Sustainable energy transition

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Introduction

Once again, the energy transition finds itself at the forefront of attention from politicians and the media as attendees at COP27 debated how best to tackle challenging global energy transition targets.

The speed, efficiency and approach taken in pursuit of the transition will have profound impacts long into the future. However, the manner in which these goals are approached, and ultimately achieved, have significant implications for investment managers today. We explore some of the key concepts and considerations below.

One of the key topics in focus at COP27 in Egypt was a, 'Just Transition'. The term is defined as an energy transition to a lower carbon economy that simultaneously protects workers' rights, livelihoods and economic fairness. Roundtable sessions at COP27 have discussed the inclusion of the 'Just Transition' concepts into national energy transition plans.

Any energy transition to lower carbon practices must not ignore the importance of maintaining the security and affordability of energy. The Intergovernmental Panel on Climate Change (IPCC) are resolute in the importance of achieving global net-zero emissions by 2050 but in achieving the goal, the impact on human development and livelihoods must be recognised.

THE ENERGY TRILEMMA

The balancing act of energy sustainability, security and affordability (The Energy Trilemma) is currently amplified. The IPCC's latest report has said that the world is unlikely to keep global warming below 1.5ºC – the preferable temperature target set out at the Paris Agreement in 2015. The consequences include an increased number of severe weather events and the breakdown of biological pathways. However, the human population is also experiencing an energy shortage crisis exacerbated by the recovery from the Covid-19 pandemic and the war in Ukraine, both of which are challenging for maintaining energy security and affordability. The human population appears to be left with three options:

1. Pause the energy transition and increase the use of cheap, affordable coal
2. Make lifestyle sacrifices to cut demand dramatically
3. Accelerate the development of renewable energy and other solutions

Option two above is unlikely as the world returns to normality after Covid-19 and it would be unfair on developing countries who should have the opportunity to experience the same freedoms as the developed world. Option one above is already happening to protect energy security and affordability but it clearly fails the energy sustainability criteria, whilst option three above must occur but risks discriminatory price inflation, a deepening energy shortage and intermittent power issues.

According to the IPCC the risk level for humans from the negative impacts of climate change will depend on concurrent near term trends in vulnerability, exposure, level of socioeconomic development and adaptation. Often lower income countries are not only most at risk from extreme weather events caused by delayed action on climate change but also from livelihood and financial disruption resulting from an abrupt transition away from fossil fuels and a transition to net-zero emissions that is too steep. The former risk has been a crunch point at COP27 where developed countries are being urged to agree on "loss and damage" funding for the most vulnerable nations.

Approximately 80% of the world's energy is still produced by oil and gas[1] so a rapid transition away from fossil fuels is likely to either exacerbate or put more people into energy poverty through higher prices or lack of accessibility to energy. The lowest ~50% of the world's population by country GDP per capita consume only ~15% of the world's energy. **Low-income countries are twice as sensitive to changes in the price of energy, so any energy shortage (caused by energy independence policy, a switch to renewables without scalability, supply chain issues or otherwise) and associated price increase could financially cripple four billion people[2].**

To achieve a 'Just Transition', the move to a decarbonised world needs to be equitable and fair for all populations. Lower income countries need to be given the freedom to develop economically and this will have to be facilitated by fossil fuels if lower-carbon alternatives are not ramped up sufficiently. Developed areas of the world have the highest emissions per capita which has led developing countries to believe that they have a right to pollute in order to develop. There is a relationship between CO_2 consumption and life expectancy, where the outliers are mainly the Middle East oil producers. **Energy poverty (access to modern energy services) is undesirable for two reasons; it can cause a reliance on solid fuel for cooking which is linked to approximately three million deaths a year[3] and a subsequent deforestation crisis.** Governments and the investment industry must act with technological and economic pragmatism on the transition to a decarbonised world.

