Financing the Energy Transition in a Volatile Market

This paper examines the recent disruptions that have affected the financing of renewable energy projects in Europe over the past 18 months. We argue that while there have certainly been some negative impacts, on balance, the market has shown real resilience and capital availability, per se, has not been a significant constraint to renewable deals getting done. Investors, overall, are positive about the long-term outlook for the energy transition.

Background

For several years, the renewables sector has benefitted from low financing costs, ample liquidity, rapid product development, competitive supply, broad policy support, and declining LCOEs. Rapidly rising renewables penetration in Europe has been the result.

While annual investments have continued to grow globally – at a compound annual growth rate of 8.5% over 2013-2022 – renewable energy costs declined dramatically during this period. A dollar invested today now translates into higher capacity installed than it did in the past due to falling costs. For instance, between 2013 and 2021 the global weighted average of total installed costs for solar PV, onshore wind and offshore wind came down by 69%, 33% and 45%, respectively.[1]

Of course, material barriers such as slow permitting processes and grid constraints existed then as they do today. But, on balance, the recent past was a benign environment, broadly supportive of renewable expansion.

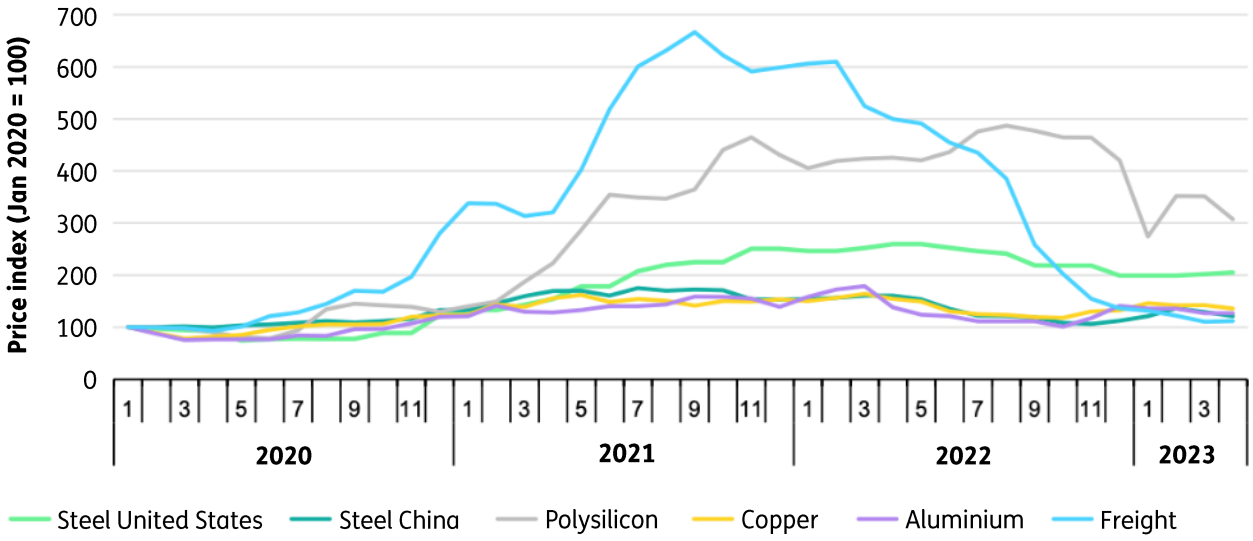
Disruption

This period came to a close in 2021 as it faced its first disruptions as the Covid pandemic impacted supply chains globally. The situation was further aggravated by Russia's invasion of Ukraine which unleased an energy crisis and inflamed commodity price inflation. The past eighteen months have seen a combination of shocks reverberating through the energy sector, and specifically in renewables:

- High and Volatile power prices. Average monthly wholesale power prices in Europe (which had already been rising since May 2020) exploded in the wake of Russia's invasion of Ukraine reaching a peak in August of 2022 of € 469/MWh (Germany) and € 543/MWh (Italy). They have since moderated considerably and are averaging € 80-€100/MWh [2] - roughly at pre-pandemic levels but still significantly higher than the 2010 to 2019 average.

