22 April 2024, 5:12PM UTC
Chief Investment Office GWM
Investment Research

Investing in renewable energy infrastructure

Private markets

Authors: Antonia Sariyska, CIO Sustainable and Impact Investing Strategist, UBS Switzerland AG; Catherina Campedelli, CIO Sustainable Investing Analyst, UBS Switzerland AG; Antoinette Zuidweg, Alternative Investments Strategist, UBS Switzerland AG

- Renewables account for the majority of energy capacity additions globally, and governments have recently committed to triple renewables by 2030 globally.
- Private infrastructure offers opportunities to invest in renewables. Infrastructure assets can act as an attractive diversifier due to their low correlation to other asset classes as well as a stable source of income and returns within a portfolio context.
- Investing in renewables infrastructure contributes to a number of the UN SDGs and aligns to our longer-term investment theme on *Clean air and carbon reduction*.

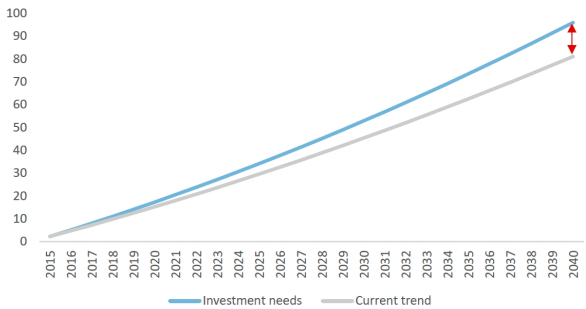
Why invest in renewables infrastructure today

Infrastructure assets provide critical networks for the movement of people, goods, and ideas translated into utilities, energy, transportation, communication, and social infrastructure. These assets play an indispensable role for economic productivity and sit at the heart of global structural trends like deglobalization, changing demographics, digitalization, and decarbonization. These trends require significant infrastructure investing to meet future needs. Indeed, the infrastructure investment gap is expected to widen to USD 15tr by 2040 (see Fig. 1). Moreover, achieving net-zero objectives by 2050 will need roughly USD 2.6tr of annual investments in green infrastructure, according to IEA estimates. This will require expanding efforts in technologies such as solar, wind, and hydropower.

We believe the current market environment favors investments in renewables as governments globally create a supportive environment for private infrastructure investments. From the Inflation Reduction Act in the US to the European Green Deal, this support should spur renewables' capacity expansions while enhancing current and future project economics and competitiveness.

Fig.1: Widening infrastructure investment gap

in USD tr

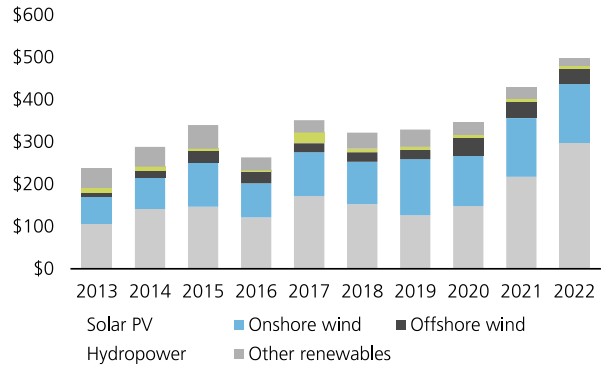


Global Infrastructure Hub as of 2017

Despite the overall global infrastructure deal activity slowdown and challenges such as inflation and capital costs, annual spending on renewables continues to set records. According to the IEA, the global annual renewables' capacity additions increased by almost 50% in 2023, the fastest growth rate in two decades. The increase in infrastructure spending is fueled by the quest for steady cash flows, potentially lower risk, and alignment with structural tailwinds such as the global decarbonization objectives.

Fig. 2: Annual financial commitments to renewable energy

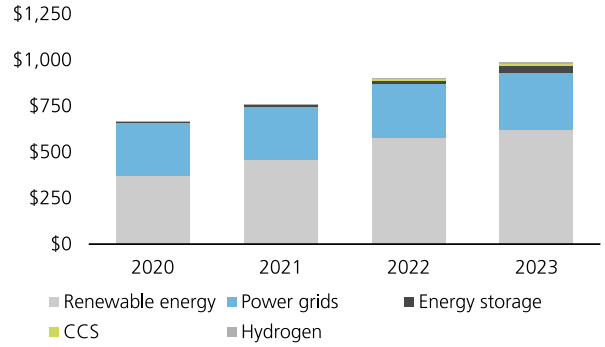
in USD bn



Source: BloombergNEF, UBS (2024)

