



Green Investment Partners

Renewable Energy Asset Valuation

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Renewable Asset Valuation

If you want to invest in project-based renewable energy companies, you have to value each underlying asset accurately. In this article, we will share the six most common pitfalls in renewable asset valuation.

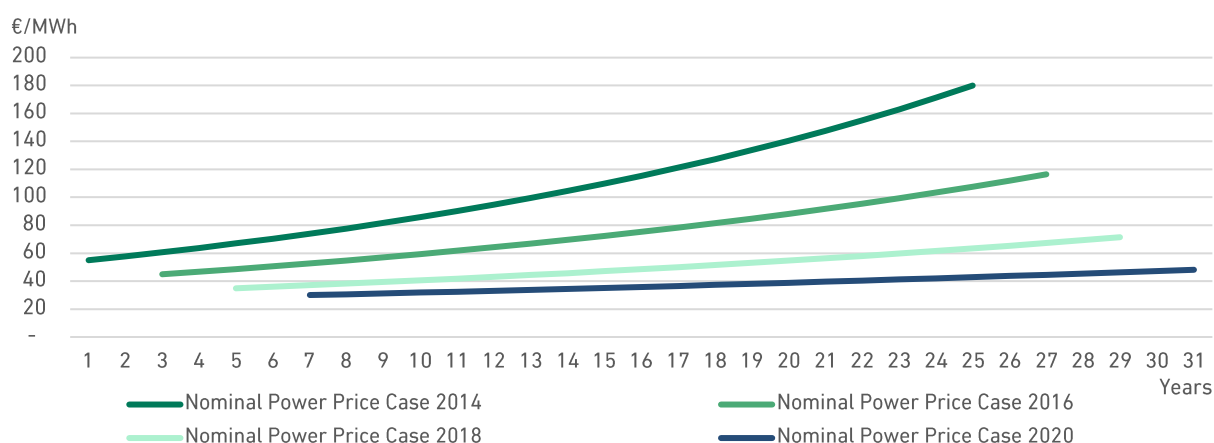


1. Using Too Aggressive Long-Term Power Price Assumptions

The most common, and arguably the most serious, mistake investors make when analysing renewable energy assets, is not to pay attention to long-term power price assumptions. Many companies present numbers backed by overly optimistic power price curves from consultants without thinking through how much this affects the valuations.

Figure 1 is an illustrative graph showing how power price forecasts kept getting downgraded by consultants from 2014 to 2020. The graph is an example of how the curves moved in several European countries. And as you can see, the curves all had one thing in common. The price growth looks conservative for the first couple of years until cumulative growth pushes them to the sky long-term.

