YieldCo Cost of Capital

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Large renewable energy project developers often use a type of financing vehicle colloquially known as a "YieldCo" to finance portfolios of assets that are expected to have stable cash flows over relatively long periods, such as solar or wind farms. In theory, investors should be willing to accept lower returns on investments in these "safe" assets than they would on investments in the developers themselves, thus reducing the cost of capital for such assets and increasing their value.

We thought it would be useful to see how this has worked out in practice. In this post, we show how we determine the cost of capital for a yieldco using 8point3 Energy Partners, a yieldco formed by SunPower and First Solar to own and operate solar systems, as an example. Then we show the results of using the same methodology across a number of public yieldcos with a variety of asset types. On average, we find a cost of yieldco equity is 7.01% levered and 5.46% unlevered.

This relatively low cost of capital has implications for the value of projects held or purchased by yieldcos. It should allow developers that have yieldcos to sell their projects at attractive prices, and allow their yieldcos to pay more than many other project investors for projects they purchase from independent developers.

Yield is not Cost of Capital

A surprising number of otherwise sophisticated investors confuse the yield on a yieldco stock with its cost of capital. These are not the same thing.

First, let's define what we mean by the term "yield." It is simply the dividends divided by the price of the stock:

$$y = \frac{div}{E}$$

Where:

y = yield, in percent
div = this year's dividends
E = price the company's stock

If distributions are $4 in a year and the price is $100, the yield is 4%. Rearranging, we see that the company's equity value is the dividend divided by the yield:

$$E = \frac{div}{y}$$

Investors buying the stock are not only buying the rights to today's distributions, but also those in the future. When we talk about cost of capital, we are looking for what investors would demand independent of the rate of growth in dividends. We can decompose the yield in our equation into two

factors, one of which represents our expectations for growth and the other of which is the returns we would demand for any investment with a similar level of volatility:

$$E = \frac{div}{r_e - g}$$

Where:

r_e = return equity investors would want, regardless of growth rate
g = expected dividend growth rate

The first of these factors, r_e, is the cost of capital. (Actually, the cost of levered equity capital.)

Consider two yieldcos that are identical except that investors expect one to grow at 5% and the other at 10%. The cost of capital for these two companies will be the same, but the one growing at 10% will have a higher stock price and therefore a lower yield.

Which Cost of Capital?

Before we derive the cost of capital, it is important to understand which cost of capital we are talking about. Investors and developers might care about any one of the following three different costs of capital:

1. Levered cost of yieldco equity — returns investors should demand on a yieldco equity investment, given that the yieldco is also financed with debt

2. Unlevered cost of yieldco equity — returns investors should demand on a yieldco equity investment, assuming it has no debt

3. Weighted average cost of yieldco capital — the weighted average of the cost of levered equity (above) and debt

All of the above should account for any risks associated with the future distributions from the yieldco. These might arise due to changes in tax law affecting yieldcos or financial difficulties at a sponsor, for example. They should also take into account the benefit of diversification, since the yieldcos often own assets with different technologies, in different geographies, with different contracted customers.

In this post, we are primarily concerned with the cost of yieldco equity (both levered and unlevered).

An investor or developer might also be interested in asset-specific costs of capital, such as for a single wind farm. The cost of capital for such a project would not suffer from any potential risks from the yieldco structure, but would be handicapped by lack of diversification. We estimated the cost of capital for residential solar projects in a previous post. That post and this one are related, but this one focuses on companies that own a portfolio of assets that might include different types of solar, wind, and other assets. We also take a somewhat more nuanced approach to some of the inputs here.

