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Beyond YieldCos

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About CPI

Climate Policy Initiative is a team of analysts and advisors that works to improve the most important energy and land use policies around the world, with a particular focus on finance. An independent organization supported in part by a grant from the Open Society Foundations, CPI works in places that provide the most potential for policy impact including Brazil, China, Europe, India, Indonesia, and the United States.

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Executive Summary

US-based YieldCos raised equity worth \$23 billion dollars by mid-2015, only to see their share prices fall by as much as 60% just a few months later. The rise and fall of new investment ideas nearly always provides valuable lessons, and the US YieldCos are no exception.

The creators or sponsors of YieldCos looked to a world in which financial markets were craving investments that delivered a high-yield — that is, high annual dividends relative to historically low yields for treasuries and other fixed-income investments — at relatively low risk. Recognizing that their portfolios of contracted renewable energy assets with strong cash flows and low risk provided the perfect match to yield-seeking investors, developers and independent power producers created new corporate vehicles to be sold and traded on stock market exchanges.

The creators of the YieldCos had an interesting and persuasive story. With stock market listings and portfolios of projects, YieldCos overcame three important barriers that prevented many yield-seeking investors from investing directly in renewable energy projects:

1. The high transaction costs of buying large-scale, physical assets;
2. The illiquidity, or difficulty of selling these assets if the need arises; and,
3. The concentration of risks that comes from buying single investments that are large compared to an investor's overall portfolio.

Before the development of YieldCos, only the largest institutional investors could afford to buy large-scale renewable energy assets. YieldCos opened these high-yield investments to all investors, even at the retail level. Overcoming these three barriers and attracting new sources of capital can add as much as 20% to the value of the underlying assets.

YieldCo sponsors saw further opportunities. Many institutional investors want rising dividends and cash flows to meet future liabilities that rise over time. Sponsors had large pipelines of renewable energy projects under development. By committing these future projects to the YieldCo, they could add growth to the high-yield mix. On initial offering, an average of 45% of the value of the US YieldCos was based on the growth

potential from projects yet to be incorporated into the YieldCos.

At the same time, sponsors created strategic benefits for themselves. The YieldCo guaranteed at least one potential buyer for their projects in the future, thus reducing their risk of future asset sales. They used the YieldCo to develop additional revenue streams. Revenues raised from the sale of a minority share in the YieldCo allowed them to recycle cash they had invested in early projects and invest in new projects to accelerate growth, while the higher value of their share of the YieldCo increased the share price of the sponsor. And they could do this while maintaining control of the assets.

But in pursuing all of the additional strategic and growth benefits, YieldCo creators added risk back to the story. Project development is much riskier than owning operating assets. By including future growth through an undeveloped portfolio in their value proposition, YieldCos were no longer the low-risk, high-yield investment vehicles that investors sought. Even as risks increased, the initial reaction to expectations of growth pushed near-term yields down, to as low as 2-3%.

Arguably, early yields were so low because the market did not yet understand how risky the growth itself was. If projects were delayed, growth would slow. If interest rates rose, the value of future projects would fall, stunting growth. If management invested in bad projects, returns and growth would suffer. If the YieldCo could not raise more capital, growth would fall. Most importantly, if the cost of capital for the YieldCo rose, the difference between the market price for the new asset and the value of the new asset to the YieldCo would fall. That is, growth was based on the premise that the assets were worth more to the YieldCo than the market because the cost of capital for the YieldCo was lower.

Initially the market observed the low 2-3% yields of the YieldCos and surmised that the cost of capital was, indeed, low. However, with signs of failing growth in the related Master Limited Partnership (MLP) market,¹ and

1 Master Limited Partnerships (MLPs) are a tax-advantaged corporate form available to fossil energy companies, and utilized extensively to finance and own fossil energy infrastructure, like oil and gas pipelines. YieldCo business models have been patterned after these business models, but without the benefit of their tax advantages. The Alerian MLP index has fallen by nearly 50% from its peak in September of 2014.

the prospect of rising interest rates, many investors began to reassess this view. If growth failed, they observed, the implicit cost of capital would rise. If the cost of capital rose, growth would fall further, raising the cost of capital, and so on. Any disappointment would start a vicious cycle that could drive valuations down to the level of the operating assets in the portfolio. That is, a YieldCo with no growth.

Our analysis shows that growth raised the implicit unlevered cost of equity by nearly 200 basis points, from 4% to 6%. The assets underlying a YieldCo are especially valuable because the cash flows are essentially uncorrelated to the stock market, that is, an investor can reduce their exposure to stock markets by investing in these assets. By creating a portfolio with growth that is implicitly related to market conditions and interest rates, YieldCos added back market correlation. Our analysis indicates a correlation of approximately 40% for a typical YieldCo without any debt. Many YieldCos also had debt, so the correlation was much higher. In general, investors require higher yields or returns to overcome market correlation, also known as Beta. We believe that at initial offering, many investors failed to account for this difference in risk and cost of capital, leading to the initial rise and ultimate decline when risks were understood.

The fall of the YieldCo has left a bad taste in the mouths of many investors. However, the decline of the growth-focused YieldCos should not obscure the original observation that operating and contracted renewable energy assets are an ideal fit for yield-seeking investors, and that making this match could provide tremendous

value to investors and project developers alike. Eventually, making this match could even create policy advantages by reducing the cost of renewable energy to consumers and the economy.

Accessing the lower-cost finance for renewable energy means taking what was good from the original story, while avoiding the added risk. The key is to develop a new style of YieldCo, or a Clean Energy Investment Trust (CEIT), tailored to the needs of yield hungry investors, offering high yields without the expectations and risks of growth.² Such a CEIT would consist of a closed set of assets, with low operating costs and management fees, paying out nearly all of the cash flows, rather than retaining some of those flows to invest in growth. A CEIT sponsor seeking growth would need to issue CEITs every year or two with a new, closed-end, portfolio of assets. While some of the strategic value would be lost, the proper allocation of risks to the sponsor and the investors would ultimately lead to a lower cost of capital and a sustainable business model.

Examples closer to that model exist in the UK, where YieldCos with modest inflation rate growth assumptions have been successfully floated. These lower-growth UK YieldCos have not experienced the boom-and-bust cycle that US YieldCos have endured.

The lessons learned from the evolution of the US YieldCo market are stark, but from the hard lessons about the risk of growth emerges the underlying truth that there are new finance vehicles for renewable energy that can provide value to investors, developers, and policy makers.

² Note that a legislative proposal for the establishment of another vehicle also called a CEIT has been proposed by NRDC for clean energy investments. Our proposal does not rely on the passage of such a legislative proposal.

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1. Introduction

The last three years have witnessed an explosion in activity in new renewable energy business models and financing vehicles. Perhaps the most spectacular has been the rapid emergence — and precipitous decline — of the YieldCo, and more specifically, growth-focused YieldCos designed for the US market.

The US YieldCos took three characteristics of US financial markets and renewable energy projects and created a new, innovative financial structure to address all three, namely:

1. Important segments of US financial markets look for liquid, publicly traded, low-risk, bond- or fixed income-like investments but with higher annual dividend payouts, or yields.³
2. Renewable energy projects with long-term, fixed-price contracts for their output provide relatively low-risk, long-term cash flows that match well with the requirements of fixed income investors and compare favorably with high-yield fixed-income instruments such as sub-investment-grade corporate bonds.⁴
3. Developers and utilities had created large pipelines of current and future renewable energy assets whose value would be enhanced by including them in a YieldCo-type finance vehicle.

Developing a market for publicly traded YieldCos was relatively straightforward as it could be patterned after the Master Limited Partnerships (MLPs) used to finance infrastructure investments in the mid-stream oil and gas sector in the US and Canada. MLPs are equity instruments that promise investors a modest — but rapidly growing — cash yield derived from long-term ownership and operation of growing portfolios of low-risk, cash-generating assets.

Initially, applying the growth element of MLPs to YieldCos was attractive both to investors seeking growing yields and sponsors seeking a reliable buyer to enhance the value of future assets. Unfortunately, by designing the YieldCos around this growth, sponsors included risks around new project additions that sacrificed the low-risk, fixed income characteristics that underpinned the YieldCo concept in the first place. Through mid-2015, new US YieldCos had successfully raised equity worth over \$23 billion with yields as low as 2-3%, roughly enough low-cost capital to cover a quarter of US renewable financing needs over the previous two and a half year period.⁵ But through the second half of 2015, YieldCo valuations dropped precipitously and investor appetite for new issuances from either new or existing YieldCos largely disappeared.

