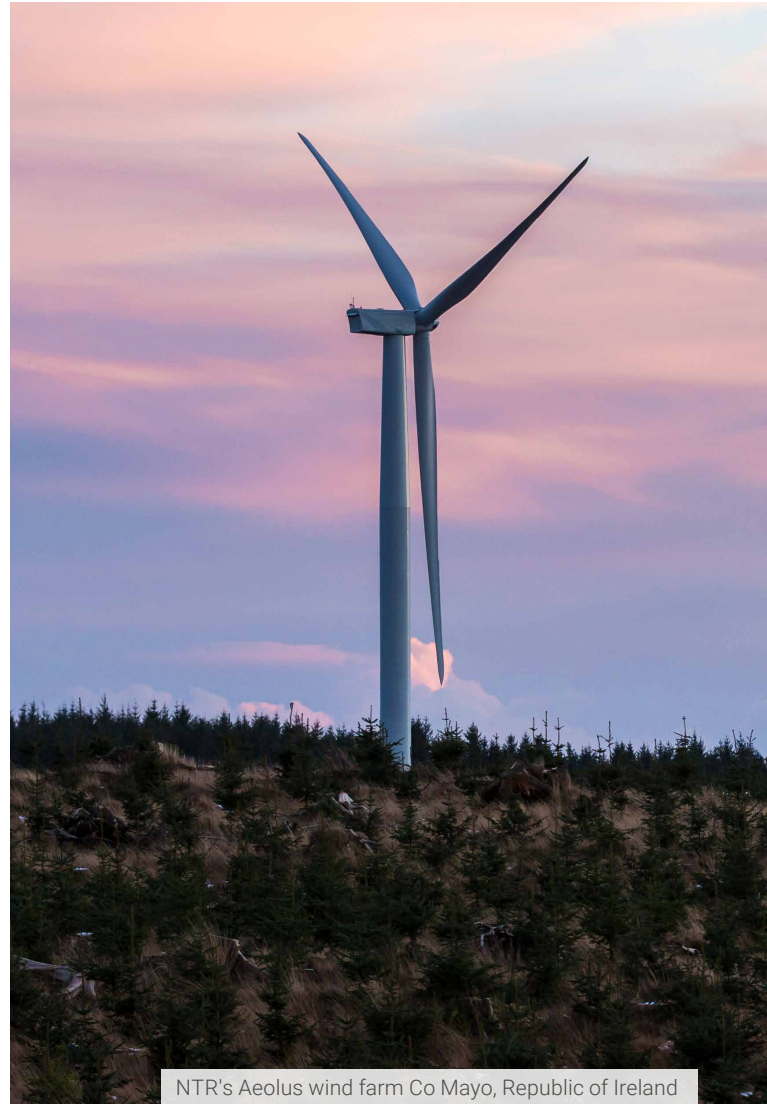


Clean energy investments: a new addition to the investors' inflation toolkit?

While investors have typically looked to commodities as an inflation hedge, a lack of income, coupled with volatile prices, has resulted in low risk-adjusted returns. Can direct energy investments help investors guard against rising prices?



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NTR's Aeolus wind farm Co Mayo, Republic of Ireland

In summary:



Direct clean energy investments

may play an important part in protecting investors against unexpected inflation



New renewable subsidy regimes

continue to provide price stability over the long-term and are linked to inflation in some countries



Power purchase agreements (PPAs)

are also set to play an important role in delivering the EU's energy ambitions, with some contracts offering inflation indexation



Merchant revenue streams

may be able to offer an indirect hedge, but assets will need to be assessed individually for risks of power price cannibalisation

NTR's Castlecraig wind farm Co. Tyrone, Northern Ireland



Clean energy: protecting investors against inflation?

The spectre of rising consumer prices across Europe has investors in search of assets which provide protection against unexpected inflation. The benefits and challenges of investing in commodities as an inflation hedge are relatively well understood. Direct investments in clean energy, for example, wind and solar project finance, can ultimately derive income from the commodity markets, but are less well studied. In this article we attempt to redress this and look at the role direct investments in clean energy can play in protecting investors against unexpected inflation.