Levered Cost of YieldCo Equity

To recap our previous post, the most widely accepted way to calculate the cost of equity is with the Capital Asset Pricing Model, or CAPM. The levered cost of equity is defined as:

$$r_{levered\ equity} = r_f + (r_m - r_f)\beta_{levered\ equit}$$

Where:

$r_{levered\ equity}$ = the cost of equity for a firm financed with equity and debt
r_f = the risk-free rate of return
r_m = the expected return from equity in general
$\beta_{levered\ equity}$ = a measure of the yieldco's equity riskiness compared with equity in general

Risk Free Rate (r_f)

We use 1.78% as the current risk-free rate, which is the current rate on a 10-year U.S. Treasury bond. We chose the 10-year bond because we think it is reasonable for an investor with a long-term investment horizon. If an investor had a much shorter horizon, the rate on a 1-year Treasury bill might be more appropriate. One might also argue that since solar and wind assets last 20 or 30 years we should use the rate on a 20- or 30-year bond. However, an investor is unlikely to hold the asset for its full term. Additionally, the longer term bonds expose an investor to more interest rate risk. We believe, therefore, the 10-year bond is appropriate.

Equity Risk Premium (r_m- r_f)

Analysts refer to the difference tween the expected returns on stocks (r_m) and risk-free assets (r_f) as the "equity risk premium" or "ERP." We estimate the ERP as 4.45%, as explained below. (Readers not interested in the details can skip to "Levered Equity Beta" section.)

Financial theory gives us many ways to calculate the equity risk premium; it is one of the most controversial elements in the CAPM. To highly simplify, one approach is to take the difference between what you think returns on stocks and bonds will be in the future. Another approach is to look at the historical relationship between stock and bond returns. We choose the latter approach because, as long term investors, we want to be neutral as to whether the market is currently under- or over-valued.

Someone who invested $100 in the S&P500 on January 1, 1928, would have had $300,725 on December 31, 2015, a compound annual growth rate of 9.53%. If that person had invested in 10-year U.S. Treasury bonds instead, he or she would have had $7,041, a compound annual growth rate of 4.95%. The difference between these, 4.57%, is the ERP over this 88-year period.

One troubling aspect to this approach is that, despite the really long time period, the answer is somewhat sensitive to the starting and ending dates. For example, if we ended our calculation in 2008 (a disastrous year for stocks) instead of 2015, we would have concluded the ERP was 3.90%. The ERP has been higher than 4.45% in some years and lower in others. The average over the last ten years has been 4.45%, which is what we use in our calculations in the rest of this analysis.

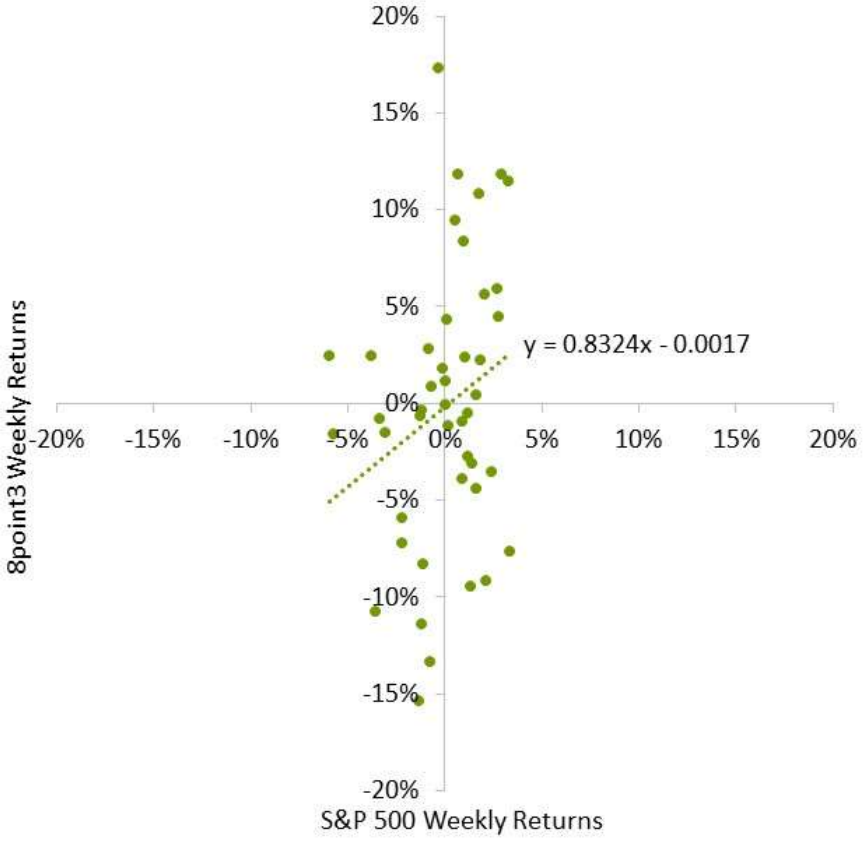
For more information on the equity risk premium, review this paper from the Federal Reserve Bank of New York, which estimates an average equity risk premium of 5.7% using a variety of different models (see page 29 in their paper) and this paper from Aswath Damodaran at NYU, in which he found the long-term equity risk premium to be 4.29% (see pg. 25).