In this report, we analyze the rise and fall of the US model of a growth-focused YieldCo (US YieldCo) with a view towards creating successor instruments that can overcome its shortcomings to sustainably deliver low-cost capital that can drive large-scale renewable energy deployment in the long-term. We show, in particular, that the difficulties with the YieldCo model can be traced to its focus on growth — a symptom of its genesis as an instrument designed by financial intermediaries (such as investment banks or fund managers) to address the objectives of its developer or independent power producer sponsors. Our analysis is based both on the recent financial performance of existing US YieldCos as well as quantitative, pro-forma financial modeling and valuation of a representative, simplified YieldCo business model.⁶

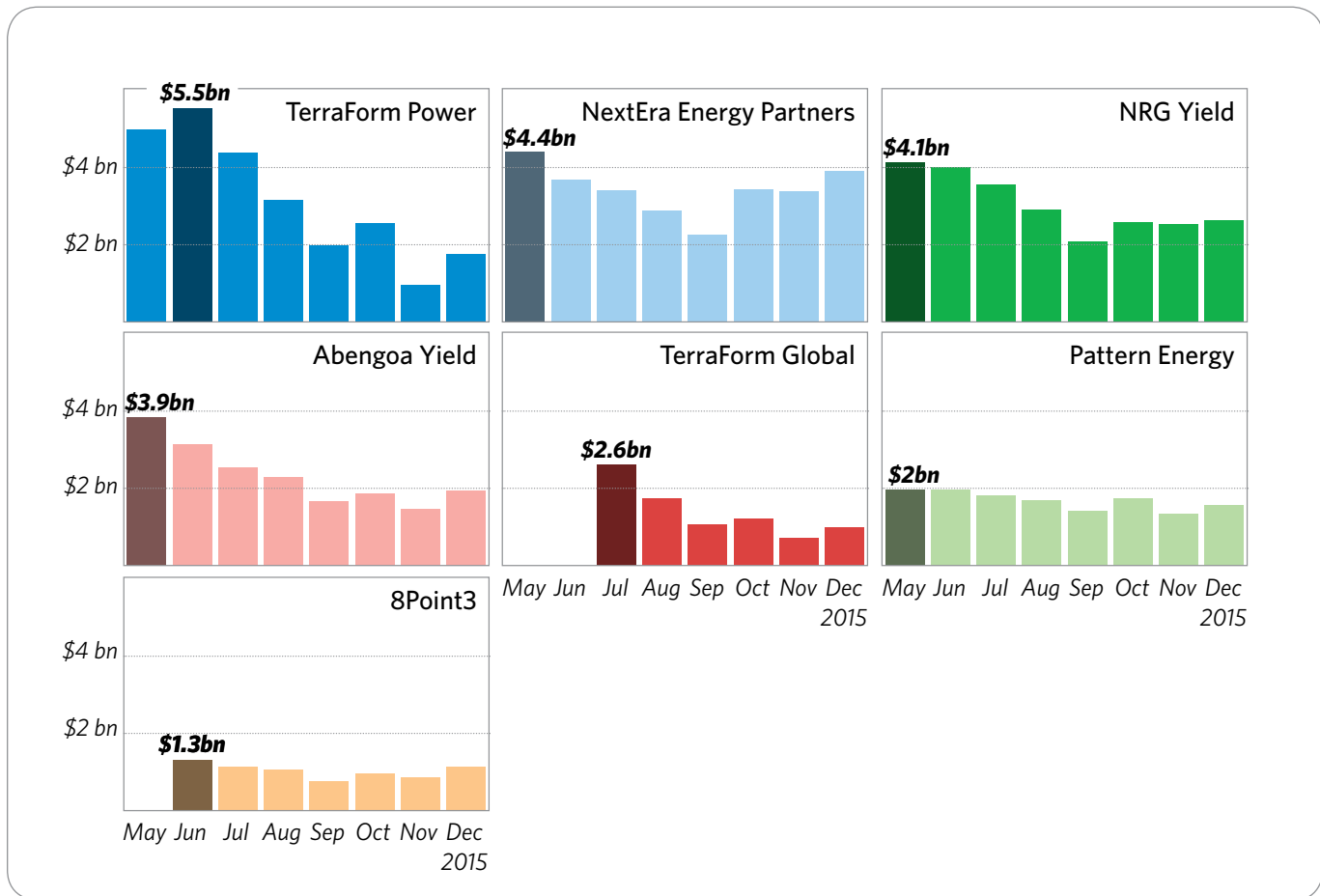
3 The “yield” of shares in a company — often expressed in percentage terms — is the annual expected dividend divided by the market price for the shares. Thus, a YieldCo is a company designed specifically to offer relatively high and steady dividends.

4 These physical assets can provide investors access to stable cash flows that provide the higher yields of sub-investment-grade corporate bonds but without the attendant management risks, lack of transparency, and reduced systematic risk. See Box 1 in Section 2 below for a more detailed discussion of the cash flow profile and risks of a portfolio of contracted renewable projects, and Section 4.1 for a more detailed discussion of why these assets can be considered bond-like in nature.

5 Total new investment in clean energy in the US is based on the quarterly amounts reported in Bloomberg New Energy Finance’s October 2015 “Global Trends in Clean Energy Investment.”

6 See the companion technical note CPI (June, 2016), “How do YieldCos and MLPs Work? A CPI Model,” for a detailed description of the pro-forma YieldCo model and a longer list of relevant references.

Figure 1 – Peak market valuation of the seven US listed YieldCos, mid-2015 and their subsequent performance through the end of 2015



Note that Abengoa Yield changed its name to Atlantica Yield in January 2016.

2. Matching renewable energy cash flows and risks to the appropriate investors

The key to developing better finance and business models for renewable energy is to match the investment profiles of projects with investors with compatible investment needs and risk tolerances. Investments in renewable energy projects, with low-risk profiles and long-term and stable cash flows, are a good match for certain types of investors, particularly institutional investors.

Institutional investors — pension funds and life insurance companies — seek low-risk investments with long-term and predictable cash flows that can offset against their long-term liabilities (pensions and insurance policies that need to be paid well into the future). A previous CPI study, [The Challenge of Institutional Investment in Renewable Energy](#) (CPI, 2013), examined the potential of institutional investment in renewable energy, as well as the barriers to investment and the policy solutions which can address these barriers.

Institutional investors — and investors in general — tend to group assets into two main categories: liability-hedging investments and return-seeking investments.

Liability-hedging investments provide relatively certain cash flows that help ensure that the investor can meet future obligations. For example, a life insurance company providing annuities to its customers will know with reasonable certainty how much it needs to pay out in 2020 or 2025. The insurance company then must be certain that either dividends or the original capital invested in the asset will be available to meet its obligations to policy holders. While investment in government treasuries with a matching maturity could provide almost absolute certainty, investors may seek to improve returns by taking a portion of the portfolio and investing in infrastructure or corporate bonds that also provide low-risk, predictable cash flows.

When an investor has enough liability-hedging assets to cover future liabilities,⁷ the investor may seek to enhance returns, and increase the profitability of the company while offering more competitive pension or insurance products, by investing in riskier, return-seeking investments.

Renewable energy projects with solid long-term fixed-price contracts can provide cash flows that are similar to investment-grade corporate bonds in both risk and cash flow profile (see Box 1 below for a more detailed description of the infrastructure-like characteristics of renewable assets, and Section 4.1 for a more detailed discussion of how the risks and cash flows of a portfolio of such assets are similar to investment-grade bonds).

However, there are three important differences between corporate bonds and direct investment in contracted renewable energy assets:

1. **Transactions costs:** Investing in real assets like wind farms require specialist investor capabilities. Generally, an investor must assemble and maintain a team with direct investment capability. For each individual project the transaction costs can eat into the return, unless these costs are spread over a relatively large direct investment portfolio. Only the largest institutional investors will have the investment needs and sophistication to justify a significant direct investment portfolio.⁸
2. **Liquidity:** Direct ownership of real assets can be difficult to sell if an unexpected need for cash occurs. Not only will the sale entail another set of transaction costs for valuation, legal, contracting, etc., but also finding a buyer and completing the transaction may take time and internal resources that the investor may not have in times of crisis. While an investor in illiquid assets may match the cash flows to specific liabilities with no intention to sell the project before the end of its life, the illiquidity places limitations and enhances risks. As a result, illiquid assets generally are priced at a discount.
3. **Diversification:** Direct investments can be relatively large. Unless an investor is large enough to amass a well-diversified set of projects, direct investment in any single renewable energy project can concentrate risk. Regardless of how low-risk an investment is, high concentration in that investment will make a portfolio risky and less attractive.

7 Or the implicit backing of the state as in the case of many state pension funds.

8 CPI (2013), [The Challenges and Opportunities for Institutional Investment in Renewable Energy](#).

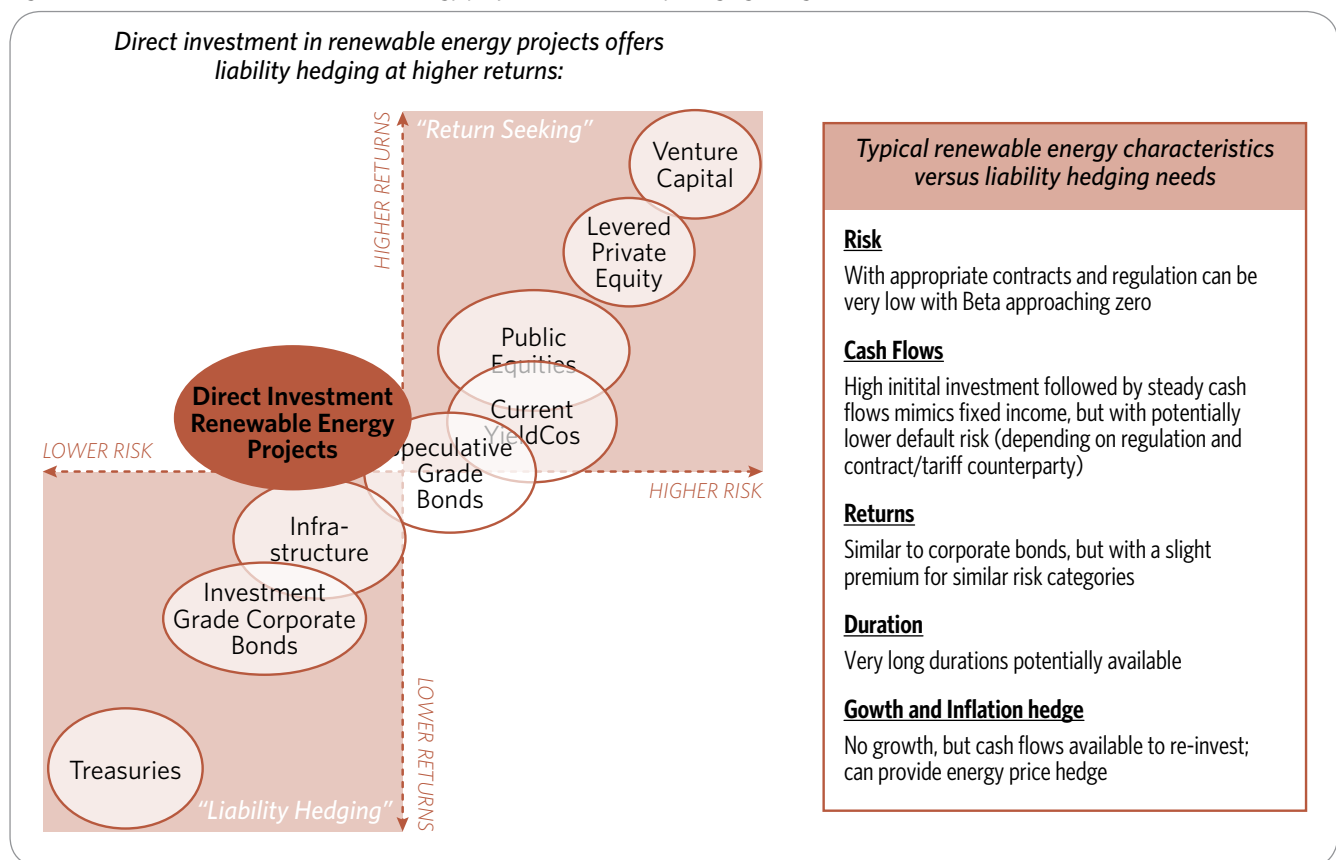
For all of these reasons, the pool of potential direct investors in renewable energy is relatively small. As a result, as shown in Figure 2, the prices — relative to risk — that investors must pay to buy these assets often reflect a lower degree of competition. That is, returns are relatively high relative to risk, creating an opportunity to create value if these differences can be corrected.

