The Mainstreaming of Renewable Energy Infrastructure Investing: Risks, Returns and Emerging Sectors

- Dr. Chris Wedding, CEO, IronOak Energy

When I first assessed the financial merits of a large solar infrastructure project in 2004, the results were not impressive, even though the $75mn investment would have generated glowing headlines for our LPs.

Oh, how times have changed.

In 2015, renewable energy investments in the power sector were 30% greater than investments in all other forms of conventional power combined (BNEF, 2016).

Moreover, investment analysts project that solar power will be cheaper than conventional electricity in roughly 70% of the world's countries by next year (Deutsche Bank, 2015). Even today, solar and wind power are often chosen by utilities as the cheapest form of new electric generation capacity.

As a result of the economic attractiveness of renewable energy, its annual electricity production is expected to grow over 600% between 2016 and 2040. During that same period, hydropower, coal and natural gas power production are projected to grow roughly 27%, 11% and 0% respectively (BNEF, 2016).

What is Causing This Growth?

First, let's be clear: capital allocation to this sector is not about sacrificing market-based returns in favour of lofty environmental or social missions.

Instead, investors run the gamut from niche private equity firms to the biggest banks in the world. As examples, Goldman Sachs, Citi and Bank of America have made public commitments to invest $350bn in renewable energy by 2025.

The key drivers include the following:

1. Falling costs of capital to finance renewable energy infrastructure.
2. Falling costs of renewable energy components and projects.
3. Increasing national renewable energy targets, policies and incentives.
4. Changing public sentiment.

Falling Costs of Capital

When I began investing in solar power infrastructure, unlevered IRR expectations were in the teens for projects in the US. However, today average unlevered IRRs range from 6% to 10% in the US, with greater upside potential in smaller projects or those in emerging economies. This is largely attributed to investors becoming more comfortable with renewable energy technologies, warranties and company balance sheets.

Falling Costs of Renewable Energy Components and Projects

Despite frequent quips that renewable power is still "too expensive," the levelized cost of electricity (LCOE) for solar and wind is often the lowest among all new electricity sources. When subsidies are also factored in, the LCOE are even lower. This data is a reflection of capital and operating expenses today, not in some distant future.

For example, consider that the costs for solar panels and wind turbines have fallen by 80% and 35% respectively, since 2009 (IRENA, 2016). In terms of LCOE, the range for medium and large solar projects and wind projects contracted today are $30-86 per megawatt-hour, compared with natural gas- and coal-fired power plants at $61-151 per megawatt-hour (Lazard, 2016; PV-Tech, 2016; CleanTechnica, 2016).

Increasing National Renewable Cleantechnia Targets, Policies and Incentives

The number of country-level renewable energy targets is up roughly four-fold from 43 countries in 2005 to 164 countries in 2015. Interestingly, developing countries account for 80% of these targets (IRENA, 2015).

For more information, the International Energy Agency maintains an interactive database of renewable energy policies around the world.

Changing Public Sentiment

Typically, the growth in renewable policies is a function of rising public interest in the benefits of this sector.

As of 2012, over 85% of consumers around the world prefer to see more renewable energy on the grid (BNEF, Vestas, 2012). As for motivations, 87% of US citizens view renewable energy as important to the future of the country; 82% focus on electricity cost savings and 34% care about its environmental benefits (SolarCity, CleanEdge, NASDAQ, 2015).

Misperceptions about Risk and Return

Despite the mainstreaming of this sector, when I speak at investor conferences and talk with potential new investors, I am surprised by the persistent negative perspectives about renewable energy.

I believe this is due to the disproportionate influence of three factors:

1. Subversive, yet isolated, retroactive renewable energy policy changes (example: retroactive cuts to feed-in tariffs in Spain and Italy).

2. Poor venture capital returns in the late 2000s (example: bankruptcies by solar panel makers such as Solyndra).

3. Leading proponents are often environmental groups (example: investors respond differently to data from Greenpeace than if produced by the financial industry).

As for policy concerns, very few sectors are immune to regulatory risks. Some renewable energy policies have been stable (e.g. state tax credits, accelerated depreciation benefits) and others have struggled with predictability (e.g. US Production Tax Credit for wind projects). Perhaps more importantly, renewable energy investments are largely immune to many significant risks present in conventional energy industries, such as those posed by geopolitics and commodity markets.

As for the worries regarding risk versus return, recent investment industry data highlights a very different story than the outdated, negative headlines stemming from cleantech venture capital investments years ago. High-risk, early stage venture investments are a tiny portion of overall renewable energy investments, making up just $6bn of the total $445bn invested globally in 2015. The majority of that capital (approximately 70%) was allocated to lower risk renewable energy infrastructure.

Attractive Risk-Adjusted Returns in Renewable Energy Infrastructure

As is well known, most infrastructure funds offer limited downside risks with predictable returns over a long period of time, with below-average correlation to broader financial markets.

