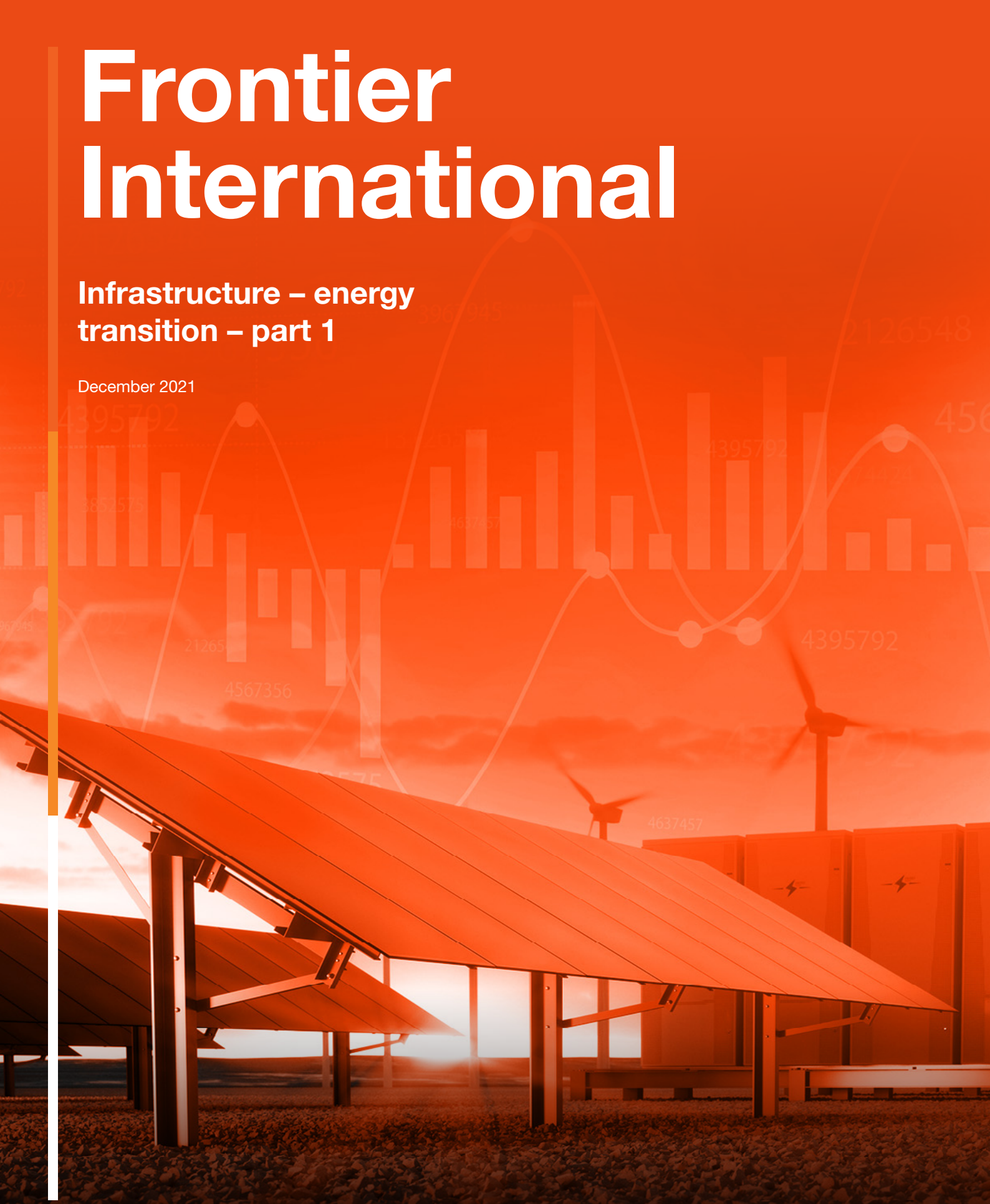
Frontier International

Infrastructure – energy transition – part 1

December 2021



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About us

Frontier has been at the forefront of institutional investment advice in Australia for over 25 years and provides advice over more than $500 billion of assets across the superannuation, charity, public sector, insurance and university sectors.

Frontier's purpose is to empower our clients to advance prosperity for their beneficiaries through knowledge sharing, customisation, technology solutions and an alignment and focus unconstrained by product or manager conflict.

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Manish Rastogi is the Head of Real Assets with Frontier having joined the firm in August 2017. He leads a dedicated team of real assets investment consultants that provides investment consulting, manager research and support on infrastructure, real estate and private equity to Frontier clients. Prior to joining Frontier, Manish worked at IFM Investors as Vice President in the infrastructure investment team, based in Melbourne, undertaking direct investments and asset management with a specialisation in airports and telecommunications. Prior to IFM, Manish worked in M&A advisory with O'Sullivan Partners (now Lazard) in Sydney and with Lehman Brothers in its Telecoms & Media M&A team in London. Manish holds an undergraduate degree in Engineering with a major in Computer Engineering (honours) from the University of Melbourne, and an MBA from the London Business School with a major in finance.

