Investment Intelligence

Renewable Energy: A real-asset alternative for institutions seeking growth, yield, and low correlation

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Armin Sandhoevel, PhD
Chief Investment Officer
Infrastructure Equity

Martin Ewald
Head of Investment Strategy
Infrastructure Equity

Executive Summary

The high levels of liquidity seen in the financial markets since the 2008 crisis—propelled, among other factors, by the augmented role of central banks as large buyers of financial assets—has had many lasting impacts on asset prices and introduced new challenges to institutional investors, chief among them is the continued search for yield in a world of low interest rates and shifting long-standing asset correlations.

While there's no silver bullet to rid institutions from these challenges completely, we believe that infrastructure investing presents a unique mix of opportunities to help investors address today's issues. Specifically, investments in Renewable Energy Infrastructure (REI) offer strong long-term growth potential with low correlation to other asset classes, while also providing stable cash flows and meaningful dividend yields (due to the nature of the energy business, as well as its market dynamics). Additional benefits include Environmental, Social, and Governance (ESG) compliance.

Institutions will have ample opportunity to invest in REI assets, primarily as a result of the rapid growth of solar and wind energy in the United States. But as renewable energy infrastructure projects proliferate, institutions will have to sort through the opportunities and decide how (and how much) to allocate to the segment so as to generate the maximum positive impact on portfolios while still properly managing risk and volatility. Further, what should institutions look for when seeking an asset manager who can deliver on the true promise of this intricate asset class?

Key Takeaways

- The continued search for yield in a world of still low interest rates and shifting long-standing asset correlations presents challenges for institutions seeking to optimize portfolio returns.
- While no one option alone can free institutions from these challenges, we believe that infrastructure investing, especially in renewables, presents unique opportunities to help investors address today's issues.
- Driven by increased cost competitiveness and a sustainable shift in the U.S. energy mix, renewables can deliver strong growth potential, low correlations, stable cash flows, and ESG compliance.
- The complexity of this highly specialized sector, however, makes these benefits not easy to realize. In our view, both technical and financial expertise is needed to ensure cost-effective energy generation that can lead to positive financial outcomes.

We wrote this paper to help investors answer these questions.

We first provide an in-depth view of the market, dimensioning and quantifying the opportunity, as well as delving into the forces propelling investments into the sector. We also evaluate the impact of the geopolitical environment—especially under President Trump's administration in the United States—and its influence on growth trends for the industry. We then take a close look at the regulatory environment, and how it impacts investment and potential-return trends.

Additionally, we provide our views on how institutions should deploy potential investments into infrastructure. Due to the complexity of the asset class, we believe that investors will increase the odds of success by taking a strategic approach to infrastructure investing that is holistic in nature, but segmented in tactical implementation, especially in the renewable energy space.

We firmly believe that effective strategies in renewable energy stem from a combination of technical and financial management, with vertically integrated expertise working together to ensure sustainable, optimal, and cost-effective energy generation (through state-of-the-art technology and engineering know-how), as well as efficient financial management (through improved cash flows via efficient leveraging, hedging, and negotiation of contracts). Finally, investors should seek managers who can properly optimize the financing structure within the multitude of invested assets.

Expanding Opportunities for Investors

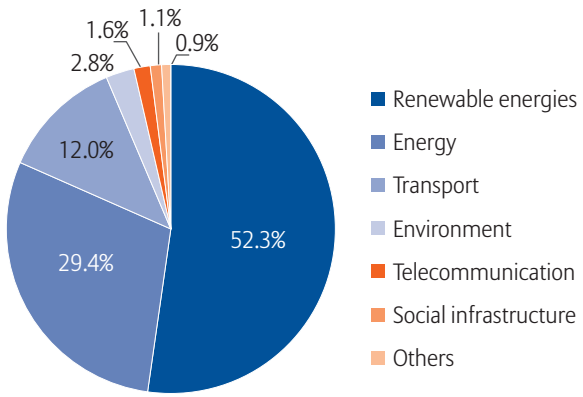
Infrastructure is attracting investments from institutions around the world at a record pace, and renewable energy is at the center of this activity.

Two factors are acting as the primary drivers of this global surge in infrastructure investment: 1) Institutions' need for higher yields from portfolio assets in an era of persistently low interest rates, and 2) The breakneck pace of growth in global infrastructure development—especially in renewables. We believe these trends will remain in place for the long run and that the infrastructure sector will continue to grow at a rapid pace, creating a steady stream of new opportunities for investors.