Fig. 1 illustrates how the aggregate net IRR for infrastructure funds (orange line) compares to five other asset classes: less variability and above-average net IRRs for the aggregated fund performance shown.

In addition, Preqin performance data indexed to 2007 show that the growth of the infrastructure asset class has been more attractive than distressed private equity, real estate, venture capital, buyout, fund of funds and the S&P 500.

While renewable energy investments do not constitute the entirety of the infrastructure category, their fraction of all infrastructure investments has grown two-fold in the last 10 years, from 19% in 2006 to 28% in 2015, and accounted for 54% in Q3 2016.

Accordingly, I would suggest that the risk/return profile of the broader infrastructure sector is a respectable proxy of the appeal of the renewable energy sector as well.

As a further indication of the attractive risk/return profile of renewable energy, it is worth highlighting that its fraction of all energy infrastructure investments has increased, from 59% in 2006 to 73% in 2015. One reason for this movement away from conventional energy is due to its underperformance compared with private equity since 2012. Note that oil & gas investments constitute approximately 63% of Preqin's natural resources category.

Emerging Trends in Renewable Energy Infrastructure Investing

Most infrastructure investors that are comfortable with this sector only place capital in large solar and wind projects.

In mature markets, this creates increasing competition for projects and is partly to blame for yield compression.

As a response, an increasing number of GPs are looking at new ways to raise and place capital with different investment strategies within the renewable energy sector. Here are three areas worth consideration, starting with the most obvious:

1. Developing Nations Present Greater Relative Opportunities

The EU was the early leader for renewable energy investments. Today, the US and China lead the world, but increased competition has dampened IRR expectations.

In contrast, developing countries are attracting greater investor interest due to the potential to achieve higher absolute financial returns and place more capital with less competition among investors (Fig. 2).

Because of these factors, in addition to higher GDP and energy demand growth, renewable energy investment in the developing world exceeded capital allocation in the developed world for the first time in 2015 (EY, 2016).

Considerations for investors:

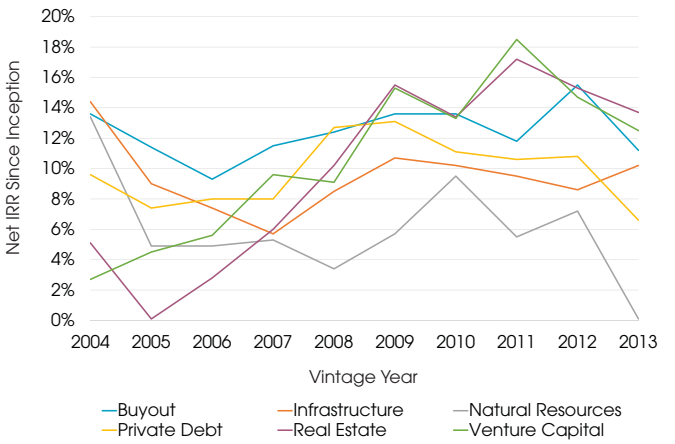
- Political, economic and currency risk: investing in less mature markets carries additional risks, yet too often these receive insufficient attention from confident investors. Insurance products from organizations such as the Overseas Private Investment Corporation (OPIC) can hedge against some of these risks.
- Markets are idiosyncratic and local knowledge is key: the unspoken rules of doing business are sometimes as important as what is written in regulations. Investing in developing countries requires experienced partners with trusted local relationships and intimate understanding of the cultural aspects of closing deals.

2. Smaller Solar Projects Offer Aggregation and Higher Return Potential

Growth in the global solar market has been surprising to most international energy agencies and conventional energy giants. Consider that global annual solar installations have grown from 1 MW in 2005 to approximately 73 MW this year, with 105 MW projected in 2021 (GTM, 2016).

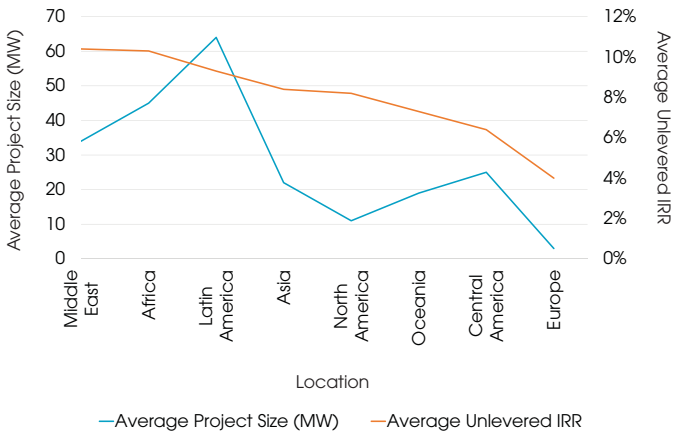
This market expansion has been dominated by large utility scale projects.