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INTRODUCTION

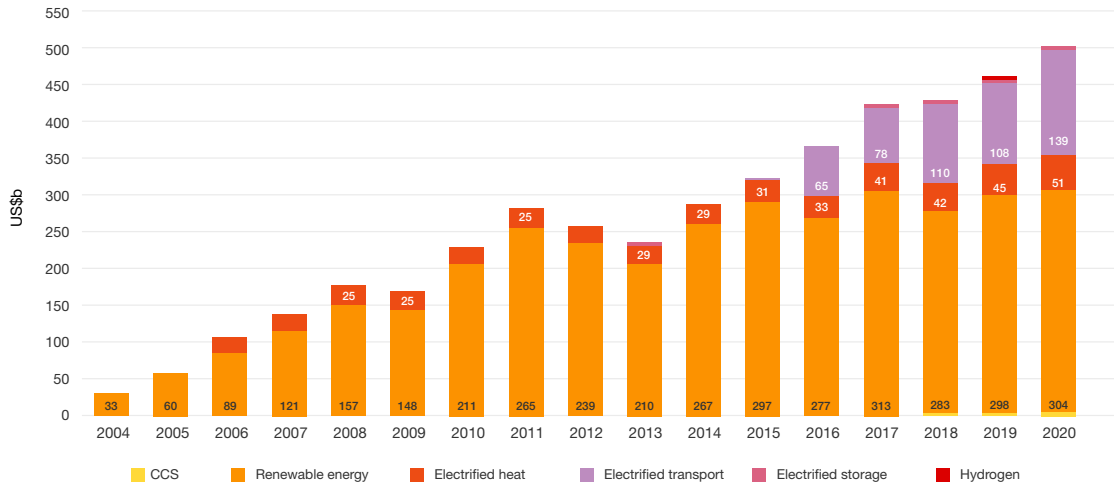
Infrastructure – energy transition Part 1

2021 witnessed the continuing spread of the COVID-19 pandemic globally as well as the remarkable human ingenuity in the aggressive rollout of emergency-use vaccines to contain the devastating health impact of COVID-19.

Within this backdrop, the global community remained focussed on another major challenge facing humanity, that of climate change. While many governments, corporations and citizens have accelerated the adoption of renewable energy in order to contain global warming to within 1.5°C, as agreed in 'The Paris Agreement' in 2015, not enough has yet been done. This became even more pertinent in 2021 as global citizens expected a commitment from world leaders to a 'net zero' future at COP26 in Glasgow in November 2021. Frontier's 2020 virtual research trip to Europe highlighted strong policy support (new Green Deal) and incentives from the European Union, through which it would champion and fund the push for the energy transition of its economies. Frontier's virtual research trip in October 2021 explored the topic of energy transition as one of the infrastructure thematics of the future.

The International Renewable Energy Agency has estimated that US$131 trillion in capital will need to be invested in the global energy system by 2050 to engage in activities consistent with limiting global warming to 1.5°C. This amounts to US$4.4 trillion p.a. or 5% p.a. of global GDP. Yet in 2020, only US$501.3 billion was invested in the transition to low-carbon energy assets such as renewable energy, energy storage, EV charging in infrastructure, hydrogen production, and carbon capture and storage facilities. Of this total, just over 60% (US$303.5 billion) was invested in renewable energy technologies (solar, wind, biofuels and other). This amounts to a small fraction of what is required to be invested annually.

Chart 1: Global investment in the energy transition by sector



Source: Bloomberg New Energy Finance.

While action on energy transition is not uniform globally, our research has revealed that Europe is at the vanguard of fighting climate change and its major government bodies, financial institutions, investors and corporations are leading the world into the domain of energy transition and decarbonisation.

This paper represents part one of two papers on our coverage on energy transition and it outlines Frontier's findings on the energy transition thematic from an institutional investor's perspective. We evaluate the drivers, regulation, investment characteristics, access and implementation for investments that not only enable energy transition but also provide a sound financial return. We consider the pitfalls of investing in this secular theme, the expected returns and the evolution of technologies in the space.

What is ‘energy transition’?

While the term ‘energy transition’ has become fashionable amongst climate-focussed investors and stakeholders, it is often a complex topic, with a loose interpretation of what transition themes it covers.

For the purposes of this paper, we define the concept of energy transition as ‘changes leading to zero greenhouse gas (GHG) emissions from energy production and consumption’. The infrastructure assets that fall under this thematic are assets that enable the transition of economies to the utilisation of lower carbon intensity energy sources and eventually to carbon neutral energy sources.