- Substantial EPC/OEM price increases ranging from 20% to 40% resulting – at least in part – to a 47% decline in wind turbine sales in Europe in 2022 [3] [4]. The cost explosion was driven by severe rises in commodity and freight costs in 2022. These have since fallen, but remain elevated in comparison to 2020. [5]

Monthly commodity and freight price indexes, 2020-2023



Notes: Steel United States: North America steel plate spot price ex-works; Steel China: China domestic 20-mm steel plate average spot price; Polysilicon: BNEF solar-grade silicon spot price; Copper and Aluminium: London Metal Exchange 3-month forward contract proce; Freight: WCIDCOMP index.

- Cost inflation for O&M has followed a similar – if less pronounced – trajectory.

- Rising interest rates and increases in equity return requirements. European base rates have increased from 0.75% in July 2022 to 4.25% one year later – a very substantial and rapid increase.[6] Recent announcements from monetary authorities in Europe and the US suggest that this elevated level will not be coming down in the near term. Market participants report that all-in financing costs have more than doubled on single assets. Equity return requirements from investors have also increased materially on ready-to-build renewables assets.

- OEM troubles have been in the headlines of late. A combination of supply chain shocks and overly ambitious rollout of new products have damaged the profitability and the performance of some of the major OEMs. In August, 2023 Siemens Energy announced losses of € 4.5 bn arising, principally, from its turbine business and has provisioned € 1 bn to resolve technical faults in its platform.[7] It is now in discussions with the German Government on financial support.

- Danish wind turbine manufacturer, Vestas, found quality issues in 2020 with its onshore fleet and provisioned € 600 million for repairs. GE ascribed the $US2.2 billion annual loss incurred in 2022 on rising warranty provisions from its wind division in the September quarter, which contributed to a 17 per cent drop in revenue.[8] Restoring balance sheets and resolving material product quality and manufacturing problems will be expensive.

- Because of the combined cost impacts of financing and supply chain described above, LCOEs for onshore wind and solar rose for the first time (along with other power generation costs). The years of ever declining renewables LCOEs have come to a close as levelized costs are on the increase.[9]

Consequences

Given the story of the past 18 months, we would expect the industry to be in pronounced retrenchment, developers biding their time, investors exploring other investment opportunities. Indeed, there are signs that this has been happening:

- Offshore wind has been buffeted by very rapidly rising costs that make projects which have locked in their remuneration schemes over the past 12 months uneconomic.[10] This was made noticeably clear by Vattenfall's announcement that it would stop development of its Norfolk Boreas offshore wind project in the UK.[11] The offshore market was further battered by the failure if any offshore wind developers to take part in the UK Government's latest CfD round.[12] In the US, Commonwealth Wind (Iberdrola)and Orsted have both terminated power supply contracts. They will now re-vist their options for a new deal in future auctions.[13] Unless auction/off-take conditions are changed, other projects may follow suit, which would clearly jeopardise the important offshore targets set by EU and the US

- As noted above, European turbine sales for both on and offshore were down considerably in 2022.

- The volume of project financing debt levels for renewables projects, as will be discussed below, are also down year-on-year.

- Given high interest rates, some investment flows are being lured away from alternatives to fixed income according to anecdotal information. *Infralogic* reports that over the past 18 months there has been a reallocation within portfolios from infrastructure to higher yielding, fixed income.

- Developers who can afford to bide their time, have held onto their projects rather than sell to investors at levels below their return expectations.

Resilience

But, on closer inspection, the picture is more nuanced. And, in some respects, differs from the headlines. Growth continues and deals are, in fact, getting done:

- European Solar is experiencing growth of 47% year-on-year, adding over 41GW of capacity in 2022 with the expectation that capacity will double in the next four years. [14]
- Despite all the challenges, wind expansion rose to a record of 19.2 GW of new installations[15] in Europe and is on track to exceed the average of the past two years. Germany is leaving the dark days of 2019/2020 with an over four-fold increase in 2023 versus three years ago . As DWG noted in the H1/23 report: In the two tender rounds conducted so far this year, 2,999 MW were awarded. Both tender rounds were significantly undersubscribed, yet almost as much capacity was awarded in the first half of 2023 as in the entire previous year. [16]
- Battery energy storage systems (BESS) are gaining momentum with an expected 40% CAGR in capacity across Europe with 4.5GW of utility scale battery storage in place [17] and expectations that this may rise to 70 GW by 2030. [18]
- Investment funds are complementing their focus on core renewables with other technologies that will be essential to the energy transition. These include storage, hydrogen, BESS, and EV charging.