Fig. 3: Global transition infrastructure spending

in USD bn



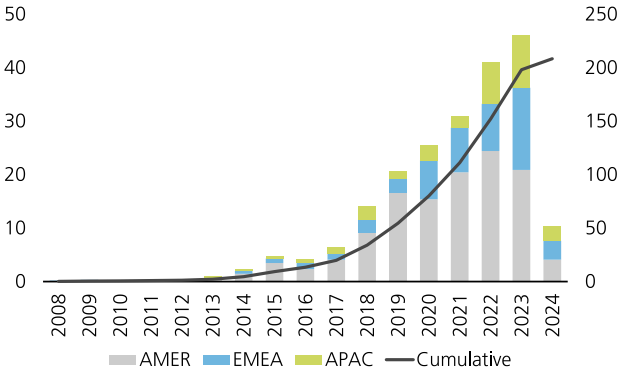
Source: BloombergNEF, UBS (2024)

At the end of 2023, COP28 represented a landmark moment with countries pledging to transition away from fossil fuels, triple renewables, and double energy efficiency by 2030, thereby emphasizing the urgency of decarbonization efforts. In Europe, the overall renewable energy target has been raised to at least 42.5%, while in the US, the Inflation Reduction Act has unlocked significant private sector investments in renewable energy. The global energy landscape is in flux, driven by a convergence of technological advancements, policy imperatives, and environmental considerations. In this context, investing in renewables infrastructure emerges not only as a strategic necessity but also as an investment opportunity for investors seeking both financial returns and environmental impact.

The secular trend of digitalization also plays a role in the medium-term development of renewables. The IEA estimates that the global energy consumption of AI and data-centers could reach more than 1,000 TWh in 2026, roughly equivalent to Japan's consumption today. This, combined with the increase in companies' commitment to decarbonize (by the end of 2022, companies with science-based targets or which had committed to set targets represented 34% of the global economy by market capitalization), further increases the need for clean and renewable energy.

Fig. 4: Global corporate power purchase agreement (PPA) volumes

in GW (left axis) and cumulative (right axis)



Source: BloombergNEF, UBS (2024)

Renewables infrastructure and environmental impact

Concerns about climate change, national security, and advancing technology are driving global decarbonization. Creating an economy free of carbon emissions and transitioning to clean fuels is a complex undertaking. Investment in areas such as power generation and energy infrastructure will be required to achieve net-zero targets.

Renewables contribute to decarbonization in different ways. For example, they are instrumental in decarbonizing electricity generation, as well as the transportation sector, through its electrification powered by renewable energy. Also, renewable energy can help decarbonize heating and cooling processes both for private individuals and industrial plants. The use of renewables is crucial to reducing emissions of industry and agriculture associated with manufacturing, processing, and agricultural activities.

Investing in renewables contributes to a number of the United Nations' Sustainable Development Goals (SDGs), both directly and indirectly. Examples of direct contributions are SDG 7 (*Affordable and clean energy*, aiming to increase substantially the share of renewable energy in the global energy mix) and SDG 9 (*Industry, innovation and infrastructure*, aiming to develop quality, reliable, sustainable and resilient infrastructure). Renewables infrastructure contributes indirectly to SDG 13 (*Climate action* given policy-related mechanisms) and SDG 3 (*Good health and well-being*, due to a reduction in air pollutants dangerous for human health).

However, renewables could produce negative externalities that must be considered. These include biodiversity implications such as declines in species populations, ecosystem integrity and resilience due to habitat

destruction, alongside local species displacement. Offshore wind produces ocean noise, which could affect marine animals' behavior and hamper their navigation ability and communication, among other things. Onshore wind, on the other side, could pose a threat for birds which at times collide with the blades. These negative effects usually can be minimized through nature preservation laws and an improved project infrastructure design. A study on solar power projects in California concluded that considering biodiversity in siting decisions reduces the time needed to obtain permits and the costs of biodiversity impact mitigation, with an overall cost savings of up to 14% (Dashiell, Buckley and Mulvaney, 2019).