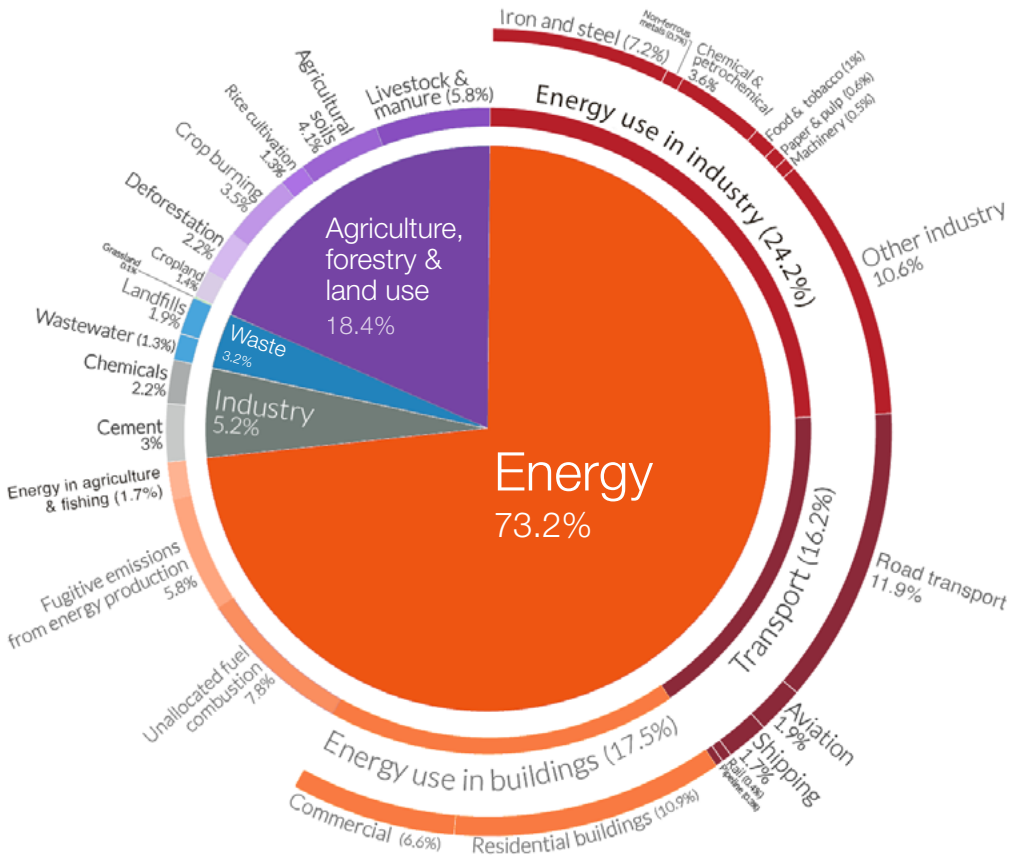
There can be some grey areas even under such a broad definition. For example, peaking gas-fired power generation enables greater penetration of GHG emissions-free renewable energy into an electricity network (at the expense of dirty coal-fired power generation), but this still creates GHG emissions itself (albeit at considerably lower levels than traditional coal-fired generation). If we were to follow a strict interpretation of energy transition, then an investment in gas (widely viewed as a reliable transition fuel) generation would be prohibited if there wasn’t a clear path to it reaching carbon neutrality. A softer interpretation may allow such an investment as it does reduce overall GHG emissions both directly and by enabling renewable energy, while maintaining energy security and energy affordability to acceptable levels.

What is driving the energy transition sector

At its core, the primary drivers of the energy transition theme are the damaging nature and global warming caused by carbon dioxide (CO^2) and other GHG emissions, and the resulting negative consequences on the planet and natural ecosystems.

To avoid the worst consequences of global warming, the global economy needs to decarbonise rapidly due to general inaction over previous decades. Specifically, the decarbonisation of energy systems is key to this (Chart 2).

Chart 2: Global greenhouse gas emissions by sector (2016)



Source: Our World in Data; Climate Watch, World Resources Institute (2020).

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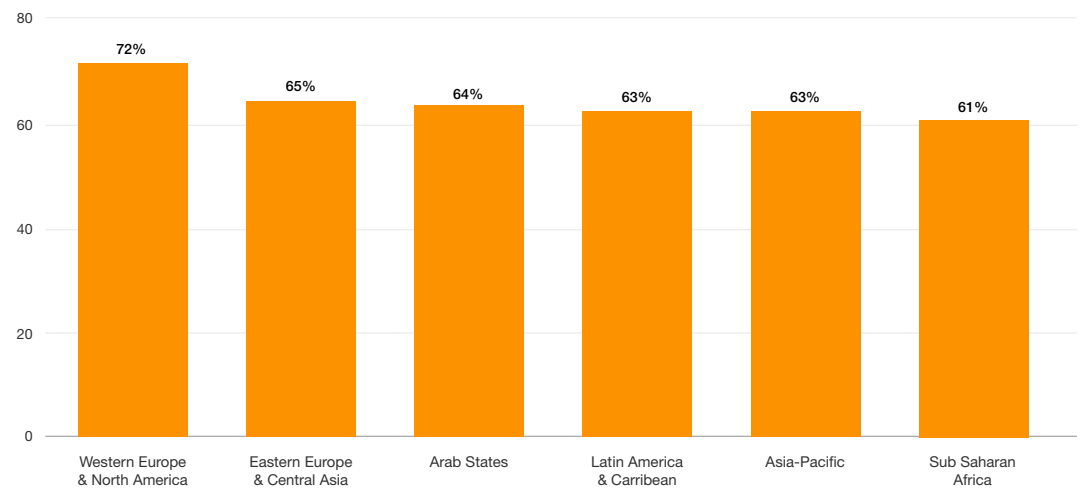
While investment markets had already mobilised to this threat (for example, the cleantech sector in the 2000s and investment in renewables from late 2000s), attention has increased dramatically over the past 18 months. Key factors include (noting these are overlapping and interrelated):