The above points to real resilience in the industry, and the overall sentiment in the market is improving based on conversations with players in the capital markets.

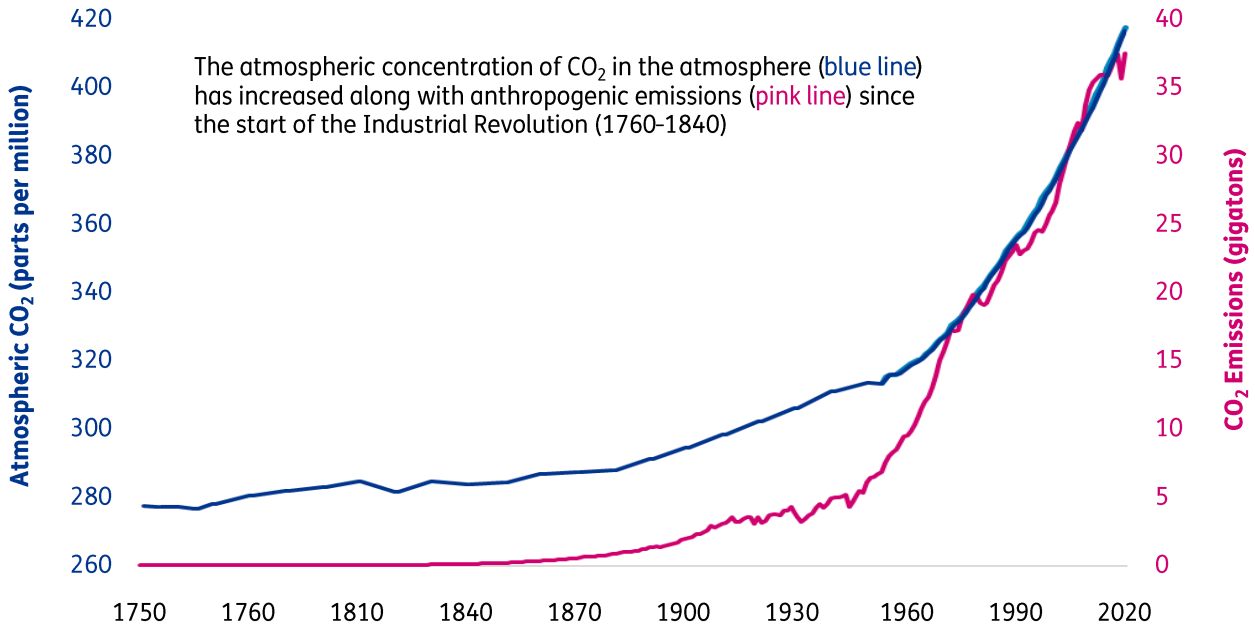
Drivers and Markets

The question is why, and how are capital markets adjusting to the current round of challenges?

As to the "Why", one compelling explanation is that the over-arching drivers behind the energy transition remain very much in place. Capital markets recognise this and are positioning themselves for the long term. Indeed, if anything, these drivers have become broader and more pronounced over the past 18+ months:

- Russia's invasion of Ukraine, and the resulting energy crisis drove home the imperative that Europe's energy security cannot be held hostage to geopolitics. REPowerEU programme has placed renewable energy as a cornerstone for the Continent's energy security and affordability. [19]
- The changes in our global climate continue to unfold as climate science has predicted: more extreme weather events, rising temperatures, and natural disasters. By altering the carbon cycle and increasing CO2 concentrations in the earth's atmosphere in the past 150 years, we have created an existential threat to our way of life. Moving to a low or carbon-free economy is fundamental to the future health of our planet and society. Here a not-so-gentle reminder from NOAA Global Monitoring Lab and World in Data:

Atmospheric Carbon Dioxide and Annual Emissions (1750-2021)