The role commodities play in inflation protection

Numerous academic studies have analysed the link between unexpected inflation and asset prices, with the common finding that equities and fixed income tend to underperform during periods of unexpected inflation.¹ By contrast, commodities, and energy commodities in particular, are found to perform well when inflation is high.² In fact, commodities perform much better during periods of accelerating inflation than at other times.³ As such, energy commodities are highlighted in various studies as an effective hedge against inflation.⁴

However, allocating to commodities is not straightforward for most investors. For a start they don't generate income returns⁵ and their prices tend to be volatile, resulting in relatively low risk-adjusted returns over the long run. Building an appropriate level of exposure can be difficult given the absence of established benchmarks, with investors usually reliant on the discretion of specialist advisers. Furthermore, instrument illiquidity and frequent contract rollover usually mean higher fees compared to more traditional asset classes such as equities and fixed income.

1.Fama and Schwert (1977), Kaul (1987), Fama (1981), Gultekin (1983) Beckers (1991), Lee. (1992), Boudoukh and Richardson (1993), Ferson and Harvey (1993, 1994), Sharpe (1999), and Ang (2014), Neville et al (2021).

2.Ibid.

3.Neville et al (2021).

4.Ibid.

5.Ignoring the interest on posted collateral.

Can direct investments in clean energy act as an inflation hedge?

More than a trillion euros⁶ have been invested in renewable energy in Europe so far, adding almost 500 gigawatts of renewable – mostly wind and solar – capacity over the last 20 years.⁷ A sizeable portion of this capacity was built using project finance vehicles, allowing institutional investors to directly own, or lend to, wind and solar assets. These projects can generate a portion of their revenues from sales of power in the wholesale electricity market. Given their commodity exposure, long useful lives and regular dividend payments, can direct investments in clean energy act as an effective hedge against unexpected inflation?

Renewable assets mostly generate revenues from subsidies, power purchase agreements, or from sales of power in the wholesale power market – or a combination of the three.

Subsidies such as feed-in-tariffs, contracts for difference and renewable certificates provide a stable source of income per megawatt-hour of power generated. The subsidy payments can be indexed to inflation in some countries, usually adjusting the payments for inflation annually.

Renewable subsidy systems in Europe have undergone reform over the last decade. Early subsidy programmes which awarded generous levels of support to initial renewable

build-out projects will start to expire from around 2030 onwards, meaning wind and solar assets will become more exposed to wholesale power price movements.

In the meantime, remaining support mechanisms are based on competitive capacity auctions where winning projects are usually awarded fixed prices per unit of output. While they tend to result in less generous subsidy payments, compared to legacy subsidy regimes, new subsidy regimes continue to provide price stability over the long term (usually 10-15 years) to both developers and investors. In countries such as the UK and France, subsidy payments are indexed to inflation, providing another layer of protection. As such, despite the lower level of support payments in absolute terms, subsidy auctions remain an important mechanism for the delivery of renewable capacity in Europe.

Renewable subsidies’ inflation linkage in Europe

	Legacy renewables support	Current support mechanism
Germany	No	No
UK	Yes	Yes
France	Yes	Yes
Spain	Partial*	No
Italy	No	No

*Legacy mechanism sets renewable project returns relative to average government bond yields during a reference period. This may offer some inflation protection.

Sources: LGIM research, BNEF, as of June 2022.



6.Source: BNEF, Energy Transition Investment Trends, 2022.

7.Source: Added net capacity between 2000 and 2020 according to BNEF.

Power purchase agreements: increasing in importance

As developers compete for a limited amount of available subsidised capacity, the EU’s targets for renewable deployment continue to increase. Against the backdrop of the Ukraine war, the EU has increased its 2030 renewable capacity target by roughly 169 gigawatts – equivalent to more than the total installed power capacity of France. Developers unwilling, or unable, to compete in heavily oversubscribed subsidy auctions usually opt for power purchase agreements (PPAs) with large corporate consumers. These long-term contracts serve to stabilise a portion of the power asset’s revenue stream and enable projects to secure external financing. Given the rapidly rising demand for renewable assets, going forward, PPAs are set to play an important role alongside the subsidised pipeline in delivering the EU’s energy ambitions.

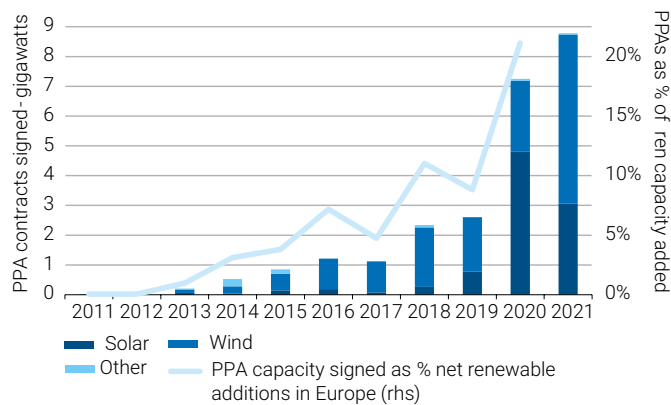
PPA structures differ widely depending on the market, technology and the offtaker. The most common structure is a fixed-price PPA. Under this arrangement, the corporate buyer

pays a fixed price per unit of renewable output. This provides the renewable project with revenue stabilisation while the corporate buyer receives visibility over the long-term costs of energy, which can comprise a significant part of the cost base, especially in heavy industries and manufacturing.