In theory, the YieldCo addresses all three of these differences, creating an exchange-traded security with similar, but more diversified, cash flows. The exchange

trading creates liquidity, while lowering transaction costs to levels close to those of bonds. As a result, our analysis suggests that a YieldCo that simply addresses these issues could reduce the financing cost of renewable energy by as much as 20%.⁹

However, as we will see in the next section, in practice the US YieldCos did more than that, and in so doing added more risk and changed the risk-return positioning of the YieldCo investment.

Figure 2 - Direct investment in renewable energy projects offers liability hedging at higher returns



9 CPI (2014), [Roadmap to a Low Carbon Electricity System, Parts 1 and 2.](#)

BOX 1: The infrastructure-like investment characteristics of long-term contracted wind and solar PV

Investment in wind and solar generation projects are more akin to bond-like infrastructure investments than investment in traditional power generation facilities. YieldCos and other innovative renewable financing vehicles have been built from the ground up around these infrastructure-like characteristics:

1. **Low operating costs:** Fixed and variable operating costs account for less than 30% of the cost of wind electricity, and less than 15% of the cost of solar electricity.
2. **Low operating risks:** Further, as these facilities do not face fuel price risk and as operating risks can be managed through long-term (up to 20-25 year tenor) insurance, warranties, and operations and maintenance (O&M) contracts with creditworthy counterparties, long-term asset owners have options to significantly reduce operating risks relative to fossil energy facilities. However, there are important differences in resource and operating risks between wind and solar:
 - » *Wind resource and operating risks for any given wind farm can be significant.* In particular, wind forecasting is still imperfect and subject to significant annual variability (P90 years have wind resources ~10-20% below the median year) as well as potential long-term climactic variability. Further, full-service long-term (>10 year term) O&M contracts and warranties for wind facilities have only recently become available, and may still leave long-term asset owners with some risk of unforeseen significant maintenance capital expenditures associated with systematic failures (for example, wind farm-wide turbine gearbox performance or blade failures due to unforeseen climactic or weather conditions).
 - » *Solar PV resource and operating risks are lower than that of wind.* First, insolation is easier to predict and significantly less variable on an annual or long-term basis as compared to wind resources. Second, PV systems feature few moving parts (particularly those without trackers). And third, insurance products are now available to back up long-term warranties on PV module and other balance-of-system components, making the operational risks for PV substantially lower.
3. **High up-front capital costs, front-loaded risk profile:** The bulk of the risks and costs in renewable projects are concentrated in the development, construction, and early operation of the facility.
4. **Long-term, fixed-price, take-or-pay offtake agreements:** The low commodity and operating risks and costs of a renewable project enable asset owners to offer long-term, fixed-price offtake contracts to customers, which can thereby also provide steady long-term revenues. Further, long-term state or local mandates (often through renewable portfolio standards) or commitments (corporate sustainability measures) create long-term demand for the renewable attributes (RECs) of the energy generated. As a result, demand for bundled power purchase agreements (PPAs) for both power and RECs with terms as long as 10 years (for typical corporate acquisitions) to 25 years (for utility procurement to meet renewables targets) are relatively common in the US.
5. **Predictable long-term net cash flows with bond-like risks and returns:** If the counterparties for both the long-term offtake agreements and the operating contracts are creditworthy, the combination of a long-term offtake contract and operating contract provide bankable long-term net cash flows from these assets for terms of up to 20-25 years. The resulting cash flows have bond-like characteristics (with default of O&M provider or utility off-taker serving as the analogue of corporate bond default — see Section 4.1 for a more detailed discussion).

3. The implications of designing YieldCos for their sponsors

The designers of the first YieldCos recognized the opportunity. Package portfolios of diversified assets into exchange-traded MLP style companies and those assets would suddenly become more valuable. However, the sponsors realized that YieldCos could do much more. By providing both a yield and growth they could help recycle capital more smoothly, enable the parent company to grow faster, and monetize the value of projects that hadn't even been built yet.

3.1 Key US YieldCo sponsor objectives

Most US YieldCos are spin-offs of large developers or independent power producers (their sponsors) designed and offered to the public in close consultation with financial intermediaries — generally investment banks or fund managers (see Table 1). They are dividend growth focused vehicles designed to help recycle (often very expensive) sponsor capital, maximize sponsor near-term earnings, and achieve sponsor-level strategic financial goals while enabling financial intermediaries to capitalize on renewable growth opportunities.

YieldCos were designed to exploit the opportunity in the market for creating liquid exchange-traded, yield investments, while also addressing major objectives of the sponsor, including:

Recycle capital for growth. Creating a YieldCo and selling it to investors allows a sponsor to recover the capital invested in the underlying assets. This capital can then be invested into new projects that can drive the growth of the sponsor and, eventually, the YieldCo.

Replace high-cost capital with lower-cost capital. Since the sponsors are often primarily developers or independent power producers, the bulk of their business activities feature both risks and rewards that are significantly greater than those provided by operating solar and wind facilities. The risks of wind and solar facilities occur mainly during development, construction and commissioning. Thus, developer capital targeted at covering early risks will be more expensive than capital designated for operating projects. YieldCos allow sponsors to achieve the lower cost of capital for those assets once risks have fallen.¹⁰

10 Note that another option — increasing sponsor leverage to enhance the risks and returns from their stake in these assets — is of limited help here. If the assets are levered up using sponsor debt, this will increase the overall leverage

Realize a high sales price for assets and enhance the value of assets in the portfolio. The value of the low risk, increased diversification, liquidity, and low transactions costs offered by a YieldCo increases the sales price at initial offering, leading to a higher cash realization of the portion of the YieldCo that is sold by the sponsor. In addition, the promise of ongoing higher YieldCo valuations should be reflected in an increased valuation of the sponsor company.

Monetize a portfolio of undeveloped assets to enhance near-term earnings. Most developers and IPPs have a pipeline of assets under development. By providing privileged access to this pipeline of future assets to a YieldCo, the sponsor can create expectations for a growing yield, which, in turn, could raise the value of the YieldCo. In essence, through a YieldCo they can sell a stake in their undeveloped assets, retaining some of the upside that comes from development, while enhancing near-term earnings.

Of course, this value is contingent on the YieldCo continuing to offer lower capital costs, and higher value, for assets under development. As we will see, the confusion of the value of undeveloped assets with growth premium for the YieldCo is one of the factors that led to the price rise and subsequent correction for YieldCos.

Reduce strategic risks. By creating a dedicated vehicle, sponsors can, in principle, avoid strategic risks that would be associated with selling assets to third parties in the future. The existence of a dedicated vehicle could also allow sponsors to lower their bids for new projects on the expectation of a sale to the dedicated vehicle. Furthermore, retention of controlling interest of a dedicated YieldCo subsidiary allows the sponsor to set the terms of service contracts and retain the option value associated with any potential growth opportunities at the site.

Optimize long-term financing. The subsidiary yield vehicle concentrates assets with high-quality, bond-like cash flows and is not burdened with the riskier

ratio for the business. As the cash flows from the rest of their more risky businesses generally cannot support the aggregate levels of debt required, this puts pressure on their sponsor-level credit ratings. That, in turn, further increases the sponsor cost of capital and could moderate or eliminate the value to the sponsor from the increased leverage.

Table 1 - US YieldCo sponsors and the key financial intermediaries involved in their IPOs

US YIELDCO	SPONSOR	INTERMEDIARIES (IPO LEAD BOOKRUNNERS)
TerraForm Power, Inc. (TERP)	SunEdison (SUNE - Developer)	Morgan Stanley, J.P. Morgan, Barclays
TerraForm Global (GLBL)	SunEdison (SUNE - Developer)	J.P. Morgan, Barclays, Citi, Morgan Stanley, Goldman, BAML, Deutsche Bank
Abengoa Yield (ABY)	Abengoa, S.A. (IPP)	Citi, BAML
NRG Yield, Inc. (NYLD)	NRG Energy, Inc. (NRG - IPP)	BAML, Goldman, Citi
Pattern Energy Group Inc. (PEGI)	Pattern Energy Group LP (Developer) owned by funds managed by Riverstone	BMO Capital Markets, RBC Capital Markets, Morgan Stanley
8Point3 (CAFD)	SunPower Corporation (SPWR), First Solar Inc. (FSLR - Manufacturers)	Goldman, Citi, Deutsche Bank, J.P. Morgan, Credit Agricole CIB
NextEra Energy Partners, LP (NEP)	NextEra Energy, Inc. (NEE - IPP)	BAML, Goldman, Morgan Stanley

businesses and assets of the sponsor. Thus, over time, as the subsidiary's balance sheet grows, it should be able to refinance its project debt into investment-grade corporate bonds issued at the subsidiary level. As the bonds would be liquid and backed by the full portfolio of high-quality subsidiary assets, this refinancing should allow the subsidiary to increase its leverage and improve returns to its shareholders, and in particular, for its sponsor over time. Of course, there are limits to the level of leverage achievable at the subsidiary level, and potential consequences to the parent's credit rating if the subsidiary is sufficiently large.¹¹

Each one of these sponsor objectives either requires growth or is facilitated by growth. In particular, reducing strategic risks and monetizing assets under development are both dependent upon the YieldCo growing and accepting new assets over time.