Source: NOAA Global Monitoring Lab, World in Data

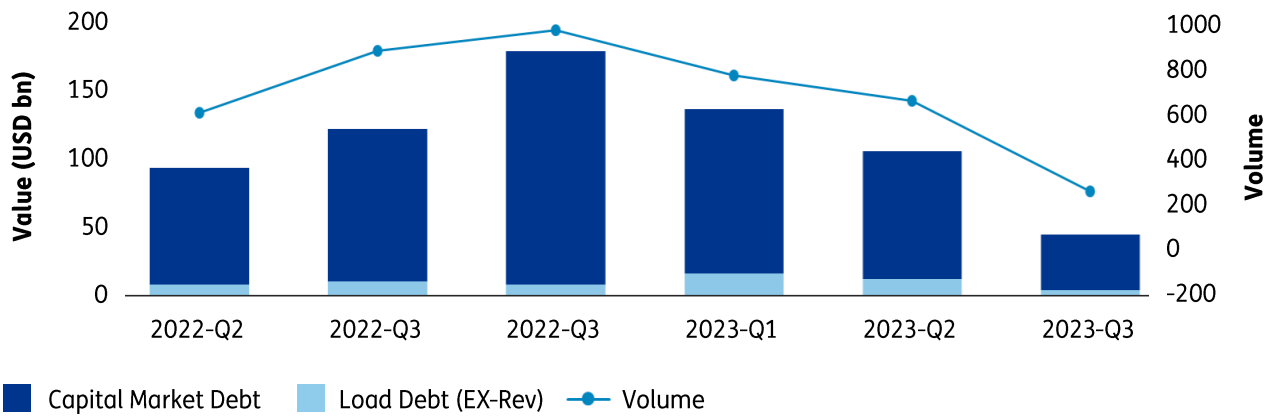
- Policy measure across Europe have been put in place to accelerate the energy transition via simpler planning procedures, increased subsidies and other support, and network build-out/upgrades. One third of the €1.8 trillion investments from the "Next Generation EU Recovery Plan", will finance the European Green Deal. The EU is legally bound to achieve carbon neutrality by 2050 and a reduction of GHG of 55% by 2030 (against 1990 levels).
- Finally, capital markets and investors continue to have robust appetite for investing in the energy transition. This is expanding beyond core renewables and diversifying into energy storage/batteries, EV charging, hydrogen and green fuels. The drive to decarbonise is spreading beyond power generation.

Financing

Beyond the headlines we examine some of the financing data to identify trends in how capital markets have adjusted to the impacts of the past 18 months:

- From the graph below we can clearly see that overall debt volumes and debt-financed deals in renewables have been trending down since Q4/22. This is fully to be expected in a rising interest rate environment where funding costs and equity return expectations have risen. Also, it is worth noting that deal flow has also been constrained by non-financial factors. For example, according to Wind Europe, the industry trade association, around 80 GW of new wind capacity is tied up in permitting procedures, including 59 GW of onshore wind.[20] In addition, some developers whose expectations of development premia are grounded in "the old world", have chosen to hold back on debt financing for the time being rather than accept the lower development returns that leverage would produce.

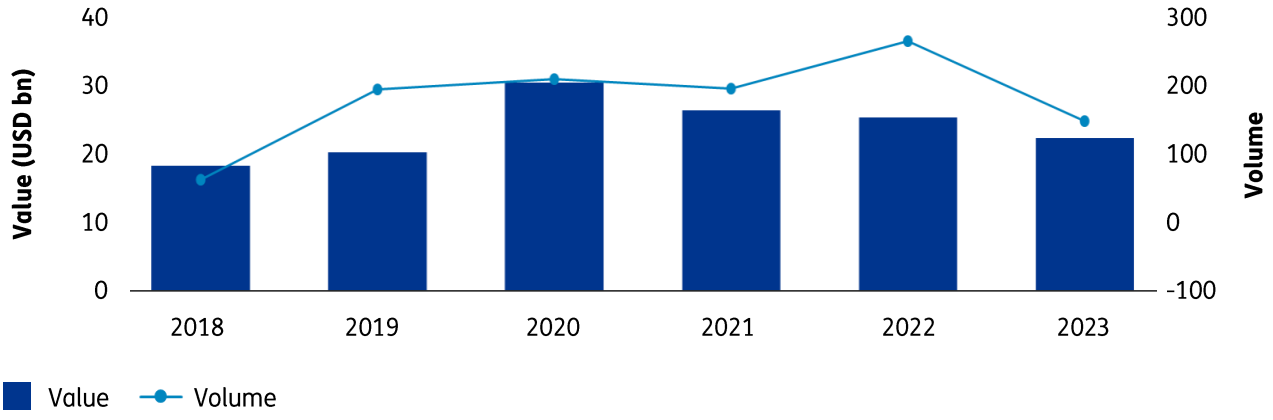
Debt Issued by Closed Transactions by Quarter