[1] iea.org/reports/key-world-energy-statistics-2021/supply
[2] Thunder Said Energy, 'Energy Shortages: Priced out of this world?', February 2022
[3] who.int/news-room/fact-sheets/detail/household-air-pollution-and-health

THE ROLE OF GOVERNMENTS

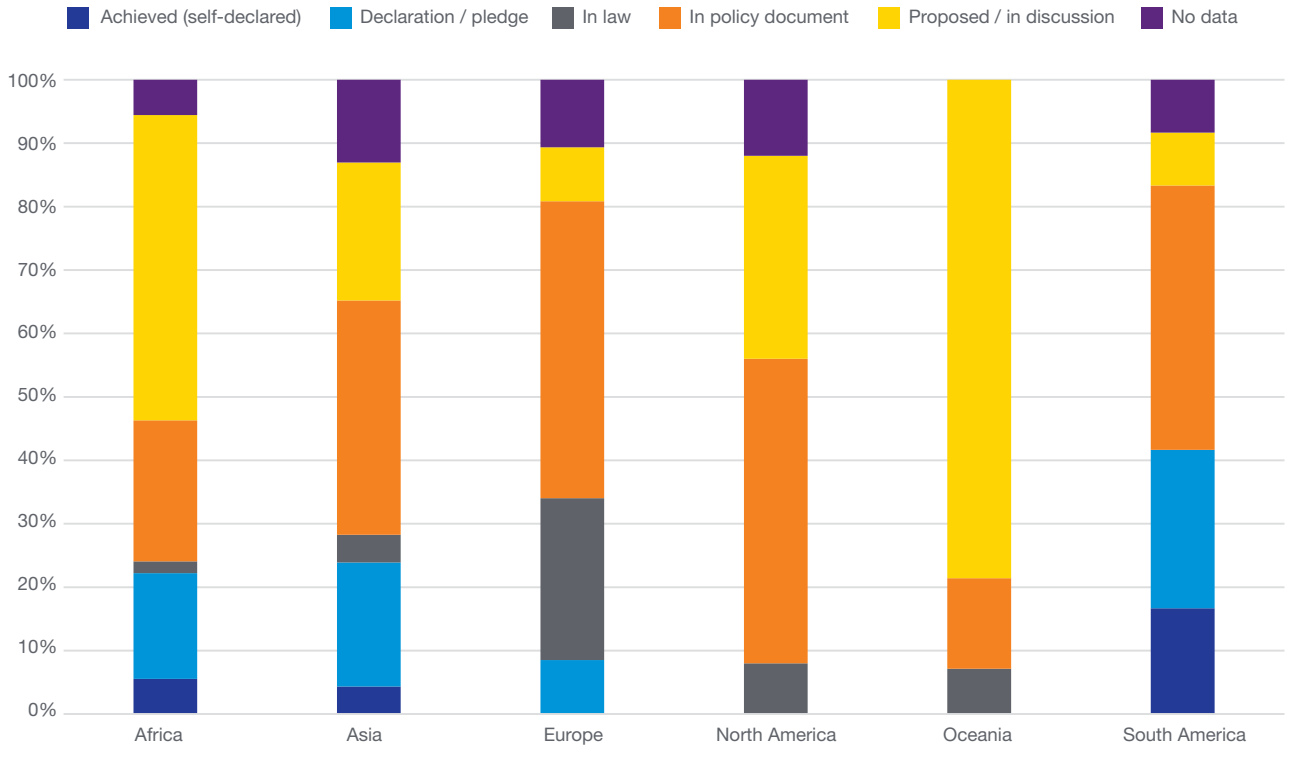
In light of the current conditions, governments have a crucial role to play in incentivising the most pragmatic solutions that satisfies energy sustainability, affordability and security. **However, it is currently hard to hold governments to account because whilst the number of net-zero national commitments has increased overtime, the number enshrined into law or policy documentation globally is low.** In particular, the US and China (the top two global emitters) fail here and election hopes have been a constraint in the past. In addition, the International Energy Agency (IEA) stress the importance of international climate cooperation but creating net-zero commitments at the national level, particularly in times of rising nationalism, risks pursuing them at the expense of environmental and social disruption in other countries.