The new assets can add to the value of the YieldCo as long as the assets being acquired are truly accretive in the long term (that is, they increase distributions per share in the near term and increase the total value of the yield vehicle). If they are, investors should be willing to pay a premium for this expected growth, thereby enhancing the near-term capital that could be raised by selling shares in the yield subsidiary. Another benefit of offering a growing yield is that it enhances the fair market value of the sponsor's share of the yield subsidiary, enhancing the sponsor's market valuation and potentially enabling the sponsor to increase leverage at the project or corporate level as well.

¹¹ See Moody's (2016) "Sponsor Strategy Is Key for Renewable YieldCos; MLPs Yield Lessons on Growth."

Another, more direct way to monetize this pipeline, and to explicitly align the interests of the sponsor in growing the yield subsidiary's dividends, is to include the use of Incentive Distribution Rights (IDRs). IDRs are rights to increasing fractions of the subsidiary's cash available for distribution (CAFD) if growth targets are met or exceeded. IDRs are common in MLPs and are typically specified by a minimum level of distributions per share (DPS), usually set at the expected initial DPS, and a series of three higher threshold DPS levels (the first, second, and third targeted levels).¹²

As the yield vehicle aims to distribute the bulk of the cash flows generated by its assets to its investors, it will generally need to continually raise capital to acquire additional accretive assets to deliver on promised distribution growth. It can moderate its capital needs in the long term if it retains at least some of the operating cash flows from its assets to reinvest them to acquire new assets. However, if it retains too much cash, it risks eroding its value to investors (which is predicated on timely receipt of those cash flows) and introducing additional reinvestment risk that can also increase its cost of capital. The sponsor would seek to try to optimize the design of the vehicle to minimize the capital raises required to absorb a potential future pipeline of assets.

¹² In any given quarter, if the cash available for distribution (net of retained cash) per share is below the targeted level, then IDR holders are not entitled to any distributions. However, once the DPS to common shareholders exceeds the first target level, IDR holders are entitled to fixed, increasing fractions of the cash in excess of each target level. The IDRs therefore effectively increase the value of the sponsor share of the yield vehicle as long as the vehicle is able to deliver sufficient distribution growth to all shareholders.

3.2 US YieldCos were designed to meet sponsors' objectives

The designs of the US YieldCos we see on the market today essentially follow from an attempt to achieve sponsor objectives. Specifically, we can characterize US YieldCos by the following seven key design parameters, each of which are motivated by the sponsor objectives discussed in the previous section:

1. **Publicly traded subsidiary:** The US YieldCos are publicly traded subsidiaries of their sponsor that feature a diverse portfolio of operating, high-quality assets as well as access to a pipeline of sponsor development assets through a ROFO (right of first offer) agreement.
2. **Controlled by developer sponsor:** Each US YieldCo was structured as a yield-oriented subsidiary of its sponsor, with the majority share of economic interests in the assets and/or subsidiary retained by the sponsor. In all cases, majority control of the voting rights for the operating assets was also retained by the sponsor.
3. **Diverse portfolio of contracted assets:** The initial portfolio of each US YieldCo consisted of operating assets with long-term offtake contracts featuring 20-25 years of remaining life and (usually) fixed-price take-or-pay contracts (see Table 2 for the weighted average remaining life of the contracts for each US YieldCo). Each also has a ROFO agreement with its sponsor that gives it access to a pipeline of future assets for potential dropdown (including operating assets as well as a development pipeline). Most YieldCos are diversified across a combination of technologies, countries, regulatory regimes, and project scale. The value of the US YieldCo business critically depends on the quality of the expected cash flows from the portfolio of operating assets as well as investor confidence in the realization and expected quality of its asset pipeline.
4. **Growth oriented:** US YieldCos are growth-oriented vehicles with modest initial yields whose valuations hinge significantly on dividend growth expectations. US YieldCos feature a relatively modest initial yield with the promise of significant near-term growth in dividends per share (DPS) to be achieved through accretive acquisitions of a pipeline of high-quality new assets. US YieldCos have set ambitious targets dividend per share growth rates over their first three years; on average 12-15% compound annual growth rates (CAGR), some up to 20-25% (see Table 2). Maintaining that level of growth (particularly the more aggressive targets) necessitates a steady stream of asset acquisitions which YieldCos typically attempt to manage through relationships with developers, independent power producers, or utilities.
5. **Levered:** Most of the assets dropped down to the US YieldCo are significantly levered at the project company level, and some feature additional leverage at the YieldCo level. That is, US YieldCos are levered equity growth vehicles, and are also attempting to take advantage of the enhanced valuations associated with their pipeline of assets to increase their leverage after drop-down.
6. **Distribute most but not all cash:** US YieldCos distribute between 80-90% of their available cash flows, far in excess of earnings, representing the majority of the cash the assets generate. They retain only 10-20% of cash generated to reduce future capital raises (see Table 2). The range of reinvestment rates reflects differing levels of aggressiveness or optimism among sponsors about the potential for future capital raises. However, as the cash distributed is well in excess of earnings, the cash retained is below the replacement rate needed to replenish their asset base as it depreciates — let alone finance asset acquisition for growth. Nevertheless, with some additional help from tax incentives, this means that their distributions are treated largely as return of capital and not subject to dividend taxation.
7. **Include incentives for growth:** Several sponsors (SunEdison, SunPower and FirstSolar, NextEra, NRG) have chosen to implement IDRs. The design of the IDRs has been relatively uniform across the US YieldCos. The minimum distributions promised to common shareholders have been set at the targeted initial DPS level. The thresholds for the three DPS target levels (150%, 175%, and 200% above the initial DPS level) have been standardized, as have the fraction of CAFD to be diverted to IDR holders if the DPS exceed each of those three thresholds (15%, 25%, and 50% respectively). However, the significant variation among US YieldCos in the aggressiveness of their growth means that there was significant variation in expectations of when each US YieldCo was expected to hit its target levels and trigger IDR distributions.

Table 2 - Key design parameters for US YieldCos on the market today at IPO

YIELDCO	IPO DATE	IPO PRICE	SHARES OFFERED	OFFER AMOUNT (\$M)	INITIAL PAYOUT RATIO	INITIAL LEVERAGE	INITIAL CAFD PER SHARE	INITIAL YIELD	INITIAL CAFD VALU. MULTIPLE	WEIGHTED AVE REM. PPA LIFE	3-YEAR DPS CAGR TARGET AT IPO	IDR?
NRG YIELD, INC. (NYLD)	7/17/13	\$22.00	19,575,000	\$431	90%	63%	\$1.34	5.45%	16	22	10-15%	Yes
PATTERN ENERGY GROUP INC. (PEGI)	9/27/13	\$22.00	16,000,000	\$352	80%	71%	\$1.56	5.68%	14	19	8-10%	No
ABENGOA YIELD (ABY)	6/13/14	\$29.00	24,850,000	\$721	90%	45%	\$1.16	3.59%	25	26	N/A	No
NEXTERA ENERGY PARTNERS, LP (NEP)	6/27/14	\$25.00	16,250,000	\$406	80%	78%	\$0.94	3.00%	27	21	12-15%	Yes
TERRAFORM POWER, INC. (TERP)	7/18/14	\$25.00	20,065,000	\$502	85%	77%	\$1.06	3.61%	24	20	15%	Yes
8POINT3 (CAFD)	6/19/15	\$21.00	20,000,000	\$420	85%	19%	\$0.99	3.99%	21	22	12-15%	Yes
TERRAFORM GLOBAL (GLBL)	7/31/15	\$15.00	45,000,000	\$675	85%	62%	\$1.29	7.33%	12	19	20%	Yes

Table 2 provides a summary of the seven key design parameters for the US YieldCos on the market today at the time of their IPOs.

Given the above design, the term “YieldCo” is something of a misnomer when applied to these YieldCos. A yield instrument generally connotes a low-risk security with fixed-income-like returns. In practice, the majority of US YieldCos were marketed at IPO to prospective investors as dividend growth vehicles featuring high-quality cash-generating assets rather than the other way around.

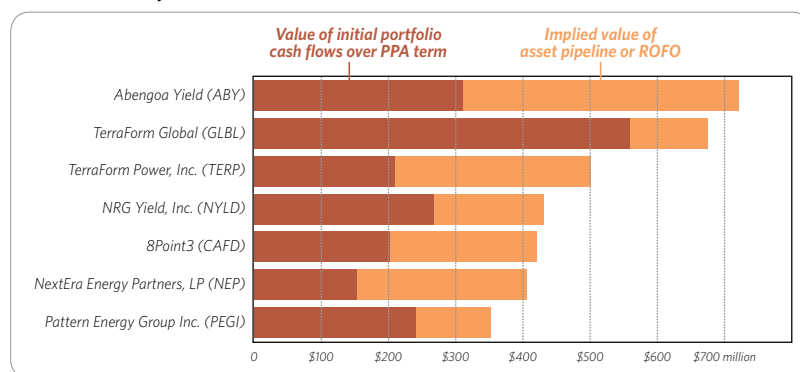
In fact, we can use the design parameters in Table 2 to determine the fraction of the equity raised at IPO that could be attributed to the value of the yield expected from their operating assets as compared to yield expected from future growth. As we show in Figure 3, at IPO, their valuation depended as much on growth expectations as they did on cash flows from operating assets.