In 2016 alone, investors poured some $645 billion worldwide into infrastructure projects, with roughly $150 billion (or 23.2%) of that money flowing into infrastructure in the United States.[1] Specifically, renewable energy is dominating those flows. As shown in **Exhibit 1**, renewable projects made up more than half of all U.S. infrastructure-related projects that reached the financial closing stage from January 2011 to May 2017. Over that same period, non-renewable energy accounted for some 30% of U.S. infrastructure investments.

Exhibit 1: Renewables make up more than half of all U.S. energy projects

Infrastructure projects by sector (financial close between January 2011 and May 2017)



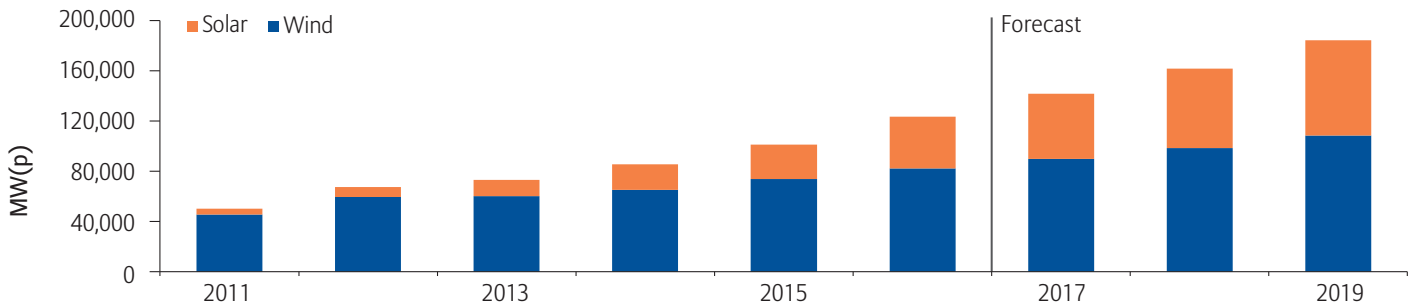
Source: InfraDeals USA

We expect this rapid growth to continue and perhaps even accelerate in coming years. Some 1,100 gigawatts of electricity capacity are currently installed in the U.S. Two thirds of this power comes from fossil fuels (42% from natural gas and 25% from coal), 9% from nuclear power, 7% from hydropower, 3.4% from oil, 1.4% from biomass/waste, and 0.2% from geothermal. Wind and solar power together amount to 12%. Aggregate future capacity additions are expected to increase by about 20 gigawatts annually from 2016 to 2019, with nearly all these gains coming from wind and solar.

As shown in **Exhibit 2**, solar is growing fastest, with U.S. capacity going from four gigawatts in 2011 to a cumulative 41-plus gigawatts in 2016. This growth is set to continue in the foreseeable future. Most of the solar expansion to date has taken place in California, with growth also occurring in Utah, Georgia, Nevada, and North Carolina.

Exhibit 2: U.S. solar and wind production is expanding at a rapid rate—with continued growth projected

Solar and wind capacity additions in the U.S. (cumulative)



Source: Bloomberg New Energy Finance, June 2017

[1] Prequin, Global Infrastructure Report, 2017

Growth rates are almost as impressive in the wind sector. A total of 17 gigawatts of wind power were installed in the United States from 2015 to 2016, with a focus on a few states like Texas. Another 36 gigawatts in wind capacity is planned to come online between 2017 and 2020. In 2016, the first offshore wind farm, Block Island, was hooked up to the grid. The 1.6 gigawatts in offshore wind projects in Massachusetts could serve as a catalyst for other coastal states to follow suit with offshore projects, with North Carolina, New Jersey, and New York already working on at least initial plans of an equivalent scale **(Exhibit 3)**. Provisional plans call for offshore investments of at least $8 billion by 2024.[2]

As illustrated in **Exhibit 4**, this fast growth of both solar and wind will cause a dramatic shift in the U.S. energy mix. While natural gas will retain its important role, more than 40% of U.S. power will be produced through wind and solar by 2040.