Figure 1 – Illustrative Power Price Assumptions



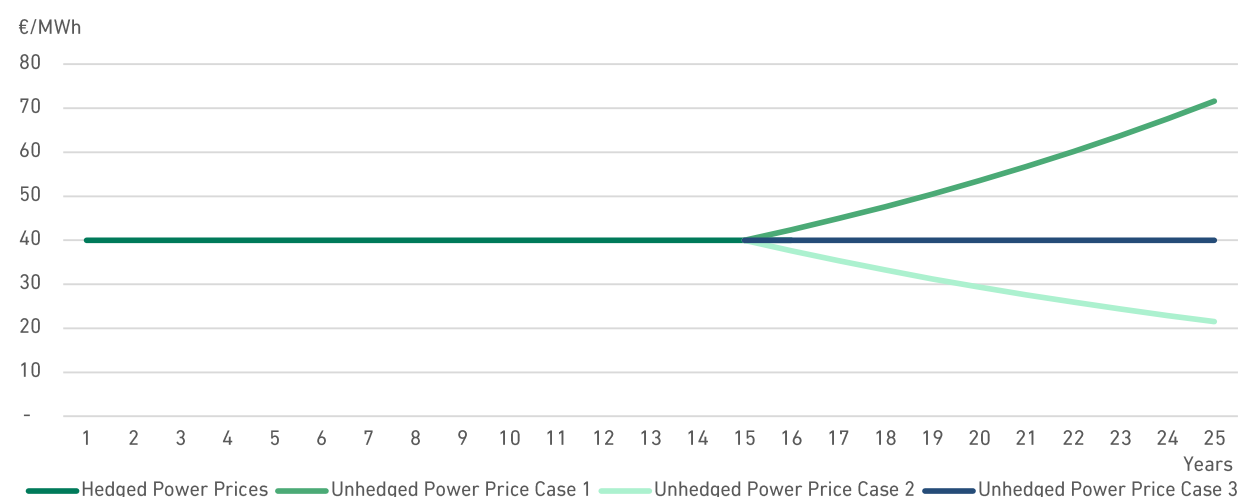
Source: Green Investment Partners

For many other types of projects, this matters less as there is quite a lot of upside in the first few years if prices end up getting higher. But renewable energy projects often have an initial period of 10 – 20 years where power prices are hedged. As a result, merchant prices (spot market prices) will matter most after this period ends.

In many countries, projects have up to 75% of revenues hedged for years 1 – 15. However, this can vary and be structured differently for each individual project. If in 2014, you considered an investment with 2014 power price assumptions, you might have believed your investment offered excellent downside protection. But as the years progressed, nominal prices decreased, and so did the forward curves. The actual power prices ended up much closer to the 2020 assumption. And if power prices are lower than the initial assumptions, the negative impact on the project IRR can be significant.

While it was tempting to look at the forward curves in Figure 1, 75% of your cash flows will rather look like the ones in Figure 2. Here, the first 15 years of cash flows are hedged and therefore not impacted. But the net present value of the project at a given discount rate will still be significantly influenced by power price assumptions for the period after the hedging runs out.

Figure 2 – Illustrative Power Price Hedged Profile



Source: Green Investment Partners

The energy market is complex, and predicting what it will do across a 10 – 20 year period is difficult. Some of the reasons why consultants and investors have incorrectly predicted significant power price growth long-term are listed below:

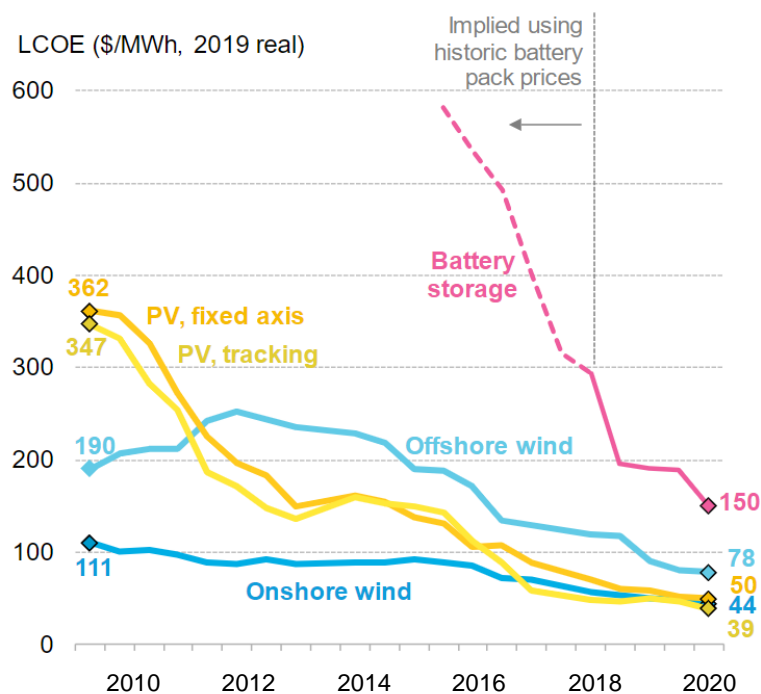
- Not capturing how fast renewables are growing and the impact on the system.
- Underestimating technological advancements as measured by the average net present cost of electricity generation for a generating plant over its lifetime (Levelised Costs of Energy "LCOE") and therefore the marginal cost of supply for a new unit of baseload power in a region.
- Overestimating how the price of fossil fuels will impact the marginal cost of electricity production. Power markets are moving away from coal reliance and towards natural gas and renewables to set prices.
- Having too optimistic forecasts for carbon prices.
- Assuming too high correlation between carbon prices and power prices. There is now less impact from fossil fuel pricing on the system. This varies significantly depending on the country.