- **Societal acceptance/awareness:** Arguably the main factor is an overwhelming acceptance of the reality that GHG emissions cause global warming, and it has damaging consequences for the planet, the public and sustainability of life. The level of acceptance is variable from region to region but a majority of the public across the globe believes climate change is a global emergency (Chart 3). Such views will influence public behaviour, whether in purchasing decisions or on voting preference. Consequently, there is an increasing willingness amongst governments, corporates and individuals to take action in recent years.

Chart 3: Public belief in the climate emergency, by region



Source: United Nations Development Program - Oxford People's Climate Vote (2021).

- **Policy and regulation:** Policies to address climate related matters have been adopted by numerous governing entities globally. These in turn may drive other actions as outlined above and below. The European Green Deal is an example of such a policy, the main goal of which is to make the European Union a net zero emitter of GHGs by 2050. One of the outcomes of the European Green Deal is the 'Fit for 55' package, which is a set of proposals to revise and update EU legislation with the goal of achieving a 55% reduction in GHG emissions by 2030. Other government policies involve changing the market structures to better accommodate energy transition assets (e.g. providing priority dispatch to renewables) or creating subsidies/financial support (see subsidies/financial support point below) or placing an outright ban on polluting activities.

In recent times, US and Europe have moved towards sustainability-focused regulation such as 'The 100 Percent Clean Energy Act' implemented in California in 2018 and the introduction of 'Sustainable Financial Disclosure Regulation' (SFDR) in Europe in 2021. The SFDR is a stringent regulation that requires financial investors to classify their investment products as SFDR 6, 8 or 9 based on their sustainability objectives.

Chart 4: Sustainable Financial Disclosure Regulation categories

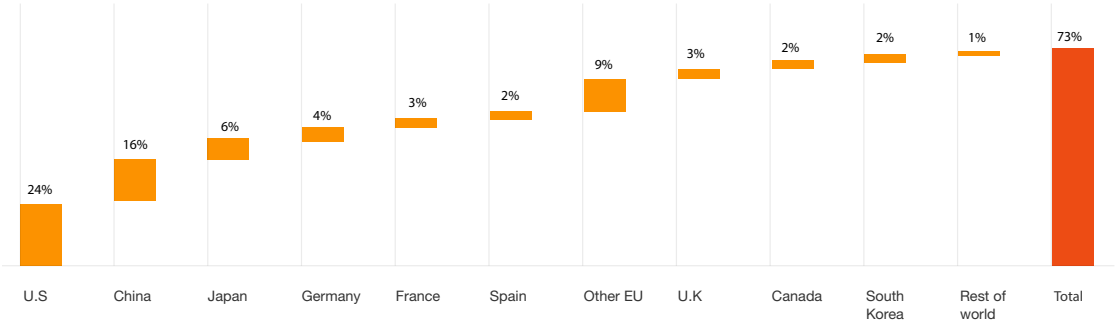
Source: Morningstar Research.

In particular, SFDR 9 classified funds must demonstrate that their (i) economic activities contribute to an environmental objective, (ii) economic activities contribute to a social objective, (iii) investments, 'Do Not Significantly Harm' (DNSH) any of the prior objectives, and (iv) investments follow good governance practice.

A SFDR 9 classification is the 'greenest' and most sustainable classification for an investment product, therefore, it is likely to garner the most attention and funding from European investors. Hence, both traditional and current regulations can influence investor behaviour.