Drivers of Growth

One of the primary drivers of the rapid growth in wind and solar power is the increasing cost-competitiveness of these renewables (**Exhibit 5**, next page). Solar module prices have fallen by 90% since 2008 to just 40 cents per installed watt of capacity. Costs of lithium batteries—essential requirements for storing solar power—have fallen by 57% in the last five years and are projected to continue dropping.[3]

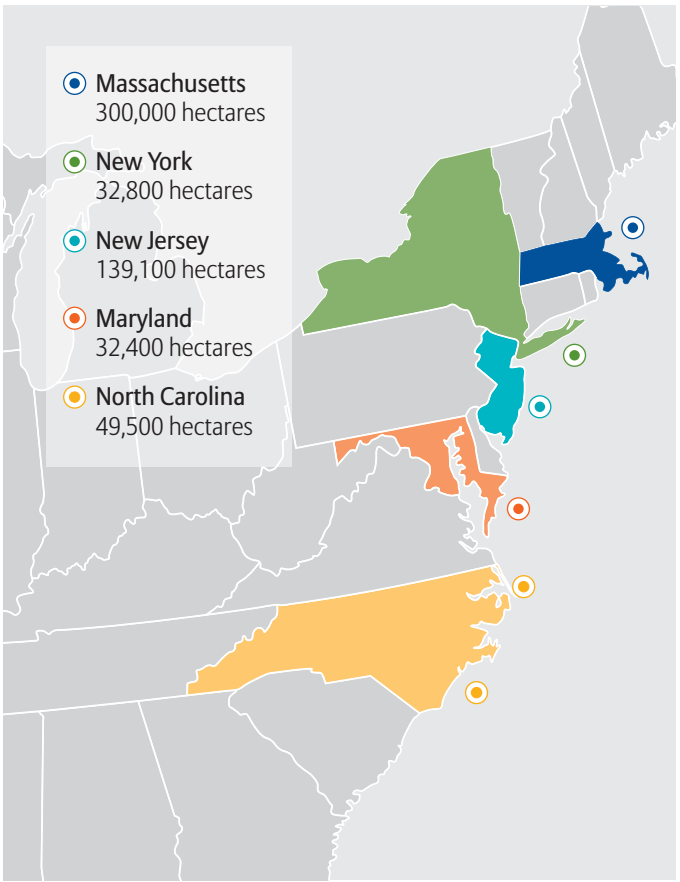
The trend is similar in costs for turbines and the windmill construction. At prime locations, wind production costs could reach parity with natural gas plants as early as 2020. Full parity between these two energy sources is projected by 2025. Solar is expected to reach full parity with natural gas by 2030.

Political Tailwinds Remain in Place

We firmly believe that government policy under President Trump will, on net, continue to act as a tailwind (as opposed to a headwind) for renewable power. Although President Trump's decision to withdraw from the Paris Climate Accords and to suspend the Clean Power Plan could slow the shift in U.S. energy mix toward solar, wind, and natural gas, these moves will not alter the underlying growth rate of renewables, in our view.

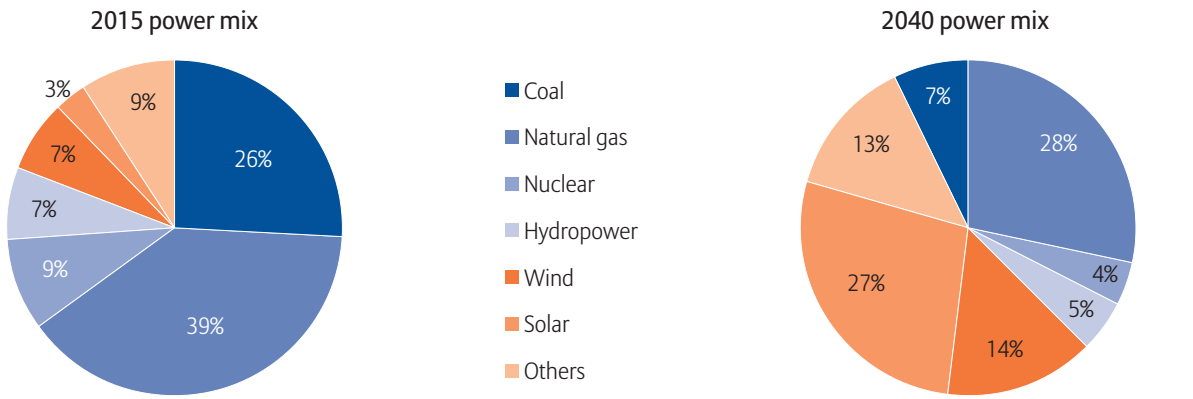
Exhibit 3: Northeast states lead U.S. with aggressive expansion plans for offshore wind power