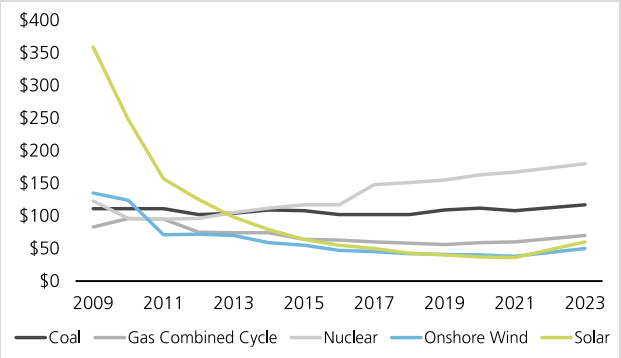
The rise of renewables

In the early years of renewable energy, wind and solar primarily benefited from a supportive regulatory framework and subsidies provided by governments worldwide. Today, one of the main drivers for renewables' growth is the decline in energy production costs. The levelized cost of energy (LCOE, see figure below) has decreased by more than 50% since 2009 and could decline further by 2025. Rapidly declining costs have boosted the installation of wind turbines and solar photovoltaic (PV) cells. PV cells have indeed become cost competitive with traditional coal/gas power generation facilities over a shorter timeframe than expected, and solar is now competitive with retail electricity prices in many markets.

Currently, renewable energy is mainly used in the power sector. However, it is also the fastest growing source of energy for buildings and industrial processes. With growing demand for batteries and hydrogen production, it's widely expected that electricity demand will grow rapidly over the next few decades. According to the International Energy Agency (IEA), global electricity demand grew 2.2% in 2023. However, an average annual growth rate of 3.4% is forecast from 2024 through 2026, with developing countries driving this increase. As such, renewables play a key role in meeting that demand.

Unsubsidized levelized cost of energy for utility scale generation

in USD per MWh



Source: Lazard, UBS (2024)

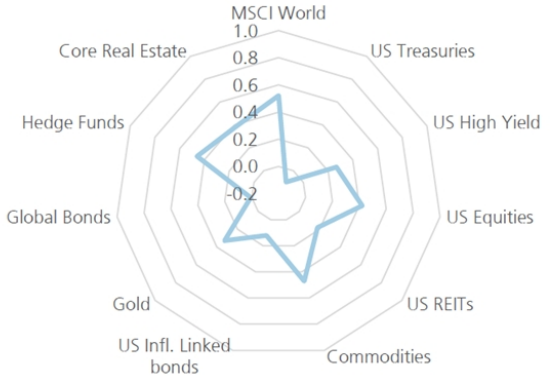
Currently, the main renewable energy sources are wind and solar. Wind employs onshore and offshore turbines to convert kinetic energy from wind into mechanical energy and then into electricity. Improvements in hub height and blade length have enhanced efficiency in recent years. Solar can be both photovoltaic and thermal: the former transforms the sun's power directly into electricity; the latter is used either for heating or indirect electricity generation.

Allocating to renewables infrastructure in a portfolio context

Investors should consider renewables infrastructure within the context of adding infrastructure exposure to a portfolio. Doing so could serve as an attractive diversifier for private markets allocations, with a return profile that shows limited correlation to other asset classes (see Fig. 5). Thus, infrastructure can act as a return enhancer and a stable source of additional income in an investor's portfolio.

Fig. 5: Infrastructure exhibit low correlation to other asset classes

Correlation of the Cambridge Infrastructure index vs other asset classes (2005-2022)



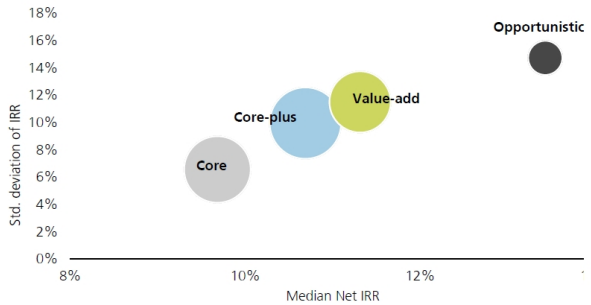
UBS, Bloomberg, Cambridge Associates, February 2024

Infrastructure covers various strategies with different risk and return profiles. However, not all infrastructure assets are created equally: dynamics can differ greatly across strategies and subsectors. Core/core+ strategies typically offer a stable source of return and income while targeting mature assets with limited operational risk. Value-add and opportunistic strategies offer higher returns, but are also characterized by higher risk as they target improvement assets or completely new construction projects.

When it comes to renewables, investing in core renewable assets can provide a consistent yield as these assets are often contracted and regulated. Assets like solar and wind can deliver power to be sold to the energy grid at set prices. Revenues, however, can vary based on power usage as well as weather patterns. Yet, based on Goldman Sachs Asset Management data, return estimates for renewable power assets could range between 8% and 13%.