THE ROLE OF COMPANIES

The weaknesses of government climate policy emphasises the role cross-border companies, with international supply chains, need to play in behaving responsibly and setting credible net-zero commitments themselves. However, the number and quality of company net-zero commitments is also low. **The quality of the net-zero commitment disclosures made by major oil & gas companies is much stronger than the market average, driven in part by the investor and public focus on this industry.**

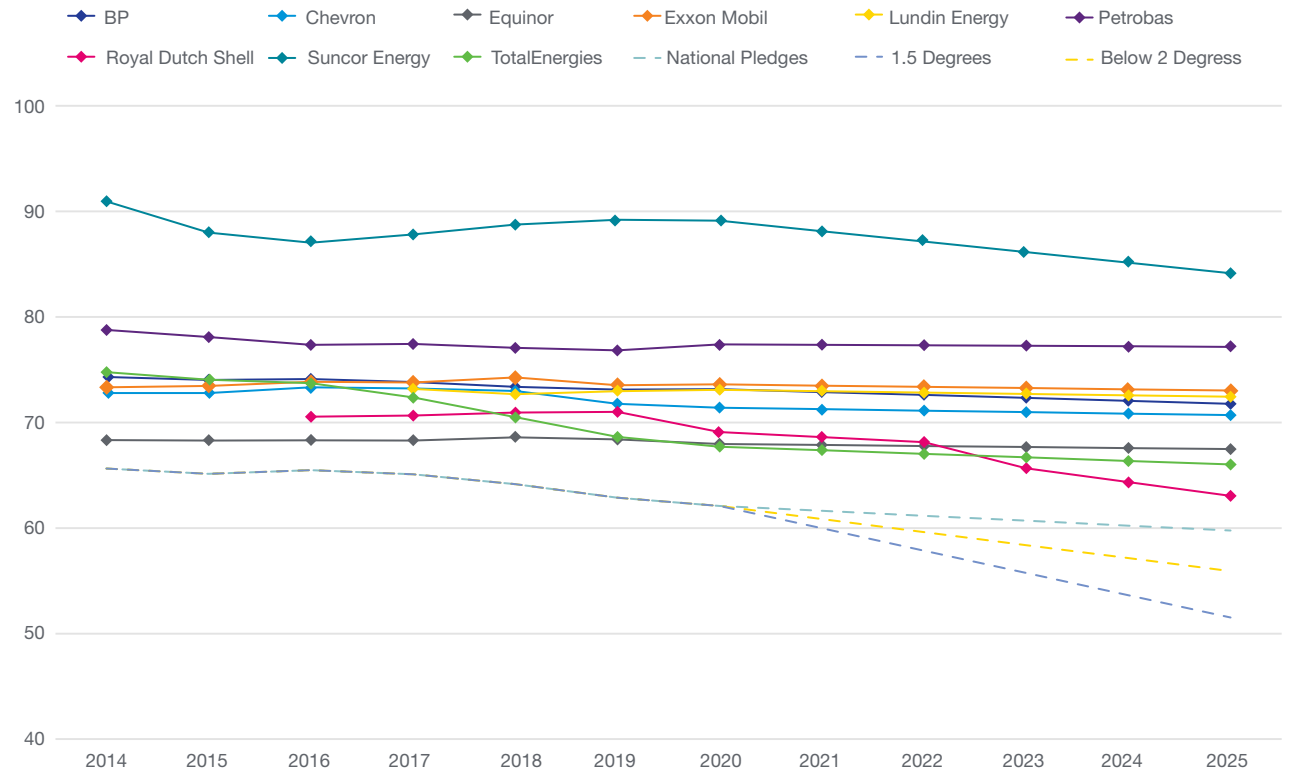
However, an analysis of actual and sector adjusted forecasted emissions of these companies shows that none of them are currently aligned with even keeping global warming below a 2ºC rise, let alone the 1.5ºC target. This is despite their carbon intensities steadily decreasing overtime. On this basis alone, oil and gas companies would not yet have a place in a sustainable universe. However, the argument is highly nuanced as the role these well-resourced, skilled companies can play in developing climate solutions in the form of renewables, hydrogen and carbon capture is potentially crucial. The issue is far from black and white.