Levered Equity Beta ($\beta_{\text{levered equity}}$)

The last piece of data we need to calculate the cost of levered equity is the levered equity beta. This is straightforward to calculate. We regress the returns on a yieldco's stock versus those of the market in general, for which we use the S&P 500 as a proxy. (Other potential options would have been the Wilshire 5000 Total Market Index or Russell 3000 Index. Both of these include a larger number of companies and would capture small-cap stocks, of which yieldcos more closely resemble. However, we believe the S&P 500 to be an appropriate market index since it is market-weighted, widely used, and generally considered a good proxy for the U.S. stock market.)

Using 8point3 as an example, we find a levered equity beta of 0.83 (see Figure 1). This indicates 8point3 stock is less volatile than the market overall. On average, a 1% change in the S&P was associated with a 0.83% change in 8point3 stock.

FIGURE 1: 8POINT3 VS. S&P 500 WEEKLY RETURNS



With all of the appropriate inputs, we can now calculate the levered cost of equity for 8point3.

$$r_{levered\ equity} = r_f + (r_m - r_f)\beta_{levered\ equity}$$

$$r_{levered\ equity} = 1.78\% + 4.45\% * 0.83$$

$$r_{levered\ equity} = 5.48\%$$

Unlevered Cost of YieldCo Equity

The levered cost of yieldco equity shows us what kinds of returns investors in a company's stock should insist upon, at a minimum, but we can't easily compare across companies because each may have different amounts of leverage. To make the figures comparable, we calculate an unlevered cost of equity, which assumes the company is financed only with equity.

Using the same CAPM formula, we have:

$$r_{unlevered\ equit} = r_f + (r_m - r_f)\beta_{unlevered\ equity}$$

From the previous section, we already have our values for the risk free rate and the risk premium. In order to calculate the unlevered equity beta—also referred to as the asset beta—we use the formula below:

$$\beta_{unlevered\ equity} = \beta_{levered\ equity}(\frac{E}{E+D}) + \beta_{debt}(\frac{D}{E+D})$$

Where:

E = the market value of equity
D = the market value of debt
E + D = the total value of the company
β_{debt} = a measure of the riskiness of the yieldco's debt

(Some derivations of this formula include a (1-T) term, where T is the corporate tax rate, to account for the value of interest deductions on corporate taxes. However, yieldcos are generally designed to not owe taxes and thus the (1-T) term would reduce to 1 and have no effect on the answer.)

We already have 8point3's levered equity beta, which we calculated above. It's equity value is approximately $1 billion as of this writing.

We calculate debt beta by rearranging the CAPM formula:

$$r_{debt} = r_f + (r_m - r_f)\beta_{debt}$$

is equivalent to

$$\beta_{debt} = \frac{r_{debt} - r_f}{r_m - r_f}$$

Where r_{debt} is the expected return on the company's debt and the other variables are as described above.

The majority of 8point3's debt is a term loan which has an interest rate of 2.64%. We calculate the debt beta to be 0.19:

$$\beta_{debt} = \frac{2.64\% - 1.78\%}{4.45\%}$$

$$\beta_{debt} = 0.19$$

Since the risk of default on this debt is quite low given 8point3's relatively low leverage, we take the coupon rate of the debt as the expected return on debt. If the risk of default were nontrivial, we would want to adjust the r_{debt} to reflect the fact that expected return is lower than the coupon rate on the debt.