Infrastructure-linked assets have proven more resilient in the current macro-economic environment while benefiting from both policy and structural tailwinds. Higher barriers to entry, combined with stable cash flows often linked to inflation and lower price elasticity, also resulted in lower vulnerability to the global economy. Cambridge Associates data shows private infrastructure delivered annualized returns of over 10% over the past decade, compared to 7.6% for global equities (MSCI ACWI) over the same period.

Fig. 6: Infrastructure risk and return by strategy (vintages 2007-18), size of each circle represents the % of assets under management



Preqin, UBS February 2024

Infrastructure investments are particularly suitable for investors with a long-term time horizon as underlying projects and contracts tend to be lengthier.

Importantly, investors should be aware of risks beyond general private market risks like illiquidity and limited transparency and control, namely use of leverage, potential for defaults, and policy and regulatory changes that may adversely affect asset valuations. When seeking to capitalize on renewables infrastructure, investors should also consider grid instability caused by adverse weather conditions and varying power usage affecting revenue streams. Sector and regional concentration risks should also be considered. For example, the supply chain required for critical clean energy materials is highly concentrated in China.

Renewables infrastructure as an impact investment

Impact investors looking at renewables infrastructure should keep in mind factors such as additionality, intentionality, and measurability. While sustainability-focused investments in renewables include mainly brownfield assets, core, and core-plus types of investments, impact investments tend to include greenfield and opportunistic assets and value-add strategies, given the higher opportunity for investor contribution and additionality. The increasing reach to underserved communities could also reflect intentionality and additionality. In general, when investing in renewables infrastructure, social and environmental intentional outcomes include reduced health problems related to air pollution, increased clean energy affordability, and other positive outcomes such as lower greenhouse gas (GHG) emissions. Lastly, to measure the impact generated by an investment in renewable energy infrastructure, investors can use metrics from systems like IRIS+, including avoided GHG emissions (or general air pollutants), access and affordability of energy, and job creation.