Source: Infralogic

- If we step back and look at the past five years, 2023 seems to be on track to be a healthy year for ***greenfield*** renewables. Here we see overall deal value (not just debt financing) holding up despite lower volumes. This incorporates core renewables, biofuel, biogas, CCS, and BESS. One interpretation behind this is that equity is simply playing a larger role. Fund managers report that strategics (i.e., utilities/large IPPs) and O&G players have opted to finance largely on balance sheet in many cases. Other players, whose liquidity positions are comfortable, have also chosen to continue with their deals and hold off on leverage at least until the asset is operational and substantially de-risked.

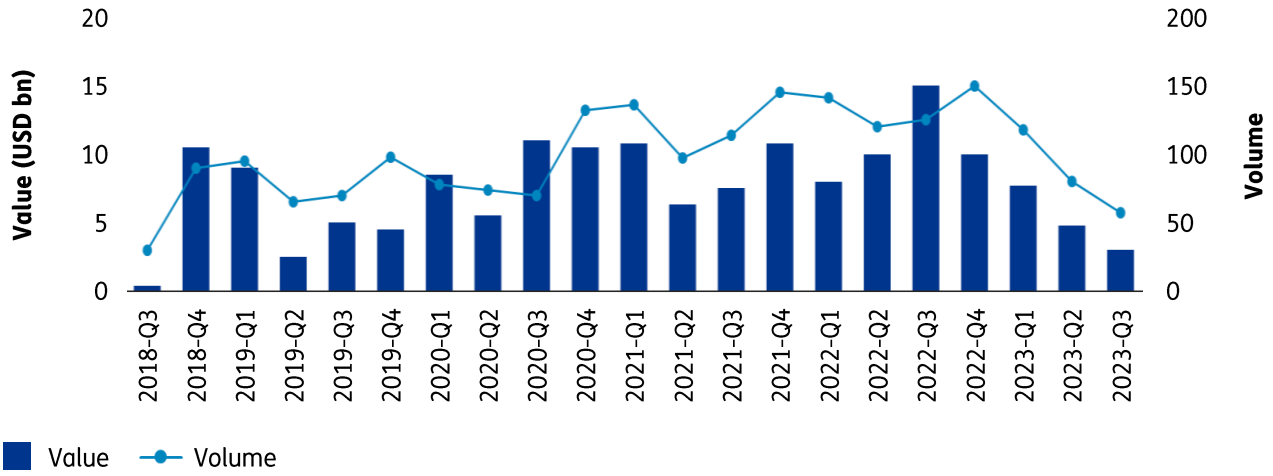
Closed Transactions by Year in Europe



Source: Infralogic

- If, on the other hand, we examine ***M&A*** in renewables in Europe, which would include the sale of an asset, or a portfolio of assets, from one private investor to another, we see a more pronounced trend. Here we anticipate that the value of renewable M&A deals is projected to be down by about 40% against the average of the prior three years and the debt volumes underpinning those deals is down even further[21] – supporting the notion of a relative comeback of equity financing.