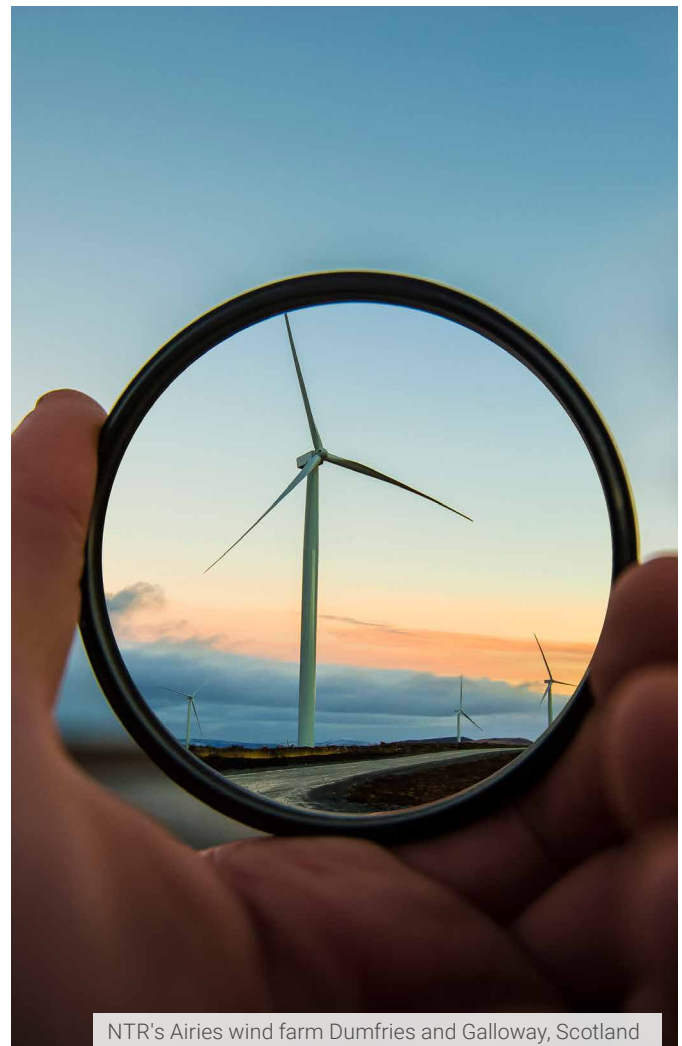
In some markets, it is common for fixed-price PPAs to be indexed for inflation. The initial PPA price in an inflation-indexed PPA tends to be set at a lower level compared to the nominal fixed-price PPAs and is adjusted for inflation annually. Inflation-indexed PPAs therefore provide renewable energy investors with effective protection against unexpected inflation over the duration of the contract.

PPAs tend to cover only a part of the project output, with the remaining volumes (often referred to as ‘merchant’ power volumes) sold on the power market. Based on our conversations with market participants, a 70:30 split between PPA and merchant power volumes is common in many European markets.

Signed PPA volume in the largest European markets



*Note: markets covered include the UK, Germany, Nordic market, Spain, Italy, France, Greece, Netherlands, Poland and Switzerland. Source: BNEF, LGIM research, data as of 15 June 2022.



Exposure to merchant power: investors have historically been wary

In the past, investors have tended to be cautious about exposure to merchant power. This is largely due to the volatility of energy commodity markets. The risk from merchant price exposure is up to two to four times greater than the construction risk and can be as high as 20 to 40% of capital expenditure in value at risk.⁸

On the other hand, wholesale power prices are correlated to inflation rates in most European countries. Power prices tend to drive inflation not only through direct consumer spending on

