be the single most important factor in driving overall pandemic resilience.

Improving BCPs is a key area for future action within infrastructure and highlights the need for a more active real asset investment style.

The occurrence and manifestation of future pandemics will be unpredictable and so diversification across a range of infrastructure sub-sectors should help to further reduce pandemic risk and limit adverse impacts.



References

Wired
"CBRE
" Aviva
^{iv} CyrusOne, Digital Realty, Equinix Inc. and Coresite Realty Corp.
^v UBS
^{vi} Assura PLC and Primary Healthcare Properties PLC
^{vii} Standard & Poor's
viii Heathrow
^{ix} The International Air Travel Association
× PVxchange
^{xi} Cameron Barney
^{xii} Carbon Tracker
xiii Bloomberg New Energy Finance

- ^{xiv} Financial Times
- ×v LaingBuisson
- ^{xvi} Centre for Health & the Public Interest
- xvii Wired
- ^{xviii}Jefferies
- xix ISP Review
- ^{xx} International Energy Association
- ^{xxi} Bloomberg New Energy Finance
- ^{xxii} Solar Power Portal
- xxiii Regulator of Social Housing
- xxiv Social Housing
- xxv Standard & Poor's

xxvi Bromford, Guinness, Home Group, Optivo, Sanctuary Group, Sovereign Housing Association and Together Housing

- xxvii Office for Budget Responsability
- xxviii LaingBuisson
- xxix Bloomberg New Energy Finance
- ^{xxx} Wind Europe
- xxxi Infrastructure Investor
- xxxii UBS
- xxxiii Evercore
- xxxiv CBRE
- xxxv Cowen
- xxxvi Bloomberg New Energy Finance
- xxxvii Bloomberg New Energy Finance
- xxxviii Regulator of Social Housing

About Foresight

We are a leading independent infrastructure and private equity investment manager.

We manage funds for institutional investors, family offices, private and high net-worth individuals and have continued to expand rapidly in recent years with staff numbers now exceeding 230.

More than half of our assets under management comes from institutions, with the remainder made up from the traditional retail structures, such as VCTs, EISs, BR (Business Relief) schemes and OEICs.

Investing for a Smarter Future

Investing for a smarter future is what we have been doing for more than 35 years.

To us, a smarter future means thinking both about the way we invest our clients' capital as well as the impact it has, be it diverting waste from landfill to convert into renewable energy; managing solar plants and wind turbines to power industry with up to 100% renewable energy; acquiring utility scale battery storage assets to balance the grid; supporting small businesses with growth capital and providing attractive investment opportunities for some of the largest and most demanding of institutional investors.

Investing for a smarter future is a principle that guides everything we do as we continuously search for ways to create a sustainable legacy for future generations.



Foresight's infrastructure business is built on strong foundations which come from investing successfully at scale, on behalf of both institutions and retail investors, across the breadth of energy infrastructure for more than a decade.

Authors



Nigel Aitchison Partner and Head of Infrastructure



Richard Kelly Director and Head of New Product Development



Tom Blackwood Investment Associate



Foresight Group LLP The Shard 32 London Bridge Street London SE1 9SG

- t: +44 (0)20 3667 8199
- e: sales@foresightgroup.eu
- w: foresightgroup.eu