Extension plans for offshore wind projects



Source: Bureau of Ocean Energy Management

Exhibit 4: The U.S. energy mix is changing rapidly, and wind and solar are on course to account for 40% of total power by 2040



Source: Bloomberg New Energy Finance, New Energy Outlook (2016, p.19)

[2] Bloomberg New Energy Finance, "U.S. offshore wind unlocked hours before deadline" (August 2016)

[3] E. Zindler, Bloomberg New Energy Finance (March 2017)

Exhibit 5: The price of solar and wind power has been falling since 2008, and is increasingly competitive with other energy sources

Purchase Power Agreements and purchase prices for renewable energies

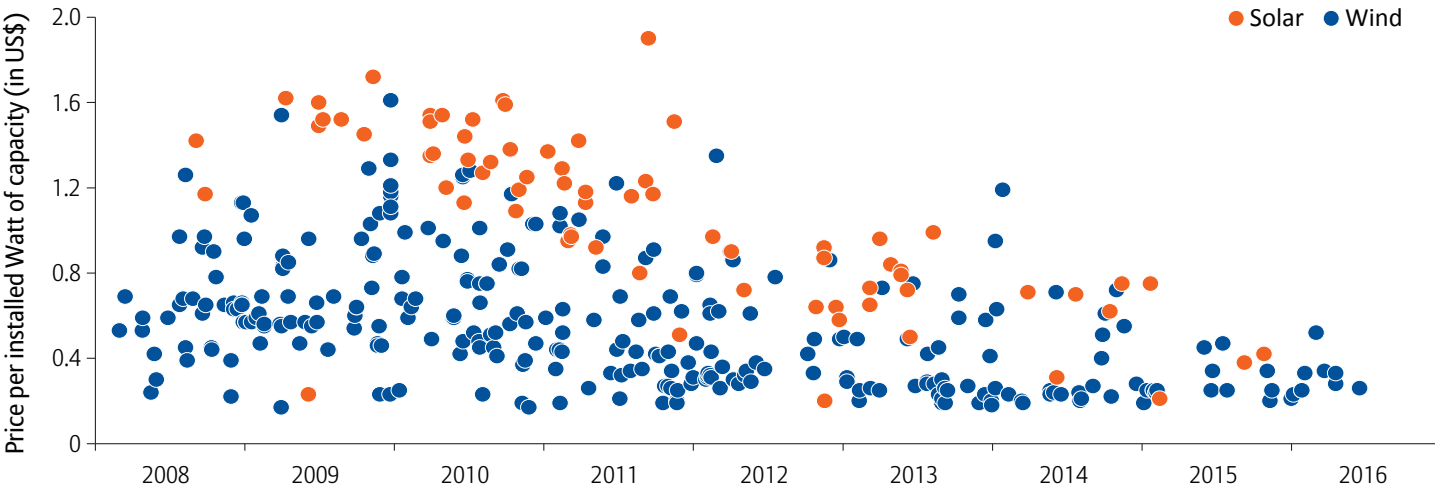


Chart shows pricing as of contract signing.
Source: Bloomberg New Energy Finance, PPA database as of March, 2017

Exhibit 6 (next page) projects how the energy mix will evolve through 2040. As the charts depict, renewables will continue to expand as a share of total U.S. energy production both with and without the Clean Power Plan.

The renewables growth trend will survive a U.S. pull-out from the Paris Climate Accords in part because many state incentives for solar and wind projects remain in place. A total of 29 states have established their own systems in support of construction of renewable energies. In addition to the oft-mentioned Texas and California, this includes states as geographically and politically diverse as Colorado, Pennsylvania, New Jersey, and Iowa.

Many of these states have set binding construction targets in the form of renewable energy quotas, backing these through various incentives, such as trading certificates. Ohio implemented and expanded such a system in 2016, with so-called renewable energy certificates (RECs), and Illinois and Michigan took similar measures. Massachusetts decided on a highly ambitious reduction plan, which it intends to meet through investments in renewable energies.[4]

We firmly believe that key U.S. states will maintain their independent support of renewables, regardless of the country's stance on the Paris Accords or its broader federal policy toward energy under President Trump. In fact, in the wake of President Trump's announcement that the U.S. would withdraw from the accords in early June 2017, 12 states (New York, Washington State, California, Connecticut, Delaware, Hawaii, Massachusetts, Minnesota, Oregon, Rhode Island, Vermont, Virginia, in addition to Puerto Rico) committed to uphold the Paris Accord by cutting their emissions 26% to 28% below 2005 levels in the next three years and to "meet or exceed" the targets of the Clean Power Plan.