BREAKDOWN OF NET-ZERO TARGETS ACROSS CONTINENTS

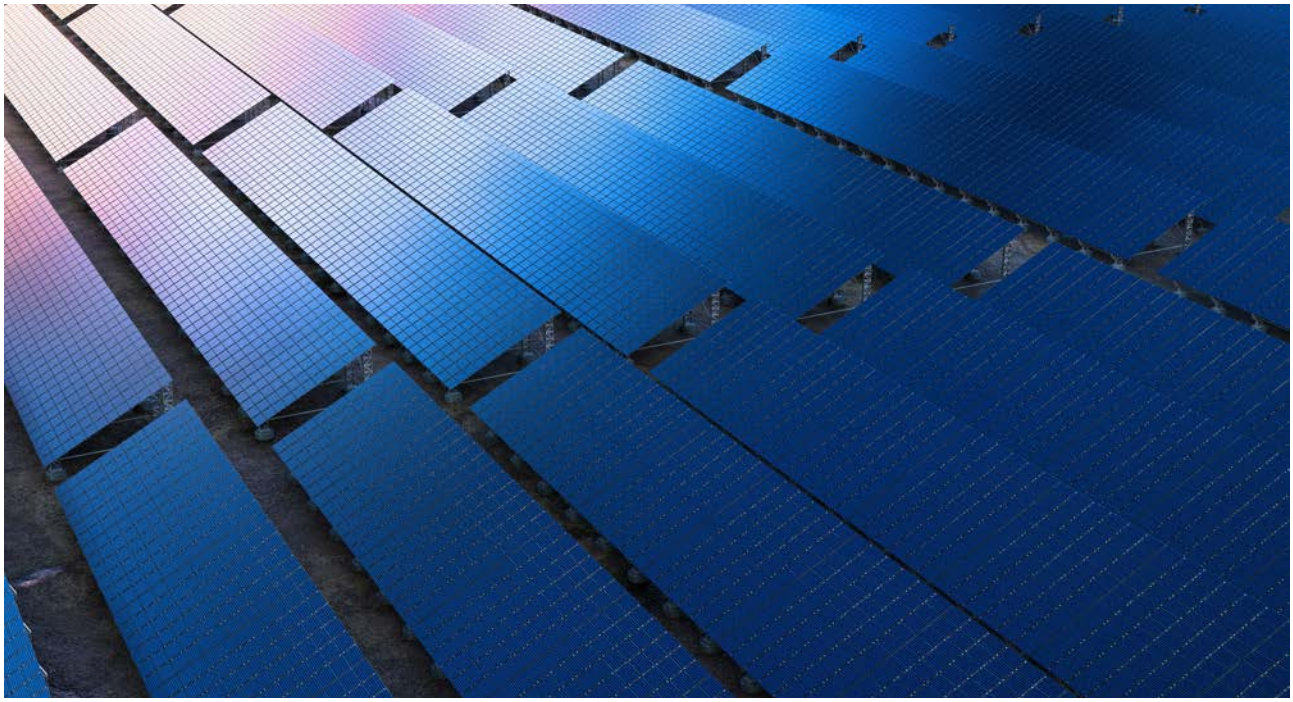


SOURCE: CBAM, ZEROTRACKER DATA, 2022

OIL AND GAS EMISSION PATHWAYS – TRANSITION PATHWAY INITIATIVE (gCO^2e/MJ)