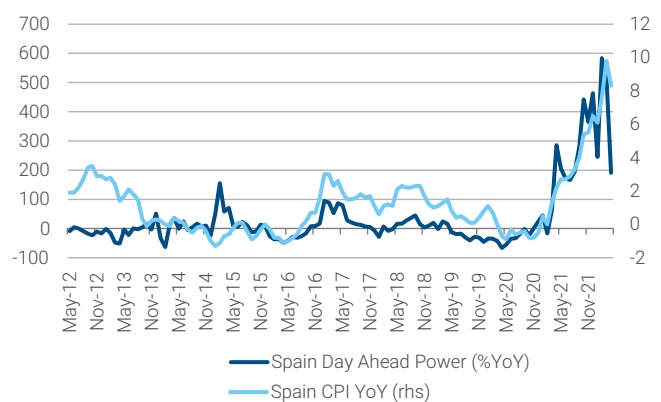
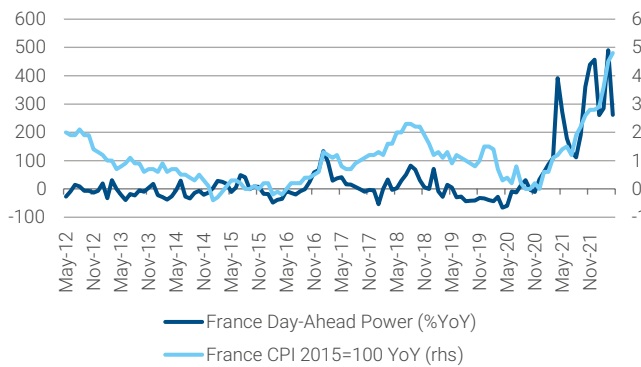
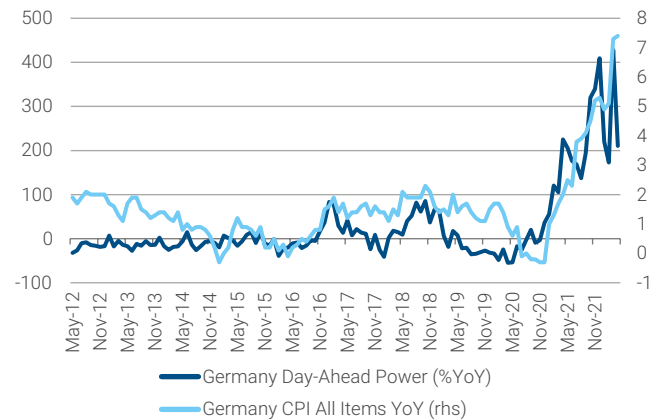
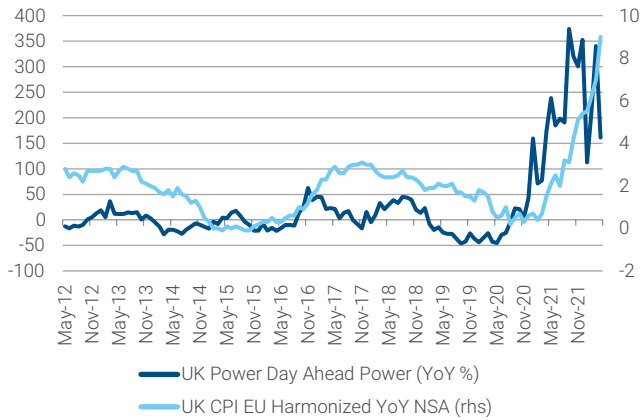
energy (which tends to be a relatively modest part of the consumer price basket) but also by driving up operating costs for other segments of the economy such as manufacturing and food processing. While hedging can protect the end users from temporary power price surges to some extent, structural shifts in the commodity markets ultimately filter through to end-consumer bills. As such, we believe exposure to merchant power volumes can serve as an indirect protection against unexpected inflation for renewable asset investors.

High power prices tend to drive inflation across Europe

	Average power prices YoY%			
	UK	Germany	France	Spain
<2 inflation	-6%	-0.2%	4%	-7%
2-3% inflation	26%	89%	123%	54%
>5% inflation	216%	312%	n/a	360%

Sources: EPEX, Omel, ONS, Eurostat, Bloomberg, LGIM research. Data as of 10 June 2022.

Wholesale power prices and inflation rates in Europe



Sources: Bloomberg, EPEX, Omel, Eurostat, ONS, LGIM research. Data as of 10 June 2022.

8. McKinsey, 2018

Considering additional risks: inflation protection levels vary

On the face of it, direct investments in clean energy appear to offer investors protection against unexpected inflation – either through direct indexation of revenues under a subsidy or PPA regime, or indirectly through merchant power exposure.