The market value of debt comprises three pieces – long term debt, short term debt, and tax equity. We include tax equity along with debt because in most structures that use tax equity the tax equity investors are effectively senior to regular equity. In fact, some yieldcos (such as TerraForm Power and TerraForm Global) account for tax equity in the liabilities sections of their balance sheets.

We use the book value of debt as a proxy for market value. Most corporate debt is not traded on a public exchange the way that a company's stock might be. Our assumption should be a good one if the risk of default and market interest rates are similar to those when the debt was issued.

To estimate a market value of tax equity, we take the book value and multiply it by a multiplier that is the ratio of book value to market value of regular equity:

$$Multiplier = \frac{Equity\ Market\ Value}{Book\ Value\ of\ Total\ Sharehold\quad 's\ Equity - Book\ Value\ of\ Tax\ Equity}$$

We calculate a multiplier of 1.66 and a tax equity market value of $15.4 million. Thus, the total debt and debt-like market value is:

FIGURE 2: DEBT AND TAX EQUITY IN 8POINT3'S CAPITAL STRUCTURE

	Market Value
Long-Term Debt	$297M
Short-Term Debt	$2M
Tax Equity	$15M
Total	**$315M**

Now that we have all the elements, we can calculate our unlevered equity beta.

$$\beta_{unlevered\ equity} = \beta_{levered\ equity}\left(\frac{E}{E+D}\right) + \beta_{debt}\left(\frac{D}{E+D}\right)$$

$$\beta_{unlevered\ equity} = 0.83\left(\frac{\$1{,}038}{\$1{,}038 + \$315}\right) + 0.19\left(\frac{\$315}{\$1{,}038 + \$315}\right)$$

$$\beta_{unlevered\ equity} = 0.68$$

And finally, we calculate the unlevered cost of equity:

$$r_{unlevered\ equity} = r_f + (r_m - r_f)\beta_{unlevered\ equity}$$

$$r_{unlevered\ equity} = 1.78\% + 4.45\% * 0.68$$

$$r_{unlevered\ equity} = 4.82\%$$

Our unlevered cost of equity is lower than the levered cost of equity. This makes sense because any debt has a senior claim on cash flows, thus increasing the riskiness of equity in levered companies.

Average YieldCo Cost of Equity

To broaden our analysis, we used the above methodology to calculate the cost of equity for a number of other public yieldcos. We found an average cost of equity of 7.01% levered and 5.46% unlevered.

FIGURE 3: BETA, CAPITALIZATION, AND COST OF EQUITY FOR YIELDCOS

YieldCo	$\beta_{levered\ equity}$	$r_{levered\ equity}$	D / (E+D)	$\beta_{unlevered\ equity}$	$r_{unlevered\ equity}$
8Point3	0.83	5.48%	23%	0.68	4.82%
Abengoa Yield plc	1.38	7.91%	79%	0.81	5.39%
NextEra Energy Partners	0.71	4.93%	56%	0.49	3.95%
NRG Yield	1.52	8.55%	65%	0.83	5.50%
Pattern Energy Group	0.99	6.20%	52%	0.76	5.14%
TerraForm Global	1.51	8.48%	73%	1.15	6.89%
TerraForm Power	1.29	7.52%	64%	1.06	6.50%
Average	**1.18**	**7.01%**	**59%**	**0.83**	**5.46%**

Conclusions

These relatively low figures have important implications. First, these are lower than the cost of equity at every developer we know, and that of most large corporations. Placing projects in these types of vehicles will therefore increase their value if the owner would otherwise discount cash flows at a higher

rate. This means a yieldco should be willing to pay more for projects than most corporate investors, other things being equal. (Sometimes other things are not equal, though, such as when a corporate investor can offset its own taxes with renewable energy tax credits rather than using third-party tax equity.)

A developer or corporation without a yieldco could make the argument that it should discount cash flows from projects at these lower rates because they reflect the risks inherent to the projects, but in our experience they frequently lose these battles with their own investors.