Regulatory Outlook: Incentive Phase-Outs Create Window for Investors

As we look into the regulatory front, we believe that the scheduled phase-out of influential U.S. tax incentives could, paradoxically, trigger a near-term surge in institutional investment in renewables.

Federal support for renewables comes mainly through the system of Production Tax Credits (PTCs) in wind and Investment Tax Credits (ITCs) in solar. Simply put, the costs of building (ITC) or operating (PTC) the power plants are tax-deductible in the form of tax credits, subject to the condition that there must be a counterbalancing tax burden.

Under this tax system, renewables projects are mostly structured as co-investments between so-called tax-equity investors (i.e., investors that have a domestic tax burden and can therefore take advantage of the tax credits) and so-called sponsors, or cash-equity investors (i.e., investors unable to take advantage of tax credits as they lack a domestic tax burden or that for other reasons want to participate as sponsors in the co-investment).

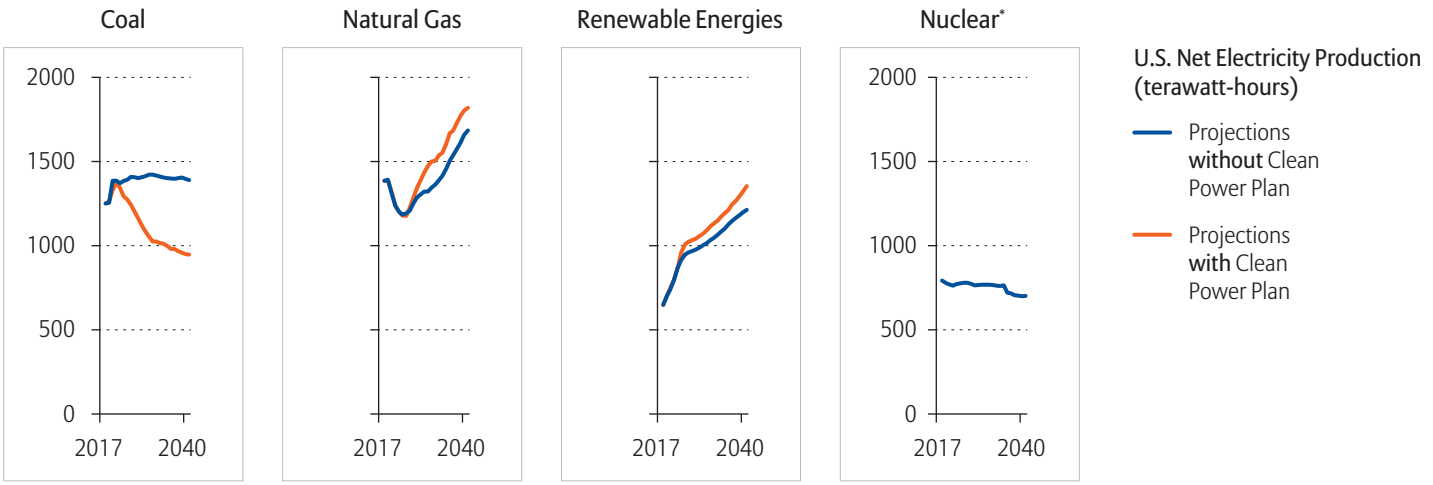
In this structure, tax benefits generally flow to tax-equity investors, while profits on the sale of electricity predominantly go to the cash-equity investors. The co-investment is usually scheduled over a period that allows the tax-equity investor to achieve their targeted return or until the tax credits run out. Typically, the tax-equity investor then exits the project leaving the sponsor alone with the project.

Under this structure, profits for tax-equity investors have been on par with those achieved by sponsors in recent years. These strong returns have attracted significant investment flows from institutions.

The ITC is currently scheduled to ramp down incrementally through 2021, and remain at 10 percent permanently beginning in 2022.