That said, there are some limitations regarding the level of protection that can be achieved. Assets with output volumes fully covered by inflation-linked subsidies have attracted much investor interest over the last decade, leading to heavily compressed rates of return in this market segment. For example, over the last two years certain UK offshore wind assets have traded at unlevered internal rates of return below 5% even before commencing operations.⁹

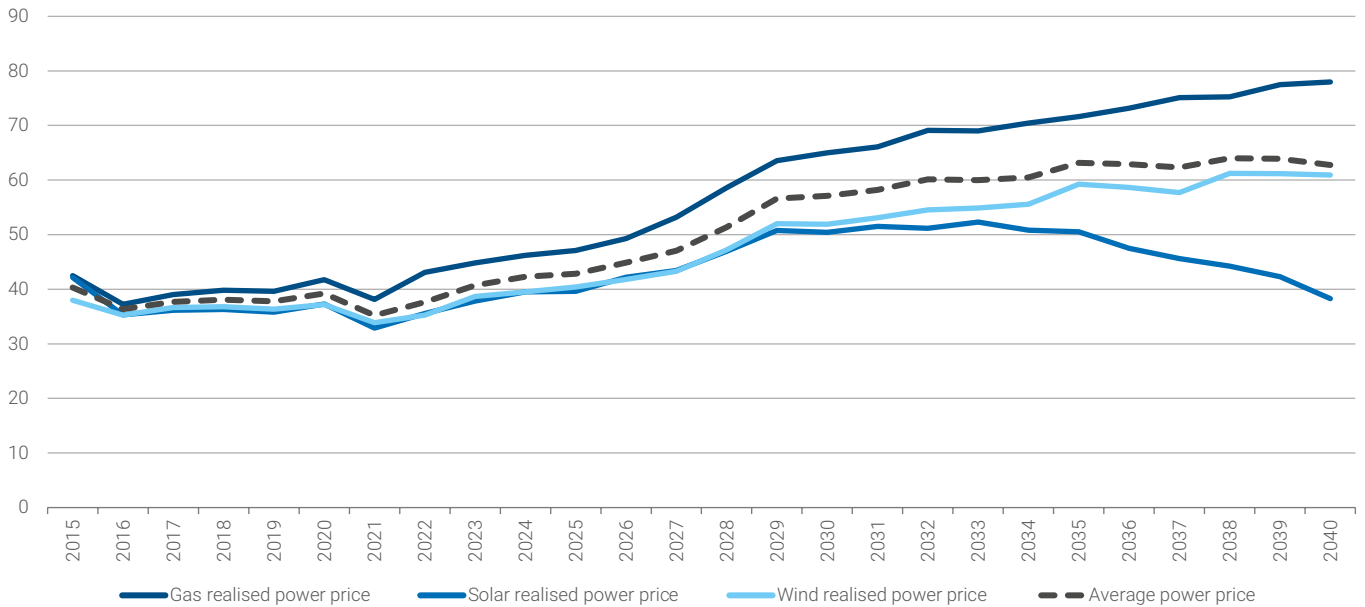
With regard to PPAs, the obvious additional risk is the offtaker creditworthiness. This means that the total addressable corporate PPA market will be limited by the availability of

investment-grade corporate offtaker volumes. Additionally, inflation-linked PPAs have been attractive to electricity buyers in times of low inflation and low power prices, which may not be the case in the current environment of high prices and accelerating inflation.

Regarding merchant revenues, while European power prices tend to correlate with inflation, there are complicating factors between power price movements and renewable generator revenues. Increased renewable generation tends to depress power prices, as more expensive generators are pushed out of the generating plant stack and the power price is set by generators with lower marginal costs.¹⁰ This phenomenon is called power price cannibalisation and leads to below-average realised (‘captured’) prices for renewable generators. Power price cannibalisation may mean that movements in wholesale power prices become less reflected in merchant renewable revenues as more renewable capacity is added to the grid.

The cannibalisation effect leads to below-average realised power price for renewables

Average wholesale and realised power prices in the UK, 2015-40 (£/MWh)



Source: BNEF, as of 16 June 2022.