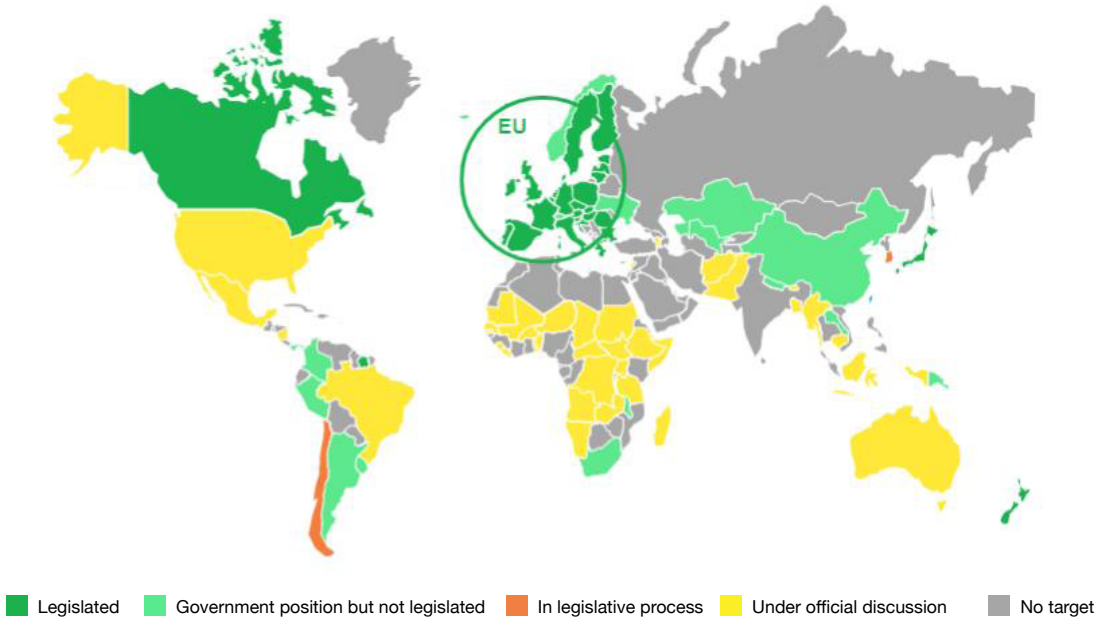
- **Subsidies/financial support:** Direct or indirect financial support for specific asset types was one of the earliest support mechanisms, primarily targeted at renewable energy. The exact mechanism varies from jurisdiction to jurisdiction, but can include subsidies in the form of guaranteed feed-in-tariffs, contracts-for-difference, tax reductions in the form of rebates, tax equity (US) or the implementation of carbon emissions trading schemes. Another indirect financial support is direct participation in energy markets, which helps encourage the development of specific technologies e.g. the Australian Capital Territory tendering for renewable energy generation.
- **Corporate image:** For some corporates, having a carbon neutral position may generate brand value, provide a competitive advantage or differentiator within their respective market. Notably, this is more likely to be the case where the incremental cost of achieving carbon neutrality is insignificant relative to the total cost of their product(s).
- **Net zero pledges:** National governments, global governing bodies as well as investors and corporates have made net zero pledges. These have typically targeted carbon neutrality by 2050, often with interim targets. Such pledges covered 16% of the global economy in 2019, rising to circa 73% in 2021. It's notable though that to keep global warming below 1.5 °C, global GHG emissions need to be cut by at least 45% by 2030 relative to 2010 levels, which current commitments do not even come close to reaching.

Chart 5: Global GDP covered by net zero pledges



Source: World Bank, ECIU, Bernstein analysis.
Note: Individual country figures have been rounded, total is 73%.

Chart 6: Countries with net zero carbon emission targets (as at 30 June 2021)



Source: Bloomberg New Energy Finance, 2021, Manager research.
Notes: Includes net-zero and carbon-neutrality targets with a range of deadlines.

Clarity of ‘net zero’

At present there are no global standards for what is deemed ‘net zero’ or the closely related ‘carbon neutral’.

An important element of achieving net zero is offsetting those GHG emissions that cannot be reduced by other means. However, such offsets need to genuinely capture and remove GHGs (including CO^2) from the atmosphere to achieve a true net zero state. A recent trend is for investment managers to announce net zero achievement dates and pathways with fanfare based on their Scope 1 and 2 (from direct and indirect held assets) emissions but omitting Scope 3 emissions (emissions from assets associated with but not owned by the investment managers). Under the EU’s new SFDR legislation, Scope 3 emissions must also be recognised in the GHG emissions calculation. In addition, it is also debatable whether some activities that generate carbon offsets truly achieve this. For example, so called ‘avoided deforestation’ or ‘reforestation’. Lack of clarity may also result in double counting. Given the importance of this issue to the whole energy transition landscape, a robust system that achieves a true global net zero state is needed and we expect this to be addressed over time.

Key energy transition investment thematics

The key sectors impacted by energy transition include renewable energy generation, electricity networks, energy storage and transportation. Based on our discussions with global managers / investors during our virtual research trip, we believe the above sectors are neatly wrapped within the four broad themes that require vast amounts of capital to enable energy transition.

- **Decarbonisation of electricity production:** the key (i) to reducing fossil-fuel dependency (primarily coal) in energy generation, and (ii) to the decarbonisation thesis is to expand renewable energy generation in its various forms, as well as other infrastructure that helps integrate renewables into a broader electricity network. This can include battery storage, transmission and distribution and gas generation (as a transitionary fuel), where the purpose is to provide grid characteristics that are needed for a renewables heavy electricity network.
- **Decarbonisation of transportation:** can cover a range of sectors, the most obvious of which are related to the electrification of transportation, such as electric vehicles (EVs). This could include EV fleets (for example, electric trucks) or the associated charging infrastructure. Another approach to the decarbonisation of transportation is the production of clean renewable fuels such as green hydrogen and related products (e.g. ammonia or methanol) from renewable energy to power a new generation of vehicles (hydrogen-powered cars and ships). Biofuels such as ethanol or biodiesel are another option and may have some potential for the decarbonisation of air transport.