[4] Bloomberg New Energy Finance, "States lift renewable targets despite uncertain federal policy" (January 3, 2017)

Exhibit 6: The suspension of the Clean Power Plan will only marginally slow the growth of renewables



*Nuclear projections without the Clean Power Plan (CPP) are similar to those with the CPP.
Source: U.S. Energy Information Administration, as of June 2017

The Production Tax Credit is scheduled to phase out over the next few years, ending in 2020 (although PTC projects need to start construction before January 1, 2020 to fully qualify).

We see this phase-out creating a window of opportunity for investors, especially in wind power. In 2016, tax-equity investors invested $12.7 billion into the market—mainly in Texas for wind and in California for solar. These investors are expected to pour an additional $51.4 billion into the market by 2020.[5]

Benefits of Renewables on Institutional Portfolios

Investments in renewable energy infrastructure offer significant advantages to institutions, including strong expected growth rates, portfolio diversification derived from a low correlation with other investment assets, stable cash flows, potential protection from inflation, and compliance with Environmental, Social, and Governance (ESG) standards.

Attractive growth rates: We believe that renewable infrastructure assets stand to benefit dramatically over the coming decade from the solid expected rate of growth for the asset class (as described earlier in this paper), with a resulting beneficial impact on valuations.

Low Correlation to Other Portfolio Assets: Renewable energy infrastructure's low correlation of investment returns with other major asset classes can allow for attractive diversification and enhanced risk-adjusted returns. Simply put, what happens in equity and other financial markets has no impact on the sunshine or wind that drives most of the performance and returns in renewables. The addition of renewable energy investments diversifies an institutional portfolio, and can provide stability during highly volatile market phases (**Exhibit 7**, next page).

Stable Cash Flows: The structure of renewable energy infrastructure projects and the composition of a renewables portfolio are designed to deliver steady cash flows and potential robust dividend yields. This consistent result can be attributed to a combination of geographic and technologic diversification within the portfolio, and to the impact of the long-term Power Purchase Agreements (PPA) that underlie renewables projects. Power produced by portfolio companies is sold at a price determined by set formulas through PPAs lasting up to 15 to 20 years.

ESG Compliance: Investments in renewable energy infrastructure meet virtually all definitions of Environmental, Social, and Governance assets. Institutions have been increasingly focusing on avoiding exposure to non-ESG compliant investments due to continuous stakeholder pressure, but also their associated negative risks on potential returns. Given their positive effect on the local carbon footprint, the positive positioning in the social conscience as well as the compliance to local environmental governmental legislation, renewable energy infrastructure assets can deliver significant benefits to a portfolio as part of an institutional allocation to ESG.

How to Access Opportunities in Renewables: Vertical, Focused and Dedicated

Given this strong case for building an allocation to renewables and the growing opportunities for investors, the next question is: What is the best way for an institution to enter and participate in the sector?

We believe that investors looking to participate in this vibrant asset class will benefit from an investment approach focused exclusively on renewables, as opposed to strategies including renewables as part of a broader focus on infrastructure.

[5] Bloomberg New Energy Finance (Tax Equity Update 2017)

Exhibit 7: Investments in private infrastructure have shown low correlation to other major asset classes

	Private Infra-structure[1]	REITs US	Listed Private Equity	Commodities	Dow Jones Industrial	Global Equities	Global Infra-structure	Global Oil Companies	Global Government Bonds
Private Infrastructure[1]	1.00								
REITs US	0.64	1.00							
Listed Private Equity	0.52	0.84	1.00						
Commodities	0.50	0.44	0.49	1.00					
Dow Jones Industrial	0.46	0.82	0.84	0.46	1.00				
Global Equities	0.46	0.76	0.88	0.62	0.92	1.00			
Global Infrastructure	0.44	0.76	0.77	0.68	0.82	0.93	1.00		
Global Oil Companies	0.38	0.50	0.61	0.84	0.68	0.82	0.83	1.00	
Global Government Bonds	0.34	0.39	0.33	0.67	0.35	0.51	0.62	0.58	1.00

[1]For the sake of this exercise, we used the Preqin Infrastructure Quarterly Index as a proxy for the correlation of infrastructure investments and other widely used asset classes. Although the index includes investments in all categories of infrastructure, we believe that the correlations shown fairly represent the behavior of renewable assets against other asset classes. In fact, our experience working with many investors worldwide suggests that due to the more nascent characteristics of renewable energy companies, renewable assets could, in fact, show an even lower correlation to traditional assets classes.