SOURCE: CBAM, TPI DATA, 2022



TAXONOMIES

Taxonomies can help categorise company activities into sustainable and not sustainable business practices. The EU's Taxonomy outlines six environmental objectives that activities can be bucketed into based on technical screening criteria (e.g. emission levels). The UK is likely to produce an equivalent framework in the coming years. Interestingly, the EU's taxonomy climate mitigation objective does not completely rule out traditionally high emitting activities such as cement or steel production. Instead, the production of these materials can be categorised under 'low carbon manufacturing' if they adhere to the taxonomy's strict criteria for the process and allowable levels of emissions. **The inclusion of these sectors, along with the addition of gas and nuclear power related activities in the EU taxonomy from 2023, points towards governments understanding the requirement to maintain energy sustainability, security and affordability.** Both gas and nuclear provide relatively lower carbon intensity energy that is reliable, available and secure, notwithstanding Russia's current leverage over their global gas supplies.

A PATH FORWARD

There are numerous pathways suggested by various organisations that chart how the world can reach net-zero by 2050. It is clear that the use of fossil fuels needs to decrease but the extent to which they do differs between the pathways. As mentioned previously, **approximately 80% of the world's energy is still produced by fossil fuels so a rapid energy transition is likely to either exacerbate or put more people into energy poverty through higher prices or lack of access to energy**. Any energy transition to a lower carbon economy will only be successful if the security and affordability of energy are also maintained globally.

With this in mind, the focus should be on solutions that are already economically viable, technologically ready and effective, particularly because policy attention, time and investable capital is finite. The solutions highlighted below are; wind/solar, nuclear, carbon capture (including nature based solutions), insulation and hydrogen. Each has been assessed on its ability to facilitate a sustainable, secure and affordable energy transition. Each of these climate change solutions fall within the five categories the IPCC outline as key to keeping global warming temperatures well below 1.5°C, which are; reducing energy consumption (insulation), switching to low carbon fuels, increasing renewable or clean energy use (wind/solar/hydrogen/nuclear), removing carbon through forests and soil (nature based carbon capture), and capturing CO_2 through artificial methods (carbon capture).

We explore some of the key features on the following table:

SOLUTION (ADDRESSED ASPECTS OF ENERGY TRILEMMA)	COMMENTS
INSULATION (SUSTAINABILITY AND AFFORDABILITY)	Upgraded building insulation addresses two aspects of the energy trilemma; affordability and sustainability. It is a solution to energy demand destruction that is immediately available, effective and relatively cheap to implement. Insulation is included widely in well recognised pathways to net-zero as well as national commitments to decarbonise. The IEA's pathway estimates that the share of global building stock deemed as net-zero has to rise to 85% by 2050 (currently <1%), insulation will be critical to this. The market is investable with clear entry points but outside of new builds the delivery of insulation upgrades is operationally and socially hard to implement. If governments deploy the right incentives, insulation is an encouraging sustainable theme.
CARBON CAPTURE) (SECURITY)	Carbon capture utilisation and storage (CCUS) is the process of capturing CO2 released from carbon intensive energy production and industrial processes, and either storing or utilising it. Policy and development focus on CCUS increased significantly in 2021 as the requirement to decarbonise key industrial and fuel combustion processes became widely recognised. CCUS is a potentially attractive solution because it solves for energy security allowing gas companies in particular to continue providing a reliable energy source operating at a lower carbon intensity. However, affordability is a major barrier for scaled implementation of CCUS particularly outside of gas processing. CCUS creates an energy penalty that hampers energy production efficiency, whilst costs to capture and transport CO_2 depend on many physical variables. In addition, the reduced energy production efficiency of gas processing would require further gas drilling and a risk of increased methane leakage. In the context of shorter term energy shortage and affordability crises this solution is less attractive.
REFORESTATION (SUSTAINABILITY, AFFORDABILITY, SECURITY)	Nature-based solutions, afforestation/reforestation in particular, for removing carbon dioxide from the atmosphere include techniques that solve for each of the three aspects of the energy trilemma. It helps provide energy security as the removing ability would allow for continued use of gas as a reliable energy source with a net lower carbon intensity. It is an affordable technique and the challenges of incentivising capital into the solution (eg lack of developed carbon credit market and risks of carbon sequestration being disturbed by wildfires and deforestation) create access points for the theme. Forest, paper and packaging companies that sustainably manage their forests reduce the risk of wildfires, drive more effective tree carbon sequestration by the harvesting of older trees and planting of younger ones and also drive the amount of wood harvested for more sustainable, organic matter products. This is an attractive theme that could become even more so if the value of forestry assets increases with the recognition of these benefits along with a developed carbon credit market.
WIND (SUSTAINABILITY, AFFORDABILITY) **SOLAR** (SUSTAINABILITY, AFFORDABILITY)	The trajectory of wind and solar power expansion is steep by IEA's net-zero pathway and government policy measures, creating a large market opportunity. They have low energy payback periods (1.5 and 2.5 years for wind and solar respectively). Both power sources are exposed to the higher commodity costs in a supply constrained environment but, after extreme cost reductions over the last decade, they remain cost competitive with coal, oil and gas due to the latter's respective exposure to current supply and demand dynamics. However, further cost reductions are not certain, based on engineering limitations of wind turbines and worsening cheap polysilicon supply chains from China. Scaled up renewable power is a must in any decarbonisation pathway to net-zero, not least because it provides energy independence from fossil fuels from politically strained countries. However, intermittency issues remain a challenge for the energy security that wind and solar can provide and grid infrastructure must improve simultaneously for the full potential of these power types to be harnessed.
GREEN HYDROGEN STORAGE (SUSTAINABILITY)	Green hydrogen (not to be confused with grey hydrogen) is[4] produced by splitting water molecules into oxygen and hydrogen using electrolysis from renewable sources. It is the 'holy grail' for the decarbonisation of energy intensive industrial processes, as a solution to the intermittency of renewable energy and also as a fuel type for harder to abate transport sectors. However, the production and storage of hydrogen is very expensive, notwithstanding the forecasted fall in capital expenditure costs. In the context of an energy crisis environment it is not clear that support of this solution in the short term should be prioritised over other more affordable and readily available solutions. Green hydrogen production suffers from energy inefficiencies and scalability of renewable energy risk whilst its storage and transport suffers from cost inefficiencies. In the long term, green hydrogen will have a part to play in the pathway to net-zero, particularly in industrial processes and long form transport.
NUCLEAR POWER (SUSTAINABILITY, SECURITY)	Nuclear power is an alternative clean power source that can offer baseload and flexible power to the grid and therefore it is a vital part of the decarbonisation pathway to 2050. It also offers nations an ability to increase their energy independence away from fossil fuels originating in hostile countries. However, driven by policy, nuclear capacity has been in structural decline in most parts of the world, with exception of predominately China, which means the scale up required for 2050 appears unlikely, at least in the short to medium term. Approval and build time together with capital costs are a barrier to scaling nuclear to meet the immediate need for lower carbon energy. However, if governments stop their planned nuclear plant shut-downs, they can avoid the high energy costs of development which would be preferable in an energy crisis. In the longer term, small modular reactor innovation is an attractive sustainability theme, offering lower waste nuclear power more safely at a lower relative cost.

[4] Grey hydrogen is created from natural gas, or methane, using steam methane reformation but without capturing the greenhouse gases made in the process

CONCLUSION

While its importance is unequivocal, the energy transition journey is likely to be anything but straightforward. There are a myriad of variables, factors and key actors often pulling in competing directions. As investment managers, we also have our role to play, and while we might not have all the answers today in this highly nuanced and emotive space, the risks and opportunities of a global push to a more sustainable future will continue to be an important consideration in investment decision making. There are pros and cons, both economic and social, to each pathway and potential solution. As with all investment decision making, we will continue our thorough research and deep due diligence to identify and understand the opportunities and risks that the energy transition might present.

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