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- **Decarbonisation of industrial processes and manufacturing:** covers both the direct GHG pollution that occurs in the industrial process (for example CO2 emissions in steel and concrete production) as well as that resulting from the input electricity used (even though only the latter falls under the banner of energy transition, reduction in both forms of pollution are equally important for decarbonisation). Utilisation of renewable energy sources solves the latter issues (such as electricity or clean renewable fuels like hydrogen), while the former will require solutions on a case-by-case basis. For example, steel production can use biochar (a carbon neutral alternative to metallurgical coal) as a carbon source while cement production can explore alternative chemistries or utilise carbon capture and storage.

- **Energy efficiency:** is arguably one of the largest themes, but probably the most fragmented. Achieving improved efficiency via district heating and cooling, lighting replacements (to LEDs), improving power loss in electricity transmission networks, and reducing losses in gas pipeline transmission networks provide ample opportunities. Energy efficiency initiatives are often directly beneficial to the asset that implements them due to lower energy consumption and, therefore, costs.
- **Other:** includes assets that don't clearly qualify in the categories above. Recycling is an example of an activity that could fall into this category, as it reduces the the lifetime carbon footprint of certain materials, particularly metals like steel, aluminum and lithium.

What is notable is that renewable energy generation underpins many of these thematics or at least contributes to approaches for each theme. This is understandable since it is the primary source of creating sustainable energy which is referred to in 'energy transition'.

The production of green hydrogen for industrial applications or for export was also a regular feature in our research, with Australia featuring prominently due to its abundance in wind and solar resources to create hydrogen and associated products for export to Asia.

Current considerations

There are many factors that could impact investments in the energy transition segment. A range of different factors are outlined below, some of which may influence specific investment types and others that may have broader implications, positive and negative.

Integration of renewables into electricity networks

There are a range of challenges when integrating increasing amounts of wind and solar generation into an electrical grid. These include intermittency, balancing supply and demand, and grid stability. Solving these problems is an opportunity for those that can develop solutions, such as integrating storage (batteries and pumped hydro) with renewable generation, gas peaking (for when renewable generation is low) and grid augmentation (such as synchronous condensers or new transmission lines). Rooftop solar may also benefit as this co-locates generation and consumption, which may reduce the level of grid augmentation required. Hydrogen is also a possible future solution for energy storage.

Frontier previously published work that touches on these issues in Network level challenges facing Australian renewables in June 2020.

Orderly transition from fossil fuels

Increasing levels of renewable energy generation displaces older, carbon-emitting incumbent generation such as coal generation. However, closer consideration needs to be given to gas generation, which helps manage the intermittency issue and enables the integration of renewables into an electricity network. Gas is considered a transitionary fuel since it still generates GHG emissions. This is still an area of investment for some managers targeting energy transition. Plans to decarbonise gas generation may involve the implementation of carbon capture and storage, or a further transition to blue or green hydrogen.

Attention is also required on how such a transition impacts on local communities and employment (the so called 'just transition').

Supply chain constraints

Supply chain issues are a short to medium term consideration, in part due to the COVID-19 pandemic. This is particularly affecting the renewables sector. First, shipping constraints and delays across the freight industry are affecting delivery of required materials.

Second, there are shortages of input materials (polysilicon, glass, semiconductors) and manufacturing capacity used in the construction of solar panels and batteries. These factors have resulted in material increases in the costs for battery and solar projects. Some projects in development and construction phase, globally, are witnessing an adverse impact to project returns as a result.

Inflation

While not specific to energy transition or the infrastructure asset class, inflation sensitivity of assets is a concern at the current point in the global macro-economic cycle. Notably, inflation-protection tends to be a strong defensive characteristic of infrastructure assets, and particularly renewable assets with long-term power purchase agreements and CPI indexation.

Regulatory risk

Positive regulation to encourage the development of renewable energy and energy transition assets can also have unintended consequences. EU's implementation of SFDR was established to encourage sustainable investments and to improve transparency on environmental reporting. In practice, SFDR rules are viewed by investment managers as ambiguous and creating a high compliance barrier that only large institutions with large resources can meet. Regulation focussed on providing subsidies to stimulate a market can also backfire as government can retrospectively repeal policies thus crushing project returns (e.g, repeal of Spanish renewable energy tariffs in 2009).

Technology nascency

Much of what makes the energy transition possible is the adoption of new technology, which displaces older, inefficient, or carbon intensive technologies. As such, some investments (e.g. green hydrogen production, carbon capture storage) will (i) carry additional risk due to the adoption of unproven technology, and (ii) require subsidies. As the utiilsation of new technology increases and its maturity improves, these risks will dissipate. Furthermore, it may become cost competitive with existing technologies. An example of such a process is the path grid-scale solar has taken. Investors need to consider whether the expected return compensates sufficiently for potentially heightened risks.