The equity partners in these YieldCos are in effect buying more than just the assets from the parent; they are buying a growing, cash-generating stake in the parent’s renewable energy business — and willing to pay a premium for that opportunity. This growth premium creates a virtuous cycle for the sponsor. It provides cash up front to invest more capital in the sponsor’s development pipeline, increasing the likelihood of delivering on the ROFO to more rapidly achieve distribution growth and thereby accelerate their distributions through IDRs. This, along with the boost in business valuation and in earnings associated with the sale of US YieldCo shares at a premium, results in a significant boost to the parent’s financial metrics, while simultaneously making it easier to continue raising capital

through the US YieldCo to restart the cycle.

The design and use of this type of instrument to raise equity for infrastructure-like assets isn’t a new idea. As discussed earlier, these YieldCos are patterned after Master Limited Partnerships (MLPs), similar business models employed in the midstream oil and gas sector to finance large pipelines in the US and incorporated as publicly tradeable partnerships.¹³ However, unlike the majority of oil and gas MLPs, US YieldCo DPS growth targets were markedly more aggressive than market expectations for comparable midstream oil and gas MLPs.

Figure 3 - US YieldCo valuation at IPO was as much about growth (on average, 45%) as it was about yield



13 Note that YieldCos are treated for tax purposes as C-corporations and are subject to corporate taxation, and are not eligible for the favorable tax treatment that oil and gas MLPs have been given by Congress. Nevertheless, they are able to achieve similar results through the use of accelerated and bonus depreciation as well as use of some share of any renewable tax credits their assets may have generated. These tax benefits can largely offset corporate tax liabilities for between 10-15 years at the YieldCo corporate level. Further, the tax losses can defer double taxation by allowing some part of any distribution to shareholders to be treated for tax purposes as a return of capital rather than a taxable dividend.

More so than most MLPs, US YieldCos were valued at a significant premium relative to the present value of the expected future cash flows from their initial portfolio of assets.

3.3 US YieldCo designs are not optimized to achieve renewable policy goals

Achieving the objectives of developer sponsors and financial intermediaries is an important consideration, because they are a critical component of the renewable energy project supply chain. However, catering to their needs alone doesn't guarantee that YieldCos and related instruments are optimally aligned with the collective, long-term interests of the renewable energy sector in achieving sustainable low-cost deployment. Our analysis has shown that the long-term cost of capital has a much larger impact on renewable financing costs than the cost of development financing.¹⁴ In fact, the recent bankruptcy of SunEdison provides a clear example of the potential conflicts between the interests of developers and those of YieldCo investors – particularly in the absence of strong controls that ensure arms-length transactions between the YieldCo and its sponsor.¹⁵ To minimize the long-term cost of capital, YieldCos would have to do four things:¹⁶

1. **Provide highly predictable long-term cash flows.** YieldCos should pay out nearly all of the free cash they generate and own a diversified set of high-quality operational projects supported by long-term contracts.
2. **Provide liquidity in the investment.** YieldCos should be sufficiently large to attract a large pool of investors and be exchange traded.
3. **Provide investment at low fees.** The YieldCo must have a light management structure and impose low fees on investors so as to not consume the advantage that the YieldCo structure provides.
4. **Become established as part of the portfolio of options for institutional investors.** YieldCos will have to establish themselves as a distinct asset class with unique characteristics so institutions can incorporate them into their asset allocations and risk models.

14 CPI (2011), [The Impacts of Policy on the Financing of Renewable Projects: A Case Study Analysis](#).

15 For example, Terraform Global has sued its sponsor for misappropriation of its funds; see <http://www.reuters.com/article/us-terraform-sunedison-lawsuit-idUSKCN0X1IUC>

16 CPI (2014), [Roadmap to a Low Carbon Electricity System](#).

Our analysis suggests that low-cost investment vehicles (with cost structures below those typically charged by intermediaries) designed to meet the four criteria outlined above could sustainably reduce renewable costs by as much as 20% relative to the use of current project financing structures.^{17,18} However, our earlier analysis also identified three key potential shortcomings of the US YieldCo model that could make them less than optimal for bringing down long-term renewable energy financing costs:¹⁹

- **They have been designed with built-in growth expectations that increase risks and therefore capital costs.** They retain a substantial fraction of asset cash flows and expect to continue to issue equity (and potentially dilute current investors) to help fund their growth. This results in low yields, but higher growth premiums that require higher total returns to compensate for the re-investment risk.
- **They have higher costs and fees to support that growth.** To pursue growth, they need a larger management team, increasing costs to long-term investors.
- **Their growth largely comes from acquiring existing assets, limiting their direct impact on the cost of renewable energy.** Therefore, much of the gain from the lower financial costs does not flow through lower renewable power prices to markets and is retained by the developers/IPPs through improved valuations for existing assets.

In the next section, we will analyze in greater detail how YieldCo designs can increase risks and costs — and then end with a discussion of how alternative models can better meet the needs of long-term investors to lower financing costs and help achieve long-term renewable policy goals more efficiently.

17 CPI (2013), [The Challenges and Opportunities for Institutional Investment in Renewable Energy](#).

18 CPI (2014), [Roadmap to a Low-Carbon Electricity System, Parts 1 and 2](#).

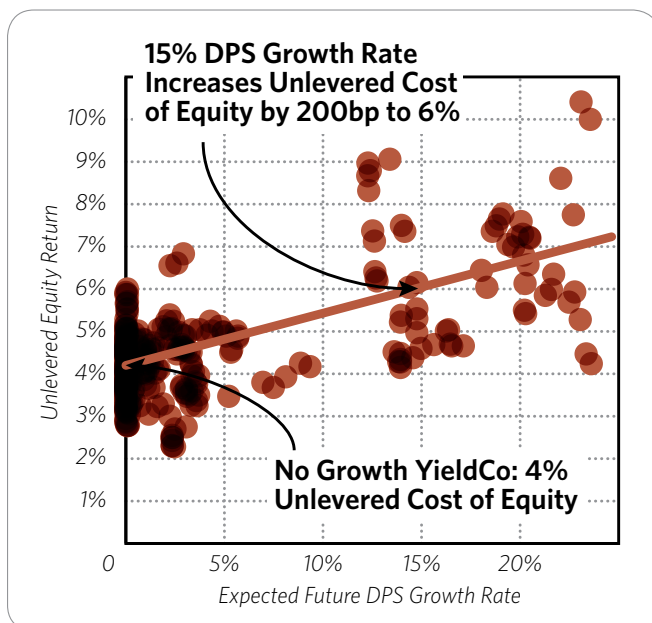
19 Ibid.

4. A focus on growth increases risks and raises the cost of capital

Motivated by the strategic needs of their sponsors, US YieldCos promised aggressive dividend growth, which they could only achieve through sustained, accretive asset acquisitions. However, such growth through acquisition and project development is risky. If projects were delayed, growth would slow. If interest rates rose, the value of future projects would fall, stunting growth. If management invested in bad projects, returns and growth would suffer. And on top of that, since YieldCos distribute most of the cash their assets generate, they do not retain enough cash even to replace their assets as they depreciate, let alone grow their asset bases. So they cannot grow their distributions indefinitely and are dependent on continuously raising more cash from capital markets to finance any growth they achieve.

This, in turn, results in a higher cost of capital than could be achieved otherwise. The assets underlying a YieldCo are especially valuable because the cash flows are essentially uncorrelated to the stock market. By creating a portfolio with growth that is implicitly related to market conditions and interest rates, YieldCos added back market correlation. Our analysis indicates a correlation of approximately 40% for a typical YieldCo without any debt. In general, investors require higher yields or returns to overcome Beta, or market correlation. Our analysis

Figure 4 - Typical US YieldCo DPS growth rates (~15% per year) can increase their unlevered cost of equity by almost 200 basis points relative to no-growth YieldCos.



shows that the growth raised the implicit unlevered cost of equity by nearly 200 basis points, from 4% to 6%. Many YieldCos also had debt, so the correlation — and the resulting increase in cost of equity — was much higher.

4.1 Growth adds market-correlated risk to otherwise bond-like asset portfolios

An unlevered and diversified portfolio of renewable assets with long-term, fixed-price contracts features risks and cash flow profiles similar to that of investment-grade bonds. The underlying assets in MLPs and nearly all varieties of YieldCos have long-term, fixed-price (or escalating) off-take contracts. Aggregating these assets into a portfolio improves the predictability of the cash flows and diversifies away risks to levels that resemble those of bonds.^{20, 21}

The remaining risks of the portfolio of projects involve the creditworthiness of the off-takers or contract counterparties and whether the credit risks of these counterparties are correlated. Careful selection of a diversified set of counterparties should minimize this risk, leaving a risk profile similar to the credit profile of the off-takers. Thus, where these off-takers, who are often utilities, have investment-grade bond ratings, the portfolio should look very much like an investment-grade bond. We expect that any portfolio would merit a small premium over a bond to reflect residual correlated risks.²² See Box 2 for a more detailed explanation of how a diversified portfolio of renewable energy assets should result in a bond-like investment.

20 For this argument to hold, the portfolio must be large enough to allow sufficient diversification to significantly reduce weather, operational, and counterparty-concentration risks.

21 Note that unlike corporate bonds which return the principal amount at the end of their term, there may be no residual value at the end of the contracted life of the underlying assets — this is more like amortizing debt.

22 For example, these may be associated with correlated climactic events such as the large-scale, correlated ~20% reduction in wind production relative to expectations across the US seen in the first half of 2015.