9. Source: LGIM research and estimates, as of June 2022.

10. Source: For more background on cannibalisation effect and merit order, please see Cornwall Insight report [here](#).

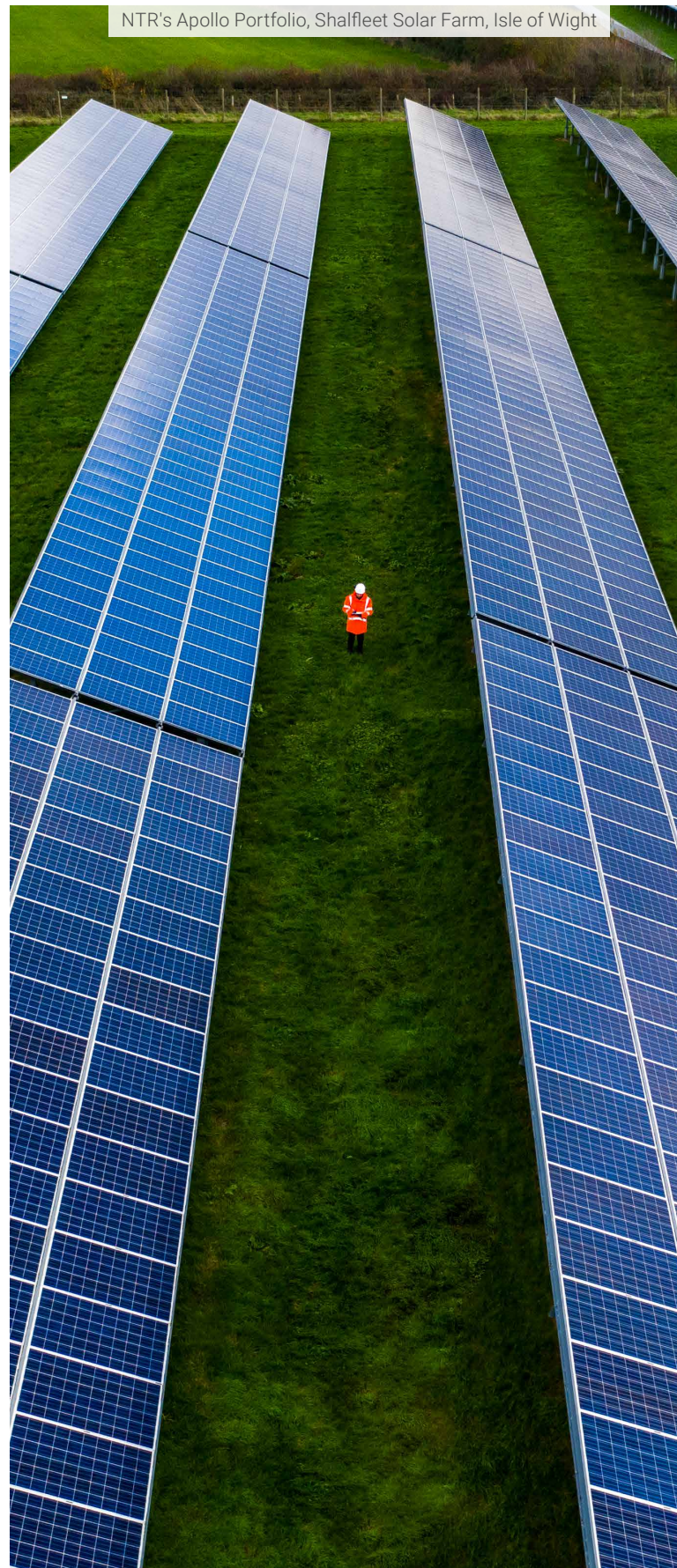
The degree of revenue cannibalisation is related to asset location and technology. Solar assets are expected to be more affected by lower realised prices than wind and may therefore need PPAs or co-located power storage to mitigate the uncertainty. Wind farms located in areas outside the usual renewable hotspot regions can have production profiles less correlated to the market average and may therefore be able to secure better capture rates (higher average realised power prices).

Clean energy investing as part of the inflation toolkit

In conclusion, direct investments in clean energy can help protect investors against unexpected inflation, in our view. However, as with other asset classes, they do not provide a guaranteed solution in the face of all the challenges posed by rising consumer prices.

The level of protection afforded varies across different assets. Projects with index-linked subsidies and PPAs will offer the strongest protection but may command a valuation premium. Those with merchant revenue streams may be able to offer an indirect hedge, but will need to be assessed individually for risks of power price cannibalisation.

Ultimately, the question of inflation protection should be viewed within the broader set of attributes that drive the strategic allocation decisions. Against the backdrop of rising uncertainty and stalling economic growth, inflation protection is important, but so is income resilience, valuation volatility and portfolio diversification. In this context, direct energy investments may offer exposure to the secular theme of energy transition, as well as resilient cashflows, diversification benefits and an opportunity for investors to tailor their exposure to unexpected inflation, driven by their own views and risk preferences.



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