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Implementation

Accessing energy transition investments

Despite the relative youth of energy transition as an explicit theme, a number of managers have commissioned new energy transition or net zero strategies in last 12 to 18 months. The key difference being that energy transition funds may invest in carbon emitting assets with the intention to achieve broader economic decarbonisation over time, while net zero funds will invest in assets that maintains zero emissions on aggregate over the lifetime of the fund, typically for an investor with a net zero mandate.

From our virtual research trip, the observations on accessing energy transition are:

- Energy transition requires vast amounts of capital for new infrastructure. Hence, by its very nature, energy transition assets will comprise greenfield risk in some form, whether in the development or construction of renewable assets (less risky) or implementation of new technologies (e.g. electrolysers for green hydrogen). This is a notable shift from investing in traditional brownfield assets that investors will need to adapt to.
- A variety of strategies have emerged, most of which are close-ended and focussed on (i) renewables-anchored industrial decarbonisation, (ii) hydrogen development projects, (iii) small-scale energy efficiency projects, (iv) developing integrated portfolios of renewables + storage, or (v) diversified energy transition strategies.
- The EU is most advanced for energy transition access options due to the EU's policy incentives, followed by the US where most states have a clean energy target, but the market is fragmented. Not surprisingly, most energy transition funds are Europe- or US-focussed with sporadic opportunities in Australia (namely hydrogen export). Not too many funds are focussed on emerging markets where the need is the greatest.
- Energy transition strategies are expensive relative to core, diversified strategies popular in Australia, and given their nascency. Some of these strategies offer returns that are commensurate with the cost of the product.

Expected returns

Energy transition strategies cover a wide spectrum of return expectations. Table 1 outlines our observations from various strategies. These are EUR denominated and assume a developed markets focus unless otherwise noted.

Table 1: Return expectations

Investment types	Gross return expectations (EUR)	Comments
Brownfield renewables	5 to 7% p.a.	Core
Greenfield renewables	8 to 11% p.a.	Core/core plus
Diversified energy transition (e.g. renewables, storage, CHP, energy efficiency, transport)	8 to 10% p.a.	Core plus with greenfield exposures. Some merchant price exposure
Greenfield renewables strategy with integrated storage	9 to 12% p.a.	Core plus
Nascent sectors (e.g. hydrogen focused funds)	12 to 15% p.a.	Core plus/value add
Diversified emerging markets energy transition	~15%+ p.a.	

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The expected returns increase in order of perceived risk, from low-risk brownfield renewables through to higher risk nascent sectors and emerging markets. However, there is also some variability within each strategy band such that some strategies can target expected returns outside of the respective ranges due to nuances in the manager's strategy (for example, a strong emphasis on lower risk assets within its target sectors). A key strength of these strategies is that their expected returns are underpinned by high cash yields since the underlying investments will need to be supported by long-term off-take contracts.

Also, the impact of capital flows on returns must not be under-estimated. The large and growing emphasis on energy transition assets may result in yield compression. This is more likely to affect the low-risk end of the sector. Nascent sectors may also experience lowering yield expectations as the investment case is proven out over time.

Fees

Fees for energy transition funds are generally high but also variable. As with the broader infrastructure sector, fees tend to increase for complex or greater risk-bearing strategies.

At the top end, we have observed product fees as high as 1.75% p.a. on commitments plus a 20% performance fee over a 7% hurdle, with a catch up. On the low-end, we have seen product fees of 0.85% p.a. and 12.5% performance fee over a 7% hurdle with a catchup. Discounts are sometimes available for scale or participation in early closes, which can reduce the fee load materially. Open-ended products (rare for energy transition) tend to be cheaper, with management fees based on net asset value.

Investor considerations

Frontier encourages investors to consider an investment in energy transition thematic based on their particular needs and constraints.

For superannuation funds, we acknowledge a key consideration to investing in the sector may be to outperform the Australian Your Future, Your Super (YFYS) infrastructure benchmark, which is possible via certain investment risk categories. The other considerations are fees (which will tend to be high) and illiquidity (most fund offerings are close-ended and highly illiquid without redemption options).

For non-superannuation investors, currency exposure is a key consideration as most products are not hedged to the AUD. This introduces currency volatility in the return stream unless a hedging overlay is applied. Furthermore, the domicile of the fund may impose additional taxation demands on an investor.

Finally, the split between capital and income returns may be a consideration for some investors. For those with higher cashflow requirements (i.e. charities and insurance companies), energy transition strategies are beneficial due to their high cash yield.

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The final word

There is increasing consensus among nations, politicians, global citizens to contain global warming to within 1.5°C. That requires a concerted effort to transition the world's energy supply and consumption from fossil-fuel based energy to clean, green, renewable energy. Energy transition is here to stay and there is no better way to access and invest in the thematic than through energy transition focussed infrastructure assets.