- Underestimating the impact of generation-weighted vs time-weighted prices. A fast build-out of renewables in one region often results in lower real achieved electricity prices for that specific technology. When there are many wind farms in one area, they tend to produce energy at the same time. And since this energy cannot be stored and used later, the power prices are pushed down significantly while this overproduction is happening. So the average achieved price for the power produced by the wind farm will be a lot lower since they mostly produce and sell power when the power prices are low. Another example is the so-called duck curve for solar in California. A further factor here can also be grid constraints, which might result in curtailment for a specific region. This is a big topic in China or Schleswig Holstein in northern Germany. The impact of this factor can often be >10% of the achieved power prices.

We are, of course, making these points in hindsight. And other types of mistakes can be the source of wrong power price estimates going forward. But it does not make it less important to us to understand historical mistakes and learn not to apply them again.

Making 25-year forecasts is difficult for any changing and dynamic system. To illustrate this, Figures 3 – 6 show how technological improvements in renewable energy change every year.

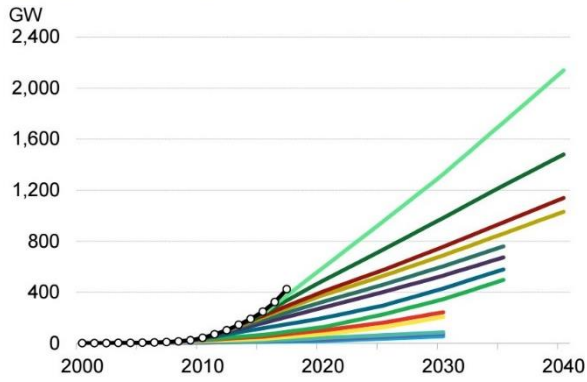
Figure 3 – Global Benchmarks: PV, Wind and Batteries LCOE



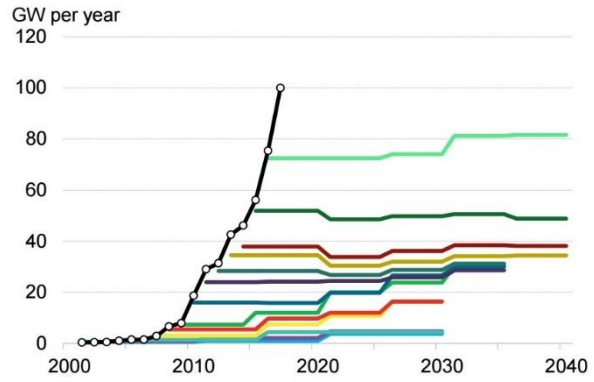
Source: BloombergNEF. Note: The global benchmark is a country weighted-average using the latest annual capacity additions. The storage LCOE is reflective of a utility-scale Li-ion battery storage system with four-hour duration running at a daily cycle and includes charging costs assumed to be 60% of wholesale average power price.

Figure 4 – IEA Solar Capacity Forecast Evaluation 2017

Global cumulative solar installations



Annual solar additions



— Historical — 2002 — 2004 — 2006 — 2008 — 2009 — 2010 — 2011 — 2012 — 2013 — 2014 — 2015 — 2016 — 2017