Private Infrastructure: The Preqin Infrastructure Quarterly Index is calculated on a quarterly basis using data from Preqin's Infrastructure Online product. The models use quarterly cash flow transactions and NAVs reported for 200 individual unlisted infrastructure partnerships. These funds have raised aggregate capital worth over US$ 230 billion.

Real Estate Investment Trusts (REITs) US: FTSE NAREIT Equity REITs Total Return Index. This is a free float adjusted market cap-weighted index that includes all tax qualified REITs listed in NYSE, AMEX, and NASDAQ National Market. All REITs have more than 50% of total assets in qualifying real estate assets other than mortgages secured by real property.

Listed Private Equity Index Total Returns: The index is designed and calculated by LPX Group. It contains the largest private equity companies listed on global stock exchanges. The index composition is well diversified across listed private equity categories, styles, regions and duration.

BBG Commodity Index Total Return: The Bloomberg Commodity Total Return Index is composed of futures contracs and reflects the returns on a fully collateralized investment in the commodity. This combines the retruns of the index with the returns on a cash collateral invested in 3-month U.S. T-Bonds.

Dow Jones Industrial Average Total Return Index: The US market index tracks the total return of the member stocks of the DJI Index. Dividends are reinvested. The index is a price weighted average of 30 blue chip stocks that are generally the leaders in their industry.

MSCI World Total Return Index: The index is a free-float weighted equity index that includes developed markets. It takes into account net dividends reinvested minus tax credit calculations but substract withholding taxes retained at the source for foreigners who do not benefit from a double taxation treaty.

S&P Global Infrastrucutre Total Return Index: The index tracks 75 companies globally to represent the listed infrastructure industry while maintaining liquidity and tradability. The index includes clusters of energy, transportation and utilities.

S&P Global Oil Total Return Index: The index tracks the performance of 120 of the largest, publicly traded companies engaged in oil and gas exploration, extraction and production from around the world. Dividends are reinvested after the deduction of a withholding tax.

Bloomberg Barclays World Government Inflation Linked Bonds 1-10 years Maturity Total Return Index: The Index measures the performance of government obligations with remaining maturities of 1 to 10 years. Coupon payments and redemptions are reinvested.

Infrastructure deals and projects are immensely complicated. In such a complex asset class, we believe that value is created through expertise applied throughout the life of a project, from sourcing and due-diligence to executions and exit. However, deal structure, financing and a host of other variables differ widely from sector to sector within the asset class. In the U.S. renewable energy sector, the ability to assess and manage risks in the project development and construction phases should have a strong impact on potential risk-adjusted returns for investors.

As such, we believe that institutions have the best chance of achieving their investment goals by forgoing a generalist approach in favor of a specialized strategy focused entirely on generating attractive risk adjusted returns in renewable energy infrastructure by:

1. Identifying viable business, financing their construction, and operating them to ensure stable electricity production;
2. Monetizing that production by selling it via long-term Power Purchase Agreements, with the aim of producing steady cash flows and robust dividend yields; and
3. Establishing a diversified portfolio with a broad appeal to a wide range of potential buyers to ensure optimal potential capital-gain retention at the end of investment's life.

More specifically, dedicated renewable energy strategies create value for investors in several ways:

Extensive and Deep Relationships for Deal Sourcing: Renewable project developers seek partners prior to the start of construction and final PPA negotiations. As such, managers with existing relationships with developers will often receive the first calls and get the first chance to review new project deals. Because more U.S. projects are increasingly developed by European companies with long histories in renewables, sourcing and gaining access

to the best opportunities requires a presence on both sides of the Atlantic. The best positioned asset managers will have in place joint-development agreements or memorandums of understanding with developers that formally secure a right of first refusal on new projects.

Specialized Expertise for Effective Due Diligence: Conducting due diligence on renewable energy projects is a complex undertaking that requires expertise across technical, legal, and tax issues. On the technical side, fund managers must assess the quality of the equipment employed in the project and the developer's operations and maintenance plans and abilities. On the legal side, managers must evaluate specialized construction permissions and land securement. Finally, managers must identify tax payment requirements and determine the tax implications on transfer pricing. Only asset managers with deep experience in these projects and a full suite of capabilities spanning all of these disciplines will have the ability to identify the best opportunities and spot potential red flags in the due-diligence process.