Frontier's virtual research trip has highlighted that the opportunity set for energy transition investments is vast and grossly underfunded at present. The intensity of funding and investments will need to increase significantly from here on in if it is to make a difference. Investors can access this newly emerging sector via four broad themes encapsulated by decarbonisation of electricity production, transportation industrial and manufacturing processes. However, investors do need to be cognisant to a range of considerations that may impact returns and just transition.

The driving impetus for energy transition is strongest in Europe and the US. Hence, most investable products are domiciled in and focussed on those regions, since the investment landscape is attractive and returns are respectable. However, the products are not cheap to access.

We believe, it is in investors' best interests to start paying closer attention to this thematic, and they can begin by understanding the total GHG emissions footprints of their own portfolios or, better still, consider investing in the thematic to kick-start the transition process. Frontier has undertaken extensive research on energy transition and is well placed to advise investors on the theme.

This part one paper will be followed by a part two paper in early 2022 focussing on infrastructure sectors impacted by energy transition.

Want to learn more?

Frontier has undertaken extensive research on energy transition and is well placed to advise investors on this theme. We encourage investors to reach out to Frontier's real assets team for a discussion on how we may be able to help.

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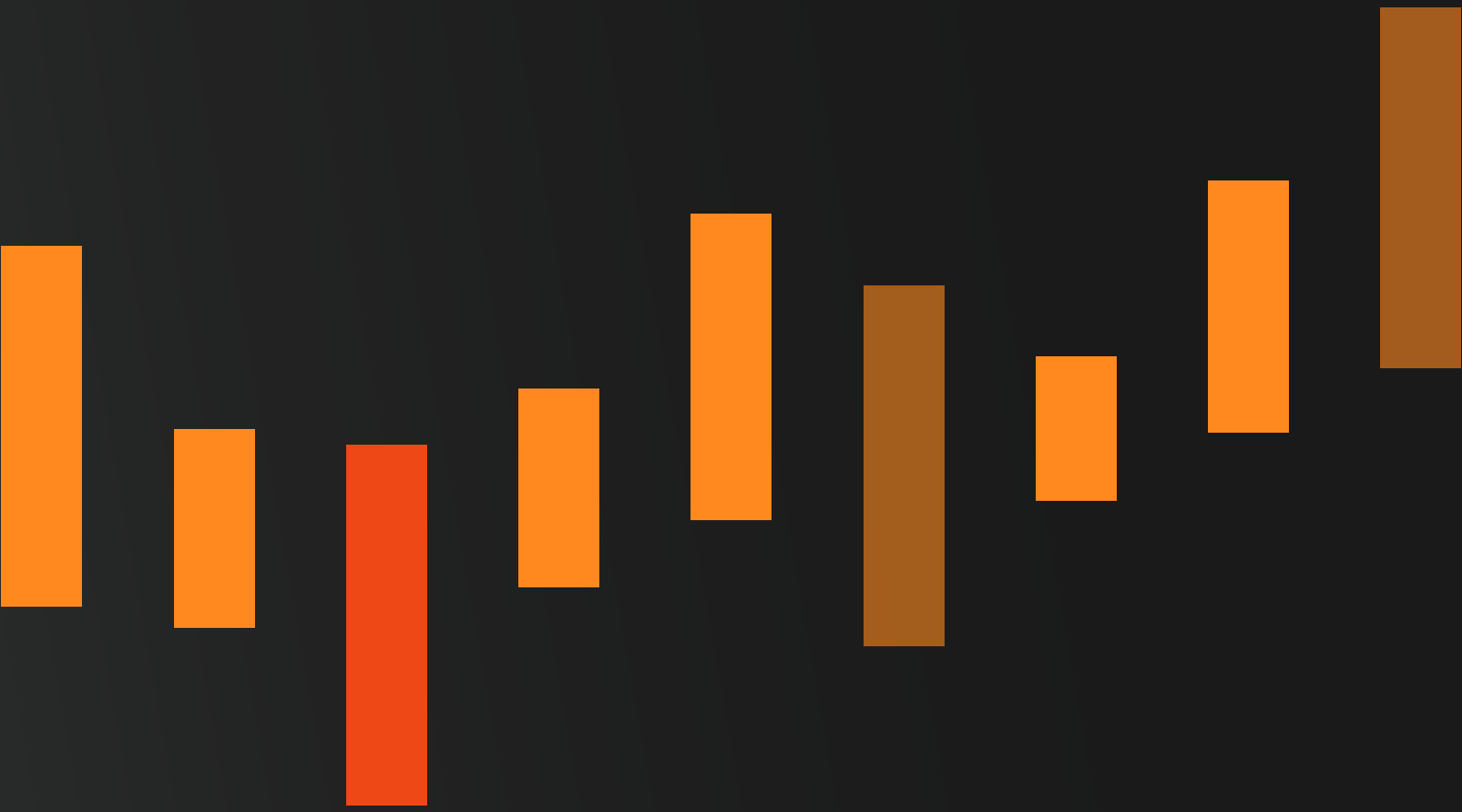

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