Fig. 1: Median Net IRRs by Strategy and Vintage Year



Source: Preqin Infrastructure Online

Fig. 2: Solar Project Size and Unlevered IRR by Location



Source: Mercatus, 2016

In the US, the residential market has also scaled rapidly, with more than one million homes equipped with solar. However, the commercial solar market in the US and some other markets has experienced relatively little expansion, largely due to higher transaction costs and challenges in underwriting credit.

Efforts are underway by many investors to standardize contracts, create unique channels for larger pipelines of similar projects and implement software solutions to reduce diligence and closing costs. As an example, we are currently using these three strategies with our investment partners to facilitate better access, stronger returns and greater scale in the smaller, distributed solar sector.

Considerations for investors:

- Underwriting credit risk for non-rated offtakers: many commercial offtakers do not have an official credit rating and success in efficiently assessing these counterparty risks has been limited. Innovative approaches to evaluating credit risk at scale is critical to lowering transaction costs and acquiring customers.

- Solar on polluted real estate: other niche solar strategies are still underutilized. One such combination is the location of smaller utility scale solar projects on real estate, where actual or perceived environmental contamination has prevented its redevelopment. In the US alone, there are 500,000 such sites. We have co-managed the investment in two solar-on-landfill projects, where stakeholders benefitted from new property taxes, new lease payments and electricity cost savings.

3. Energy Storage Becomes the New High-Growth Sector

Today, hype is greater than reality when it comes to battery installations. However, that is changing.

Despite more than 70 different battery chemistries in the lab or in the field, there is far less actual technology risk than many perceive. As an illustration, consider that 96% of batteries installed in the US in 2015 were based on lithium-ion chemistries (GTM, 2016).

With battery costs expected to fall 40-50% between 2015 and 2020, market analysts project that battery installations will undergo a 25x growth from today to 2028, with a market valued at $250bn (Lazard, 2016; BNEF, 2016).

As a sign of what is coming, this year we played a key role in one of the largest commitments to third-party battery financing to date: more than $100mn in a large energy storage portfolio committed to a leading global investor.

While costs receive the majority of the attention in determining the financial merits of investments in energy storage, the other side of the equation is value.

Today, nearly all battery installations monetize just one of their 13 potential benefits (RMI, 2015). These isolated revenue streams may come from peak shaving power in order to reduce electricity demand charges, or receiving payments by utilities for frequency regulation services. However, estimates suggest that using batteries in this simplified manner only takes advantage of 1-50% of their useful capacity (RMI, 2015).

Considerations for investors:

- Risk factors: technology risks are overstated for more established technology, such as lithium-ion; however, the same cannot be said about risks in more marginal battery chemistries. Moreover, outdated policies still present barriers to battery market expansion. Early investors may be rewarded over the investment hold period by more favourable regulations which are likely to permit additional revenue streams. To mitigate risk and entice investment, we are seeing creative deal structures such as quasi-debt instruments structured with parent guarantees, cross collateralization and equity kickers.

- Siting with or without renewable energy: most batteries today are not co-located with renewable energy systems. This is likely to change for behind-the-meter systems, which are seeing greater integration facilitated by smarter software. But larger utility batteries are likely to remain separate from solar and wind installations while providing a variety of services to the broader grid, such as deferring multi-billion-dollar transmission system upgrades.

Conclusion

For decades, renewable energy has been relegated to a tiny niche viewed as expensive and irrelevant. Those days are over. Yet most investors are still looking backward, not forward. Many do not see the dramatic changes in the global energy mix accelerating right now.

If the goals agreed upon by nearly 200 countries in last year's Paris Climate Agreement become reality, the world will need to invest roughly $1tn per year between now and 2030 (IEA, 2015). This amount is almost three times as large as today's annual renewable energy investment. Even if those goals are only partially met, the need for private capital is expected to be a multiple of today's capital allocation to the sector.

Going forward, there exists an historic opportunity for investors to place large volumes of capital in renewable energy infrastructure projects with limited downside and respectable net IRRs.

As the author William Gibson has noted, "The future is already here – it's just not very evenly distributed."

IronOak Energy:

IronOak Energy is a renewable energy investment advisory and research firm. Headquartered in the US, IronOak helps investors place capital in the solar, energy storage and electric vehicle sectors via deal origination, diligence and market analysis.

Dr. Chris Wedding is the CEO and Founder of IronOak Energy. He has over 15 years of experience in private equity, entrepreneurship, clean energy, real estate and executive education. On the side, he is a faculty member at Duke University and the University of North Carolina at Chapel Hill. He brings a global perspective, with experience in 19 countries and language abilities in Spanish and Japanese. Dr. Wedding earned an MS and PhD from the University of North Carolina at Chapel Hill where he studied environmental management, business strategy and city planning.

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