Technical and Financial Skills for Active Asset Management: Returns on renewable energy infrastructure investments are to a large extent dependent on the asset manager's ability to add value though its management of the portfolio. Managers can add value with technical expertise by constantly and effectively monitoring the performance of service providers to increase quality and minimize costs, and by optimizing technological performance overall to ensure early detection of potential problems and enhance consistency of output. They can add value though financial management by improving cash-flow patterns, refinancing opportunistically, and otherwise optimizing the financing structure of the portfolio—at times by merging companies within the portfolio.

Access to Diverse Network of Buyers for Exit: The universe of potential buyers for U.S. renewable energy infrastructure projects includes Strategic, Opportunistic, and Cash-Flow-Focused (YieldCos/MLPs) acquirers. Securing optimal pricing on deals throughout the life of the fund requires asset managers to access potential buyers from all three groups. This is easier said than done, however. Tapping into the full mix of possible buyers requires not only broad relationships across the industry and financial community, but also the technical expertise needed to structure deals in a manner that is appealing and appropriate to these three distinct groups, each with different needs and requirements.

What's clear is that all of these value-creating functions require a high degree of specialized expertise that often will be beyond the reach of generalist investors and only be achieved by managers operating dedicated renewable energy infrastructure strategies.

Conclusion

The unique characteristics of renewable energy infrastructure (REI) make the asset class an intriguing option for investors seeking yield at a time of low interest rates and shifting long-standing asset correlations.

REI can deliver attractive risk-adjusted returns, low correlations to other portfolio assets and stable cash flows—all while simultaneously complying with ESG standards and contributing to the important societal goal of promoting sustainable energy and fighting climate change.

However, due to the complexity of this highly specialized sector, these benefits are not easy to realize. Investors will be best positioned to achieve their long-term objectives with a specialist REI strategy capable of creating value by applying expertise and leveraging relationships throughout the project development cycle and across the investment timeline.

About the Authors

Armin Sandhoevel, PhD

CIO Infrastructure Equity, Allianz Global Investors GmbH

Armin Sandhoevel joined Allianz Global Investors in 2012 as CIO Infrastructure Equity. In this function, he covers energy-related infrastructure topics and is responsible for the development of energy infrastructure and impact investment products for third party investors. His track record shows three successfully closed SICAV-SIF vehicles—with a cumulative capacity of more than 700MW—of which two are already fully invested in energy assets located throughout Europe. Together with his dedicated team, he is responsible for more than one billion euros in assets under management.

Before Armin joined Allianz Global Investors, he founded Allianz Climate Solutions in 2007—the global competence center of the Allianz Group with respect to climate as well as cleantech matters—and acted as its CEO for seven consecutive years. Until today, he serves as a member of the Board of Administration. For Allianz, he set up a carbon-related portfolio investing in emerging markets that his team is managing to date.

Previously, he had been Head of Carbon Risk and had led the risk management of renewable energy at Dresdner Bank AG.

Until today, Armin has gained more than two decades of specific expertise in investment management, emissions trading and renewable energy financing. He advises national and international institutions. He is also Counsellor of the German Chapter of the Prince Albert II of Monaco Foundation.

Martin Ewald

Head of Investment Strategy Infrastructure Equity

Martin Ewald heads the Investment Strategy Team in the Infrastructure Equity department of Allianz Global Investors and is located in London.

Martin joined the Infrastructure Equity team of AllianzGI in 2012 as co-head of portfolio management covering renewable energies in Munich. Since 2013, he has been head of investment strategy shaping the strategic direction of the team via the development and implementation of new investment vehicles. In 2015 he was based in the Singapore office of AllianzGI.

Prior to that, Martin worked for Allianz SE as a co-head of the investment team of Allianz Climate Solutions and led investments in the area of renewable energy and carbon worldwide.

Martin holds a seat at the board of the Allianz Renewable Energy Fund II and the Capviva Allianz Renewable Fund. He is Co-Chair of the Infrastructure Advisory Committee of the Principles for Responsible Investment (PRI) and is a working group member of ISO 14007/14008 establishing standards for the monetary valuation of environmental impacts.

Before joining the Allianz Group in 2007, Martin worked at IBM as a business consultant for investment banking and financial markets.

Martin holds a Master's degree with merit in International Management from the University of Exeter and a Master's degree with merit in Business Administration (Diplom-Kaufmann) from the University of Mannheim. He is an external PhD candidate in Environmental Management and Accounting at the Technical University of Dresden.

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