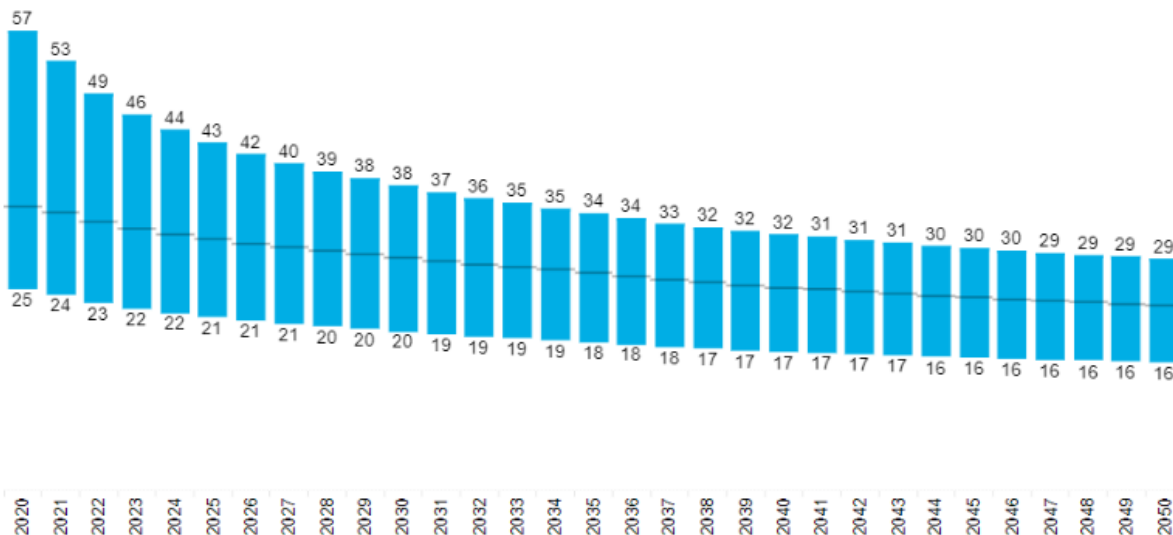
Note: 2002-2009 Reference, 2010-2017 New Policies Scenario

Source: Liebreich Associates 2017

Source: IEA World Energy Outlook

Figure 5 – BNEF LCOE Onshore Wind US

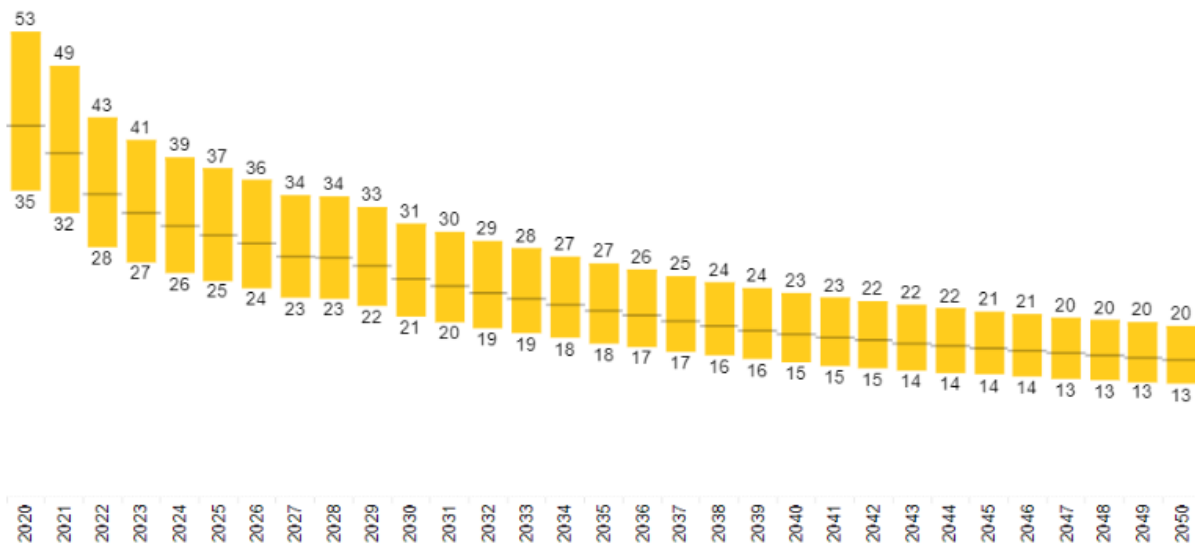
Forecast LCOE range (\$/MWh, 2019 real) - United States, Wind onshore



Source: BNEF 2020

Figure 6 – BNEF LCOE PV non-tracking US

Forecast LCOE range (\$/MWh, 2019 real) - United States, PV non-tracking



Source: BNEF 2020

2. Not Understanding the Difference Between Equity Risk and Bank Risk

Many equity investors incorrectly assume that their returns are relatively secure against power price fluctuations because a large part of the volume is hedged 10 to 15 years into the future. However, most power projects also come with high leverage. In fact, the reason for the hedged power prices is often demands from banks who will only agree to provide leverage against a power plant that has a secured income. But often, the percentage of the revenues that are hedged are only enough to cover loan repayments and interests. And what is left for the equity holders is highly sensitive to the spot power price.