Appendix

UBS Chief Investment Office's ("CIO") investment views are prepared and published by the Global Wealth Management business of UBS Switzerland AG (regulated by FINMA in Switzerland) or its affiliates ("UBS"), part of UBS Group AG ("UBS Group"). UBS Group includes Credit Suisse AG, its subsidiaries, branches and affiliates. Additional disclaimer relevant to Credit Suisse Wealth Management follows at the end of this section.
The investment views have been prepared in accordance with legal requirements designed to promote the independence of investment research.
Generic investment research – Risk information:
This publication is for your information only and is not intended as an offer, or a solicitation of an offer, to buy or sell any investment or other specific product. The analysis contained herein does not constitute a personal recommendation or take into account the particular investment objectives, investment strategies, financial situation and needs of any specific recipient. It is based on numerous assumptions. Different assumptions could result in materially different results. Certain services and products are subject to legal restrictions and cannot be offered worldwide on an unrestricted basis and/or may not be eligible for sale to all investors. All information and opinions expressed in this document were obtained from sources believed to be reliable and in good faith, but no representation or warranty, express or implied, is made as to its accuracy or completeness (other than disclosures relating to UBS). All information and opinions as well as any forecasts, estimates and market prices indicated are current as of the date of this report, and are subject to change without notice. Opinions expressed herein may differ or be contrary to those expressed by other business areas or divisions of UBS as a result of using different assumptions and/or criteria.
In no circumstances may this document or any of the information (including any forecast, value, index or other calculated amount ("Values")) be used for any of the following purposes (i) valuation or accounting purposes; (ii) to determine the amounts due or payable, the price or the value of any financial instrument or financial contract; or (iii) to measure the performance of any financial instrument including, without limitation, for the purpose of tracking the return or performance of any Value or of defining the asset allocation of portfolio or of computing performance fees. By receiving this document and the information you will be deemed to represent and warrant to UBS that you will not use this document or otherwise rely on any of the information for any of the above purposes. UBS and any of its directors or employees may be entitled at any time to hold long or short positions in investment instruments referred to herein, carry out transactions involving relevant investment instruments in the capacity of principal or agent, or provide any other services or have officers, who serve as directors, either to/for the issuer, the investment instrument itself or to/for any company commercially or financially affiliated to such issuers. At any time, investment decisions (including whether to buy, sell or hold securities) made by UBS and its employees may differ from or be contrary to the opinions expressed in UBS research publications. Some investments may not be readily realizable since the market in the securities is illiquid and therefore valuing the investment and identifying the risk to which you are exposed may be difficult to quantify. UBS relies on information barriers to control the flow of information contained in one or more areas within UBS, into other areas, units, divisions or affiliates of UBS. Futures and options trading is not suitable for every investor as there is a substantial risk of loss, and losses in excess of an initial investment may occur. Past performance of an investment is no guarantee for its future performance. Additional information will be made available upon request. Some investments may be subject to sudden and large falls in value and on realization you may receive back less than you invested or may be required to pay more. Changes in foreign exchange rates may have an adverse effect on the price, value or income of an investment. The analyst(s) responsible for the preparation of this report may interact with trading desk personnel, sales personnel and other constituencies for the purpose of gathering, synthesizing and interpreting market information.
Different areas, groups, and personnel within UBS Group may produce and distribute separate research products **independently of each other**. For example, research publications from **CIO** are produced by UBS Global Wealth Management. **UBS Global Research** is produced by UBS Investment Bank. **Research methodologies and rating systems of each separate research organization may differ**, for example, in terms of investment recommendations, investment horizon, model assumptions, and valuation methods. As a consequence, except for certain economic forecasts (for which UBS CIO and UBS Global Research may collaborate), investment recommendations, ratings, price targets, and valuations provided by each of the separate research organizations may be different, or inconsistent. You should refer to each relevant research product for the details as to their methodologies and rating system. Not all clients may have access to all products from every organization. Each research product is subject to the policies and procedures of the organization that produces it.
The compensation of the analyst(s) who prepared this report is determined exclusively by research management and senior management (not including investment banking). Analyst compensation is not based on investment banking, sales and trading or principal trading revenues, however, compensation may relate to the revenues of UBS Group as a whole, of which investment banking, sales and trading and principal trading are a part.
Tax treatment depends on the individual circumstances and may be subject to change in the future. UBS does not provide legal or tax advice and makes no representations as to the tax treatment of assets or the investment returns thereon both in general or with reference to specific client's circumstances and needs. We are of necessity unable to take into account the particular investment objectives, financial situation and needs of our individual clients and we would recommend that you take financial and/or tax advice as to the implications (including tax) of investing in any of the products mentioned herein.
This material may not be reproduced or copies circulated without prior authority of UBS. Unless otherwise agreed in writing UBS expressly prohibits the distribution and transfer of this material to third parties for any reason. UBS accepts no liability whatsoever for any claims or lawsuits from any third parties arising from the use or distribution of this material. This report is for distribution only under such circumstances as may be permitted by applicable law. For information on the ways in which CIO manages conflicts and maintains independence of its investment views and publication offering, and research and rating methodologies, please visit www.ubs.com/research-methodology. Additional information on the relevant authors of this publication and other CIO publication(s) referenced in this report; and copies of any past reports on this topic; are available upon request from your client advisor.
Important Information About Sustainable Investing Strategies: Sustainable investing strategies aim to consider and incorporate environmental, social and governance (ESG) factors into investment process and portfolio construction. Strategies across geographies approach ESG analysis and incorporate the findings in a variety of ways. Incorporating ESG factors or Sustainable Investing considerations may inhibit UBS's ability to participate in or to advise on certain investment opportunities that otherwise would be consistent with the Client's investment objectives. The returns on a portfolio incorporating ESG factors or Sustainable Investing considerations may be lower or higher than portfolios where ESG factors, exclusions, or other sustainability issues are not considered by UBS, and the investment opportunities available to such portfolios may differ.

External Asset Managers / External Financial Consultants: In case this research or publication is provided to an External Asset Manager or an External Financial Consultant, UBS expressly prohibits that it is redistributed by the External Asset Manager or the External Financial Consultant and is made available to their clients and/or third parties.
USA: This document is not intended for distribution into the US and / or to US persons.
For country information, please visit ubs.com/cio-country-disclaimer-gr or ask your client advisor for the full disclaimer.
Additional Disclaimer relevant to Credit Suisse Wealth Management
You receive this document in your capacity as a client of Credit Suisse Wealth Management. Your personal data will be processed in accordance with the Credit Suisse privacy statement accessible at your domicile through the official Credit Suisse website https://www.credit-suisse.com. In order to provide you with marketing materials concerning our products and services, UBS Group AG and its subsidiaries may process your basic personal data (i.e. contact details such as name, e-mail address) until you notify us that you no longer wish to receive them. You can optout from receiving these materials at any time by informing your Relationship Manager.
Except as otherwise specified herein and/or depending on the local Credit Suisse entity from which you are receiving this report, this report is distributed by Credit Suisse AG, authorised and regulated by the Swiss Financial Market Supervisory Authority (FINMA). Credit Suisse AG is a UBS Group company.
Version A/2024. CIO82652744