BOX 2: Why a diversified portfolio of contracted renewable assets results in a bond-like investment

- 1. A sufficiently diversified portfolio of contracted wind and solar assets mitigates most risks, but leaves systematic residual risks associated with correlated contract counterparty default.** Resource, performance, and counterparty concentration risks can largely be mitigated through sufficient portfolio scale and diversification, as these risks are not likely to be correlated among all projects and will tend to average out in a large enough portfolio of different projects. While each project in the portfolio features long-term, fixed-price contracts for both the O&M and offtake, the portfolio's cash flows are still subject to the possibility of correlated, systematic contract counterparty default risks (net of recoveries). Therefore, the risk that remains in a diverse portfolio of wind and solar assets is that sector- or economy-wide shocks or issues (for example, an economic downturn, systematic change in electricity or environmental regulation or policy, etc.) could result in correlated contract defaults/renewal across the portfolio.
- 2. The lowest contract counterparty credit rating for each project is a reasonable proxy for the risk to the project's cash flows associated with default of its contracts.** A long-term, fixed-price offtake or service contract is a debt-like liability for the counterparty. Indeed, the credit rating agency Standard & Poor's (S&P) often treats offtake contracts as debt for utility rating purposes. The issuer credit rating of the contract counterparty provides a measure of its overall likelihood to make its payments on time, aggregating a number of financial, business, market, and regulatory risk metrics. Thus, the lowest contract counterparty credit rating is a reasonable proxy for the risks associated with default of the project's contracts. We note, however, that in the event of a default, sale of electricity at market prices and/or service provision through an alternate vendor serve as a floor on the risk to cash flows.
- 3. Thus, the systematic residual risk associated with the cash flows of a sufficiently diversified portfolio of contracted assets is roughly equivalent to that of a cash-flow weighted portfolio of utility off-taker/O&M provider bonds.** At a portfolio level, diversification mitigates all but the correlated contract counterparty default risks. For each project, this default risk can be captured by the lowest contract counterparty issuer credit rating. Aggregating these cash flows, the residual risks for the portfolio's cash flows are roughly equivalent to a cash-flow weighted portfolio of lowest contract counterparty debt issuances, generally their bonds.

However, the US YieldCo focus on growing distributions adds market-correlated risks and management costs to an otherwise bond-like portfolio. A YieldCo can deliver a growing dividend in essentially three ways:

1. **Grow organically** through revenues or contracts that escalate or are indexed with inflation, or through opportunities to increase utilization of operating assets. Since the main driver of renewable energy utilization is weather related, increasing utilization is generally only a minor possibility for renewable energy assets.
2. **Increase leverage and proportion of available cash distributed.** Borrowing against the project or portfolio or increasing the fraction of cash flows distributed to shareholders can also enable growing dividends. This strategy may concentrate risks and is limited by available cash flows and debt coverage requirements.
3. **Acquire accretive assets.** The acquisition of assets through transactions structured to increase dividends per share (including through increases in leverage and/or cash distributions). Note that the new assets need not have better economics or returns than the assets already in the YieldCo in order to be accretive. Rather, the fact that equity investors paid a premium for the growth means that they were initially willing to accept a discounted yield, often 3-4% instead of the 8-10% that the initial portfolio of assets themselves might be able to generate. Using this growth equity (along with additional equity and debt raised as needed), the YieldCo can acquire additional assets with 8-10% cash yields and still increase the low initial yield (net of the impact of dilution).

In practice, US YieldCos focus on acquiring accretive assets, sometimes using increased leverage as needed. However, growing through continual acquisition of assets depends on the sponsor's capabilities and strategy, sector specific factors, and general macroeconomic trends and forces, thereby introducing market-correlated business risks:

1. **The parent may be unable or unwilling to drop down the assets needed to achieve YieldCo growth targets.** The premium valuations of US YieldCos hinge on the willingness of the parent company's management to develop, finance, and deliver projects to the YieldCo. Company specific, sector-wide, or economy-wide factors can materially impact the

parent's desire or ability to provide sufficient assets to achieve growth targets. For example:

- a. *The capital needed for asset acquisition is likely to be available and cheap only when capital markets are bullish.* The systematic weakness in the energy sector that preceded the decline of YieldCo valuations in mid-2015 and the subsequent dearth of appetite for further capital raises was an example of wider capital markets affecting the potential for parents to provide growth for the YieldCos.
- b. *Competition for projects can make accretive acquisitions scarce.* As interest in YieldCos waxed, the competition for projects in the secondary market became fierce. Thus, the price rose for assets outside of those delivered based on a commitment from the YieldCo sponsor, making asset acquisitions less accretive and reducing growth prospects.
- c. *A sponsor with weak financials or business conditions can curtail YieldCo growth.* The loss in confidence in 2015 in the financial health of the sponsors of four US YieldCos (NRG Yield, Abengoa Yield, Terraform Power, and Terraform Global) could be linked to weakness in the financial and business health of their sponsors (NRG, Abengoa, and SunEdison).
- d. *Alternative exit vehicles or termination of the ROFO (right of first offer) contract with the parent company could orphan the YieldCo.* If the parent were to find alternative, more competitively priced outlets for its projects, it would be a challenge for the YieldCo to find the high-quality acquisitions to sustain growth. The ROFO contracts — which give the YieldCo the option of purchasing parent assets before the parent can market the assets to third parties — typically last for only five years²³ and do not include all of the sponsor's assets. Thus, there is no guarantee that the YieldCo will have privileged access to the parent's project pipeline indefinitely. The sponsor may choose not to renew the ROFO agreement after five years due to the development of other, more attractive exit options or due to a decreasing number of suitable develop-

²³ The majority of ROFO contracts include a provision that allows the parties to extend the ROFO contract at the end of every five-year period if both parties agree.

ment opportunities.

2. **Macroeconomic conditions may create challenges to raising enough capital or capital at a low enough cost to enable a sufficient volume of accretive acquisitions.** For example, rising interest rates or inflation expectations will make the dividend yields provided by US YieldCos comparatively less attractive than fixed-income securities. With benchmark rates near 0% in developed countries this is a particular concern, as rising rates may require investors to offer more aggressive yields to raise capital and increase the cost of debt at the project and corporate level. If interest rates rise in the next 6-18 months the yields achievable by the assets on the market may be too low to be accretive.
3. **Since they distribute most of the cash generated by their assets, they cannot grow forever and require continuous access to capital markets to finance their growth.** Since the YieldCo is distributing over 80% of its available cash flows, it cannot replace assets as they depreciate — let alone finance growth — without going to capital markets to raise additional equity and debt. Growing cash distributions 15-20% per year while only reinvesting less than 20% of the cash generated from the projects is very challenging. Consider a US YieldCo that was valued with a 40-60% growth premium at IPO due to an expectation of 15-20% distribution growth over five years. If project economics remain unchanged, within a few years growth targets could require double the annual additions. If it cannot achieve this level of growth indefinitely, the YieldCo will see its growth premium fall, and see its yield increase by as much as a factor of 2-3x from roughly 3% initially to 6-8%. Higher yields imply higher capital costs. Thus, unless the YieldCo can find ever more attractive projects, each new investment that the YieldCo makes will add less value to the portfolio. As result, rather than double, the YieldCo could need to quadruple or more the number of assets it had to invest in to maintain growth. At some point, there will not be enough assets available at reasonable prices to sustain the business model.

Note that the level of additional risk in existing YieldCos is heterogeneous. Risks related to leverage, currency

and country exposure, the share of production not hedged by fixed-price contracts, and exposure to a fall in marginal fossil fuel prices through PPA renegotiation affect YieldCos in the US and the UK to varying degrees. It is also possible that, if a single YieldCo failed to meet dividend targets or growth expectations due to any combination of risk factors, the entire asset class would be penalized with all YieldCo valuations adjusted down.

US YieldCos are also relatively more expensive to manage than the underlying portfolio of assets would be as a result of their focus on growth. They involve multiple layers of direct and indirect investment management fees and transaction costs. This includes costs associated with pursuing growth, which requires sophisticated and costly management teams that simplified fixed-income like structures could avoid. The use of IDRs compounds this problem, significantly increasing the effective management cost of achieving any further growth. Thus, they do not necessarily provide low-cost direct access to high-quality project cash flows.

4.2 Quantifying the impact of growth-related risks on YieldCo valuations

We developed a financial model of US YieldCos to quantify the impacts of the risks discussed above on YieldCo valuations. The model shows how US YieldCo valuations are very sensitive to market perceptions and conditions. Our model assumptions and calculations are described in detail in a companion technical paper.²⁴ Through this modeling we found that:

- **Market perceptions regarding the long-term visibility and sustainability of project pipelines can significantly affect US YieldCo valuations (by 20-25%).** Our modeling shows that a loss in confidence in the long-term sustainability of asset growth opportunities after five years (from 15 years of assumed terminal growth down to five years, and then down to one year) can reduce its valuation by 20-25%.²⁵

24 See the forthcoming technical companion to this paper, CPI (2016), "How Do YieldCos and MLPs Work? A CPI Model." The model assumes a fixed portfolio of underlying assets and values the resulting cash flows under various DPS growth assumptions (and corresponding capital structures) using a finite time-horizon variant of a 3-stage dividend discount model (DDM) to value the modeled.

25 Based on a YieldCo with strong short-term growth prospects (40% initial annual asset growth, 20% DPS growth) gradually declining over five years to a more modest terminal phase (15% asset growth, with 2% DPS growth).

- **US YieldCo valuations are more sensitive to interest rate risk than lower-growth models.** Under a more rapid interest rate growth scenario (roughly triple the rate increase implied by the current treasury yield curve), a US YieldCo with 20% short-term DPS growth and visibility into asset growth over 15 years would be valued 14% less than in our base case scenario. On the other hand, the valuation of the underlying asset cash flows under a no-growth business model would drop by only 5%.
- **Extending the high short-term growth phase even by another year requires lowering initial DPS growth rates from 20% to 15% to avoid excessive leverage and maintain a viable business model.** The only way to achieve growth targets beyond the short-term growth phase is through increasing leverage. However, limits on achievable leverage largely render such models unviable without a drop in dividend growth rate. Increasing the period of high short-term growth by even a year requires dropping the growth rate to 15% to keep leverage within reasonable limits.²⁶ This, in turn, generally reduces its valuation by 3-5%.

4.3 US YieldCos' focus on growth raises the unlevered cost of equity by almost 200 basis points

As explained in Section 4.1, a diversified portfolio of contracted renewable assets with creditworthy counterparties and no growth would have a risk profile akin to an investment-grade fixed income instrument, and should trade at a small premium above investment-grade bonds. Adding growth introduces market-correlated risks, or Beta, to the business model. By analyzing the change in unlevered Beta — and therefore the cost of equity — across comparable instruments such as MLPs and low-growth analogues of US YieldCos (particularly in Canada), we show that the systematic risk introduced due to the focus on growth of US YieldCos raises their unlevered cost of equity by almost 200 basis points. Packaging a portfolio of renewable energy assets into a US YieldCo introduces market-correlated risks that convert the collection of bond-like assets into an investment vehicle that is more equity-like.