Deby Issued by Closed Transactions by Quarter in Europe



Source: Infralogic

As for financing terms and deal-doing, the new world of higher interest rates and monetary tightening have resulted in some marked changes:

- The days of very low-cost financing are over, at least for now. All-in debt costs have increased from 200 bps to 400 and above for single assets.
- Equity return requirements for investors are up as well by 150 to 200 bps. What was once acceptable at 6% now investors seek 8% for a core renewables asset, ready to build.
- Capital discipline, greater diligence and deal scrutiny have returned. Deals are taking longer to close, some are going without leverage and looking to bring in leverage once assets are operational. Hence the decline in deal numbers and the relative rise of equity. As one senior executive noted, "The craziness is gone."
- A number of capital markets advisors have observed that the focus is diversifying from single assets to business where there are operating assets providing cash flows and a development pipeline that is credible.
- Some investors that need to mark to market their positions (i.e., insurers) may be holding back to avoid booking value losses (against current market values). These players are being replaced, in part, with strategics who have strong cash positions and are not required to price their deals against current market valuations.[22]

Fundraising

Perspective is important in moments of disruption like these. We see strong growth in fund raising for the energy transition, where LPs are taking a view on the market for the next 10 to 12 years. Recent analysis from Infralogic is informative in this respect:

- The total capital raised during 2022 amounted to USD 158.4bn for the sector which was a record year. The current estimate is that USD 90bn (possibly more) will be raised in total by year-end 2023 based on the current expectations that GIP, Brookfield and EQT will close out their funds this year. While clearly down from 2022, this still exceeds or matches prior years, and is especially noteworthy given the turbulence in 2022/23.[23]

- It is also expected that the upper end of the market will pick up. Managers such as GIP and EQT had initially been struggling to build momentum with LPs waiting to see how the market would play out. However, momentum for these funds has now accelerated, with most LPs in the space now having dedicated allocations to these USD 10bn + funds. The general sense in the market appears to be that re-allocations have settled. With distributions flowing again LPs are now able to focus on deploying their infra and renewables allocations. All of this is encouraging for capital availability for the energy transition.

- New funds are also expanding their scope and capability to take on and manage more risk, thereby offering higher returns. This is both because assuming (and managing) greater risk will allow funds to offer LPs higher returns and because, increasingly, the energy transition market demands it. Specifically:

  - Development: Over the past several years we have seen a whole host of funds and institutional players establish and back development platforms in the renewables space including the likes of Brookfield, CPPIB, JP Morgan Asset Management, MacQuarie Capital, and Morgan Stanley to name but a few. The capital and expertise support allows smaller developers to build out their development assets in renewables and furnish, ideally, a reliable and bankable pipeline of assets to the GPs once they are sufficiently mature.

  - New Technology: Funds are also moving into adjacent areas to core renewables which are also proving essential for the energy transition, such as green hydrogen, e-fuels, BESS, and long duration storage. Some of the leading names entering these new segments include CIP, BlackRock, Ardian, MacQuarie, and Swiss Life. One fund, Partners Group has even arranged US$ 600 mn in order to finance the scale-up of direct air capture technology provided by ClimeWorks. These efforts are going to be essential as the efforts to decarbonise move beyond power generation into the harder-to-abate areas such as industrial heat and long-distance freight transport and – eventually - on to carbon removal as required by the IPCC.[24]

  - New Geographies: Alongside the support for development platforms, fund managers have expanded their geographic remit in Europe with rapidly increasing focus on relatively new European geographies such as the Baltics, the Balkans, and Greece.

  - Venture Capital: Finally, the venture capital space has greatly expanded its focus on developing the next generation of clean tech. In the period, 2019 to 2022, VC funding dedicated to cleantech has grown from US$ 1.9 bn to 12.3 bn, despite slow growth in other VC segments. The clean tech VC fund raising is largely focussed on storage and renewables technologies, but allocations have been made for hydrogen, grid solutions, carbon analytics and fusion.[25]

Conclusion

Overall, what can we conclude about renewables finance in this moment of disruption?

- We see an industry that is resilient and continuing to invest, build, and grow the energy transition even in the wake of interest rates that will remain elevated for some time to come and supply disruptions over the past 18 months.

- Capital markets, consumers, and policy makers (in general) have increased their support and their desire to see this transition to green, secure energy happen. The core drivers behind this transition remain firmly in place.

- Financing continues to flow, and funds continue to be raised. What does seem clear is that capital markets remain committed to the growth of the energy transition and, like all organic forms, will adjust accordingly to facilitate that growth.