Equity returns are most of the time far more sensitive to power prices than unlevered project IRRs. And this is the risk investors must consider when they compare the potential return on the investments to the opportunities in their universe.

3. Assuming Power Prices Have the Same Inflation as Operating Costs

O&M contracts and other operating contracts for power plants are often indexed to CPI to reflect general inflation. Some investors make the mistake of automatically applying this predicted inflation to power prices. But we cannot do this without considering what these inflation forecasts reflect.

CPI does, for example, include components for power and fossil fuel prices. And when power prices are modelled, increases in those prices are often already considered. Therefore, one could be double counting increases in fossil fuel prices already included in the real power price forecasts.

During the last ten years, the inflation of power prices in most markets has been lower than the CPI. Whether it makes sense to isolate inflation from other inputs when predicting power prices is a discussion on its own. And the answer is that it probably depends on your model. But as a

general rule, we do not believe it makes sense to assume the same inflation rate on power prices as CPI indexed-contracts.

4. Using Unreliable Data Sources as Production Forecasts for Wind and Solar

There have been periods when wind forecasts in Germany were significantly above the real production numbers due to incorrect reference data. However, this is becoming less of a concern as the quality and methodology of production forecasts has significantly improved over the last few years, in part due to the exponential increase in available data.

Do not trust any data source blindly. If there are large discrepancies between current production numbers and forecasts, and you see no obvious explanation for why production should suddenly increase or decrease, either find a different source or try to make a forecast using sensible assumptions about the future.

5. Not Considering the Technical Quality of Equipment

The market is competitive, and there is a delicate balance between keeping costs low and underinvesting in equipment. If a company underinvests in an attempt to save money, but ends up with production downtime due to technical issues, the losses usually far exceed any savings made.

A good warranty and suitable O&M contracts are essential to have in place, but they do not always compensate fully for every technical problem which may limit electricity production. This is especially true for older sites, and it is crucial to plan conservatively. You must also consider that higher capacity factors can come with more technical risk, as more stress is put on the wind turbines.

6. Trusting Predicted IRRs or Yields Without Knowing the Assumptions Behind

Trusting IRRs or promises of yields from companies without understanding the power price assumptions behind them is an easy mistake to make when considering listed energy companies. Infrastructure investors, yieldcos and other investors are in a competitive situation where companies will attract more capital if they can promise higher returns. This means that their incentives are not always aligned with the investors', and higher power price expectations can lie behind optimistic yield predictions.

Companies are also not always transparent about the assumptions that come along with a promised IRR or a Net Asset Value calculation. If that is the case, the investors are left to build their own models to see if the investment still makes sense when using the same power price predictions as they use for other companies.

It is important when comparing investments in general to use the same market estimates. When trying to compare apples with apples, you can easily get confused if you suddenly have an entire orchard of fruit on your hands.

Conclusion

These are historical factors to consider. And the future will certainly bring further issues to light. We believe that the best risk mitigants are always conservative assumptions. And it is during times when we can see clear upside while still keeping to conservative estimates that we want to invest more.

Sometimes during high volatility periods, such as the Covid-19 stock market crash in March 2020, the market offers such a discount that we can buy renewable projects with a comfortable margin of safety and below their private market valuations.

But also in these periods, it is important to be aware of the pitfalls of renewable asset valuation and to not take advertised Net Asset Values or IRRs for granted as each case comes with its own 25 year or more forward-looking assumptions. Without knowing the assumptions behind the IRR, one cannot judge the risk that is imbedded in the promised return.

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