This market correlated risk raises the unlevered cost of equity of a typical US YieldCo by around 200 basis points. As we discuss in greater detail in the forthcoming technical companion to this work CPI (2016), "How Do YieldCos and MLPs Work? A CPI Model," historical analysis of the market correlation and cost of capital of YieldCos and comparables²⁷ shows that a typical US YieldCos should have an unlevered cost of equity around 200 basis points higher than a vehicle with the same assets but no growth.

²⁶ Roughly a minimum 1.35x EBITDA coverage ratio.

²⁷ Including midstream oil and gas MLPs, publicly traded Canadian infrastructure funds investing in hydropower and related assets that feature similar business models to YieldCos, but with much less aggressive dividend growth.

5. Alternative renewable energy finance vehicles: their impact on meeting sponsor strategic goals, investor needs, and policy objectives

US YieldCos began with a simple proposition — operating renewable energy assets that have prices guaranteed through contracts or regulation are an ideal match for investors seeking long-term, predictable cash flows. Further, the value of these assets can be enhanced by creating a diversified portfolio that reduces risk, while packaging these assets into an exchange traded vehicle creates liquidity that further reduces investor risk and decreases the costs to investors of acquiring these cash flows. Lower risk and lower transactions costs not only make the investments more attractive, they also open up the investment opportunity to a much wider set of investors. In the long run, this combination of more investors and greater attractiveness should achieve a policy goal of reducing the finance cost of renewable energy.

Unfortunately, layering on other strategic goals, like monetizing future development pipelines and reducing strategic risk, disrupted the story and eventually exposed the mismatch between the goals of the sponsor and the policy goal of developing the lowest-cost finance vehicles that would be most attractive to long-term liability matching investors. Without the right investor interest, the result was also inconsistent with the policy goal of lowering the financing cost of renewable energy.

Achieving sponsor goals, addressing investor needs, and achieving policy objectives all at the same time is challenging, but US style YieldCos are not the only financing options that attempt to make this match. Several alternative financial instruments already on the market get closer to achieving this match. For example, UK and Canadian YieldCos with less aggressive growth targets have been successfully floated, and with less of the growth-related risks and costs we’ve seen in US YieldCos. Green bonds, infrastructure funds and municipal financing also can claim a better, but not perfect, match to all three of these goals.

In this section we will look at those alternatives and propose a new variation — a type of YieldCo that relies on a set group of assets and thus has no growth or asset acquisition risk — that we will call a Clean Energy Investment Trust (CEIT).

5.1 Lessons from four alternative renewable financial vehicles on the market today

There are several alternative instruments on the market today — UK YieldCos, privately held infrastructure funds, green bonds, and municipal financing. Table 3 provides a brief description of each.

Table 3 - alternative investment vehicles for low-risk, long-term contracted assets

US YELDCOS	Offer a growing exchange-traded portfolio of assets, but with risk associated with growth, asset acquisition and market uncertainty
UK YELDCOS	Differ from US YieldCos in that they feature more modest, inflation-linked growth — but with a less diverse portfolio of UK wind and solar assets subject to a greater degree of revenue risk due to exposure to market price volatility.
PRIVATELY-HELD INFRASTRUCTURE FUNDS	Funds designed to meet the risk and return requirements of institutional investors, but are illiquid, generally have short time horizons, and relatively high fees.
GREEN BONDS (IN COMBINATION WITH DEVELOPER EQUITY)	Are publicly traded bond offerings backed by project cash flows that differ from traditional project finance in that the bonds are dedicated only to sustainable investments. However, these projects differ little from traditional financing methods and overall finance costs still depend upon the equity cost of the sponsor developer.
MUNICIPAL FINANCING	Enable municipalities to access their low cost of finance from municipal bonds to achieve renewable energy finance that is essentially 100% low-cost debt. However, issuances are limited by local municipality financial capacity and, in some cases like tax incentives, policy.
CLEAN ENERGY INVESTMENT TRUST	Would offer an exchange-traded set portfolio of contracted renewable assets with well-defined long-term cash flows and no growth or reinvestment related risks

With all of these options available, the question is which ones do the best at serving the objectives of all the relevant stakeholders — developers, investors and policymakers. The answer lies partly with the specific design elements that characterize each of these investment vehicles and how these design elements themselves mesh with sponsor, investor, and policy goals.

We highlight a few important parameters:

Is the investment public and exchange traded or private?

The choice of whether to offer the instrument for sale on an exchange affects its liquidity, and therefore the cost of capital. As publicly traded equity instruments, US YieldCos and Green Bonds are relatively more liquid than privately placed funds, and should therefore feature a lower cost of capital. However the liquidity advantage does come at a cost, as acquiring a listing can be expensive and may be only available for reasonably sized investment portfolios.

How is the investment vehicle related to the original developer? US YieldCos are controlled subsidiaries of their developer and their valuation is partly dependent upon the assets that the sponsor will drop down into the YieldCo over its life. As such, US YieldCos are exposed to sponsor risks — most notably in the case of the Terraform YieldCos and the bankruptcy of their sponsor, SunEdison. An independent long-term investment vehicle (such as a municipal bond or private infrastructure fund) does not have the benefit of an exclusive relationship with a sponsor to provide a pipeline of projects, but can mitigate the risks associated with the health of the sponsor as well as potential conflicts of interest.

What is the quality, diversity, and scope of the assets in the portfolio? The choice of technologies, policy/regulatory regimes, and geographies can significantly affect the risks associated with the underlying portfolio of assets. US YieldCos have generally focused on geographically diversified portfolios of mature onshore wind and solar assets with long-term, fixed-price, take-or-pay offtake contracts in developed countries to minimize risks.

Is the value of the investment vehicle dependent on, or influenced by, growth? As discussed in the previous section, a focus on distribution growth significantly increases both risks and cost of capital. UK YieldCos with a more modest growth focus provide a clear example of how lower growth expectations can also lower risk and

volatility of the investment value.

Will the portfolio use leverage (debt) to enhance returns (while concentrating risk)? Borrowing against the assets, either at the portfolio or project level, may enhance returns to levels that are more aligned to investors with higher risk tolerances and more ambitious return expectations — but doing so adds transaction costs, risks, and complexity that can discourage other investors. US YieldCos are generally levered primarily at the project level, but sometimes at the portfolio level. An unlevered instrument could avoid these additional risks and costs.

Will cash earned from operations be retained for reinvestment? The fraction of cash available for distribution retained for reinvestment reflects the relative focus on growth as well as the reinvestment risk associated with the instrument. US YieldCos generally retain 10-20% of available cash for reinvestment while developers with a long-term equity stake might retain substantially all of the cash generated for reinvestment. Less growth-focused instruments may distribute all available cash, eliminating reinvestment risks and reducing the cost of capital.

Will the investment vehicle need to raise additional capital from the market to achieve its valuation? Perhaps the biggest risk associated with the growth of US YieldCos is the need to raise capital continuously in order to acquire new assets and achieve growth targets. A need to raise capital subjects the YieldCo to general economic conditions such as rising interest rates or poor market sentiment. Sectoral trends will also have an impact — perceptions that policy would turn against renewable energy, for instance, could make capital raises more difficult. In addition, contagion from the poor performance of similar securities could hurt sentiment and make capital more difficult to raise, even if the poor performance was completely unrelated to the underlying assets or business model. Finally, there is the cyclicity of capital raises. Even when conditions are good for an equity raise, multiple competitors could enter the market, raising more capital than the market needs and eventually leading to destructive competition to acquire assets using that capital, thus causing assets values to rise and growth of the YieldCos to fall. All four of these factors have had a role in the decline in US YieldCos valuations.

On the other hand, a closed-end fund, such as a privately held infrastructure fund, owns a fixed set of assets with

no need to raise capital. Regardless of how market conditions or sentiment evolve, or even policy related to new renewable energy changes, the underlying cash flows that the investor can expect will remain unchanged. To the extent that the investor is using these cash flows to meet future liabilities, the match remains unaffected by market events.

With closed-end funds, the risk of market sentiment or policy changes remains in the system, only in this case it remains solely with the project developers, rather than being passed on through to the YieldCo investors. Since investors in developers and independent power producers are used to this risk, these players are much more equipped to handle this risk, while the project level investors can then get the low-risk asset that they need.

What is the fee and incentive structure for the investment vehicle and its managers? The level of fees and the incentives associated with the choice of

fee structure can significantly impact the economics of the instrument as well as the perceived risks. US YieldCos with a growth focus generally have significant operating expenses and incentives (IDRs) associated with achievement of their growth targets. Investment vehicles without such a growth focus could be managed at substantially lower cost.

In Table 4 we look at each of the 6 potential investment options and how they address each of these questions, versus what might be optimal for investors and policy.

In Table 4 the shaded squares represent those elements that are most closely aligned with the requirements of the low-cost, low-risk, long-term, liability-hedging investors. Extending this analysis a little further, Table 5 shows how each of these investment vehicle options weighs the balance between sponsors, investors and policy.