    - New debt products to match more complex revenue stacks and merchant exposure,
    - New investors to replace existing ones,
    - Refreshed discipline to ensure assets and business are financed in a sustainable way, and
    - Funds, new and old, investing in new segments of the energy transition.

We are certainly not out of the woods. And capital markets are *only one part of the solution*, albeit an important one. Focus needs to be re-doubled to resolve some of the issues that could acting as brakes just as we need to accelerate the transition. These include:

- Wind power OEMs are in a period of repair – both in terms of turbines and balance sheets. The large OEMS have provisioned billions to fix their problems. There is recognition that in the pursuit of ever-lower LOCEs the pace of product development can be too fast and ultimately harmful for performance, reliability, and project profitability. The energy transition depends on robust and healthy supply chain to succeed. And if this requires re-designed auctions or even direct public support then so be it.

- Permitting process and timeline will, at least in the near term, continue to slow renewables build out. IEA notes that 59 GW of onshore wind projects remain stuck in permitting in Europe. However, new directives from the EU should streamline the permitting process and reduced timelines materially. This will allow renewable, particularly wind build-out to accelerate. There is every reason to be optimistic about this.

- As the IEA noted in their latest report, policy/planning uncertainties and volatile prices left one-sixth of renewable energy auction volumes unallocated in 2022. Competitive renewable energy auctions resulted in the awarding of a record-breaking 100 GW of capacity globally. However, 20 GW remained unallocated, the highest ever level with Europe accounting for two-thirds of it. As a general matter, government auction designs need to take into account recent inflation, interest rate rises and turbulence in commodity prices. Improved auction design may be needed to attract investments and break the pattern of under-subscription.

- Grid remains the final link in the chain. Grid build-out, re-enforcement, intelligent systems, flexibility and decentralisation are the watch words for the grid of the future.

In general, capital markets have not acted as a significant hindrance to the expansion of renewables – although clearly sponsors preferred the days of low-cost leverage. Rather, it is the issues described above that require resolution for renewables to embark on a step change in growth.

Finally, recent developments need to be put in perspective: the scale of the challenge that society faces is daunting. Despite the rapid growth over the past 15 years, and global investments in the energy transition reaching US$ 1.3 trillion last year, renewables still play a modest role in global energy supply. According to the IRENA, if we are to achieve our targets laid out under the 1.5c scenario, this annual investment needs to increase by four-fold.[26] The vast pools of capital to finance this level of expenditure are there and capital markets have a habit of stepping up when structures and incentives are right.[27] But the sea-change in policies that would be needed to catalyse this level of investment will be left to another White Paper.

1 IRENA, Market Outlook 2022
2 Statisa, 2023; day-ahead prices
3 Recharge News, 31st January 2023
4 Reuters, "Why the Wind Power Industry has hit Turbulence", 26th June 2023
5 IEA, June, 2023
6 European Central Bank, Statistics, July 2023
7 Financial Times, 7th August 2023
8 Reneweconomy, "Wind turbine failure rates are rising; has the industry gone too big too fast, February 2023
9 *LCOE +*, Lazard, April 2023
10 Recent Statement by Markus Krebber, CEO of RWE, August 2023
11 Reuters, 20th July 2023
12 September 2023
13 New York Times, 7th August 2023
14 Energy Monitor, 9th January 2023
15 Wind Europe, 2023
16 Status of Onshore Wind Energy Development in Germany, First Half of 2023, Deutsche Windguard
17 Energy Storage News, 20th April 2023
18 European Market Monitor on Energy Storage, LCP Delta, March 2023
19 The IEA notes that EU electricity consumers are expected to save an estimated EUR 100 billion in 2021-2023 thanks to additional electricity generation from newly installed solar PV and wind capacity.
20 Reuters, 1st June 2023
21 Infralogic Data, 2023
22 Mark to market is an accounting practice that involves adjusting the value of an asset to reflect its value as determined by current market/pricing conditions.
23 Conversations with Infralogic team, August 2023
24 IPCC Annual Report, 2018
25 Oliver Wyman, 2023
26 IRENA's World energy transitions outlook 2022, Global Landscape of Renewable Energy Finance 2023, Irena
27 Statista reports that as of 2022, US$ 112.3 trillion are under management globally.

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