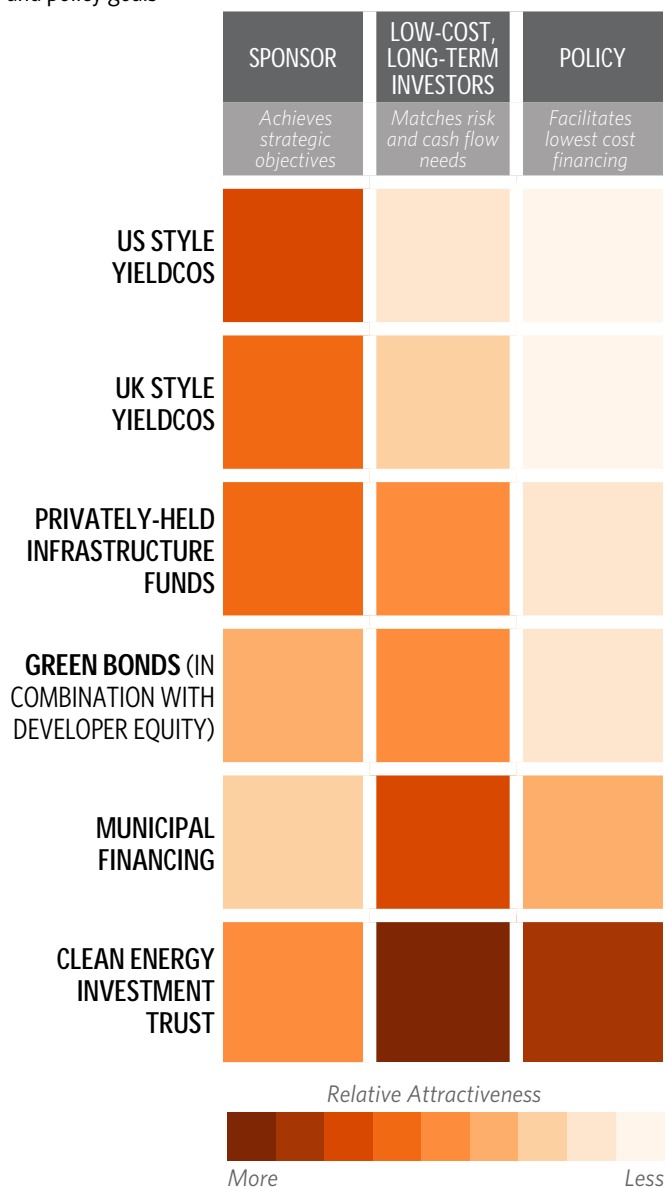
Table 4 - Parameters for different investment vehicles versus sponsor, investors and policy needs

	PUBLIC OR PRIVATE	RELATION TO SPONSOR	PORTFOLIO QUALITY AND DIVERSIFICATION	GROWTH	LEVERAGE	CASH RETENTION (FOR REINVESTMENT)	NEED TO RAISE FURTHER CAPITAL	FEE AND INCENTIVE STRUCTURE
US YIELDCOS	Publicly traded	Controlled Subsidiary of Developer Sponsor	Long-term, fixed-price contracts	10-15% DPS growth target	Often high	10-20%	High to fund growth	High operating expenses to cover asset growth
UK YIELDCOS	Publicly traded	Not developer affiliated	Assets with inflation-linked green certificates; market-priced power sales	Inflation-linked growth targets	Moderate, Limited by articles of association	Cash can be retained to smooth cash flow profile due to market risk	Low, to meet inflation-linked growth targets	Moderately high
PRIVATELY HELD INFRA-STRUCTURE FUNDS	Privately held	Developer may retain some stake in assets	Tailored to the needs of fund investors	Generally No Growth (Closed end fund)	Often high to enhance returns	N/A	None	Can be high on private equity models
GREEN BONDS	Publicly traded debt and/or equity	Developer retains equity stake	Dependent on developer portfolio	No growth (growth focused on equity)	N/A (Green bond is leverage)	N/A	None	Similar to bonds
MUNICIPAL FINANCING	Publicly traded	Developer may retain tax benefits	Generally for Municipal owned assets	None	N/A	N/A	None	~2% bond under-writing costs
CLEAN ENERGY INVESTMENT TRUST	Publicly traded	Not developer affiliated	Long-term, fixed-price contracts	None	None	None	None	Relatively low, underwriting costs and management fee
OPTIMUM FOR								
SPONSORS	No impact	Controlled subsidiary	Depends on assets	Growth to meet strategy	High to enhance returns	Some to drive growth	High as alternate access	High if to sponsor to drive returns
LONG-TERM INVESTORS	Publicly traded to increase liquidity	Not affiliated to reduce sponsor risk	Long-term, fixed-price contracts	None	None to reduce risk	None to reduce risk	None	Low
LOW-COST POLICY	Publicly traded to lower cost; increase investor pool	Not affiliated to reduce incumbency risk	Long-term, fixed-price contracts	None to lower finance costs	Whatever leads to lower-cost finance	Whatever leads to lower-cost finance	None	Low

For policymakers and investors the Clean Energy Investment Trust and municipal financing are likely to achieve better results. Unfortunately, the experience in the industry, ownership of existing assets, and standard practice lies with the infrastructure funds, developers and the YieldCos that they develop. Creating new finance models like a CEIT will require breaking the mold and establishing new practices which is often difficult. However, given the loss of market confidence

in US YieldCos, there may be an opportunity to create these new alternatives. Developers of US YieldCos themselves may also, eventually, find that CEIT-type models could be attractive. Although they may no longer be able to monetize the future value of a portfolio under development, by creating a capability to spin off CEITs on a yearly basis, they may be able to achieve much of that strategic advantage, and get higher valuations for the now less risky assets.

Table 5 - The attractiveness of different models to sponsors, investors and policy goals



5.2 The Clean Energy Investment Trust (CEIT)

Based on the lessons learned from the design of the US YieldCo, as well as the design of the four alternatives we considered above, we can now see the outline for the design of an instrument that can address the needs of investors and achieve long-term renewable policy goals while still providing value to developers.

As outlined in Table 6, the Clean Energy Investment Trust (CEIT) is a long-term, liquid, unlevered investment opportunity that provides investors full access to the cash flows of a specific portfolio of renewable assets without adding unnecessary risks or costs. The CEIT is tailored to the needs of yield-hungry investors like institutional investors, offering high yields without the expectations and risks of growth. The CEIT would consist of a closed set of assets, with low operating costs and management fees, paying out nearly all of the cash flows, rather than retaining some of those flows to invest in growth. A CEIT could still be sponsored by a developer or independent power producer — but also by a strategic investor, investor club, or asset manager. A CEIT sponsor seeking growth would need to issue CEITs every year or two with a new, closed end, portfolio of assets. While some of the strategic value to the sponsor would be lost, the proper allocation of risks to the sponsor and the investors would ultimately lead to a lower cost of capital and a sustainable business model.

The lessons learned from the evolution of the US YieldCo market are stark, but from the hard lessons about the risk of growth emerge the underlying truth that there are new finance vehicles for renewable energy waiting to emerge that can provide value to investors, developers and policy makers.

Table 6 - The design of the CEIT

ISSUE WITH CURRENT OFFERINGS	STRATEGY TO ADDRESS ISSUES IN A CEIT
<p>Illiquidity Direct investments can be difficult to sell off in a pinch. This illiquidity can raise costs or limit investors' renewable share as they may need to offset illiquid investments with liquid assets.</p>	<p>Work towards a listed vehicle Develop a listed vehicle that can provide a reliable, liquid exit for direct investors / asset owners.</p>
<p>Misalignment of interests US YieldCos and infrastructure funds are optimized to meet the objectives of incumbents (utilities, independent power producers, developers) or intermediaries (banks, asset managers).</p>	<p>Develop vehicles with investors from the start Disintermediate financial intermediaries and incumbent electricity sector players and, instead, work with investors to structure investment vehicles with developers to meet the needs of institutional investors from day one.</p>
<p>Insufficient projects or market and regulatory risks Small projects may require aggregation and bundling, while very large projects may need to be syndicated. A shortage of projects in the "sweet spot" creates competition which pushes down returns. This trend has been exacerbated by demand driven by growth-driven YieldCos. Regulation can further exclude or discourage investors not immersed in the industry, may induce risks or may require risk management techniques that favor incumbents. Policy support and analysis is often necessary to achieve optimum value.</p>	<p>Partner with a diverse portfolio of developers Work with developers not able/willing to spin off a US YieldCo to identify unique project opportunities and portfolios that take advantage of the long time-horizon and size of a group of institutions. Large projects could be split among investors; a consortium could aggregate small ones. Diversify across policy regimes and develop active policy/regulatory management strategies. Investors working together could invest in a larger, more diverse set of projects</p>
<p>Increase in cost of capital due to growth The US YieldCo focus on growth increased the cost of equity, and exposed long-term investors to developer-growth related risks</p>	<p>Closed set of assets for each listed vehicle Each listed vehicle would be issued with a closed set of assets with transparent data provided about the portfolio to all investors. Investors seeking growth would look to issue listed vehicles every one to two years.</p>
<p>Diverse risk or return needs among potential investors Institutions interested in these assets have varying risk/return expectations for their infrastructure-related investments. It is difficult for any one investment to meet their needs</p>	<p>Unlevered vehicle An unlevered vehicle allows institutions the flexibility to use leverage to structure their exposure the asset's cash flows in such a way as to meet their needs</p>
<p>Reinvestment risks US YieldCos reinvest 10-20% of project cash flows, subjecting long-term investors to reinvestment risks associated with management decisions on growth and asset acquisition, further complicated by sponsor interests.</p>	<p>Distribute all net cash flows from assets The vehicle would distribute all cash flows net of long-term asset management costs to investors</p>
<p>High transaction costs Direct investment can be expensive as transactions take time and require highly skilled resources.</p>	<p>Form investment clubs and minimize long-term risks The club can share transactions costs and benefits among investors. Further, long-term asset management costs can be mitigated by minimizing long-term risks through the use of assets with full service O&M contracts matched to the life of its offtake contracts.</p>

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List of Commonly Used Acronyms

CAFD	Cash Available for Distribution
CAGR	Compound Annual Growth Rate
CEIT	Clean Energy Investment Trust
DPS	Dividend per Share
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortization
IDR	Incentive Distribution Rights
IPO	Initial Public Offering
IPP	Independent Power Producer
MLP	Master Limited Partnership
O&M	Operations and Maintenance
PPA	Power Purchase Agreement
PV	Solar Photovoltaic
REC	Renewable Energy Credit
REIT	Renewable Energy Investment Trust
ROFO	Right of First Offer