Lessons learned from market forecasting

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www.thisisxy.com

X&Y PARTNERS

Romeu Gaspar
romeu.gaspar@thisisxy.com
+44 (20) 3239 5245

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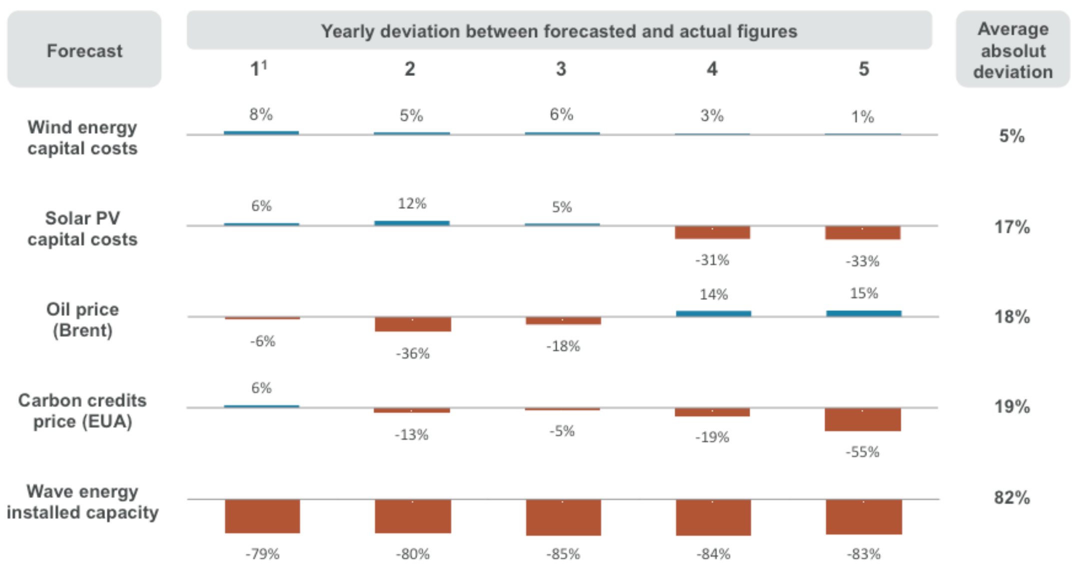
> Forecasting is about the journey, not the destination: what you learn in the process will be more useful than the forecast itself.

We are often asked to make market forecasts, so we decided to go back to some of our older forecasts and see how well we fared. We found that most forecasts had a fair 15-20% deviation from the actual figures (Exhibit 1). There were however outliers: on the one hand, we overestimated the global installed capacity of wave energy by an order of magnitude (a case we discussed previously here), while on the other hand we predicted the evolution of wind energy costs inside a 5% margin. In any case, the real value of forecasting is what you learn in the process, as it forces you to understand and quantify the forces that shape a particular market. In this article we share four lessons learned while making market predictions and forecasts.



(1): Difference between the year that was forecasted and the year in which that forecast was made (e.g. 5 corresponds to a 2012 forecast made in 2007; Source: IEA, EWEA, Bluenext, Goldman Sachs, UE DoE, X&Y Partners analysis

Exhibit 1 - Comparison of 5-year forecasts with actual data for: wind energy capital costs, solar PV capital costs, oil price, carbon credits price and wave energy installed capacity

1. Do not average forecasts

It is tempting to take forecasts from different sources and average the results. It is also risky, because: **i)** different forecasts will likely be based on different premises; and **ii)** forecasts are often biased (for instance, an industry association promoting a particular renewable energy will likely be optimistic about installed capacity forecasts and potential cost reductions).

A better alternative is to use a Delphi method, a process that shares roots with prediction markets and other crowd wisdom techniques. In a Delphi, a group of experts is asked to individually answer a question (e.g. *what will be the cost of solar energy in 2015?*). The answers and assumptions of the experts are then discussed and compared, and each of the experts makes a second prediction. This second prediction is also made individually, but now the expert is able to leverage the new information he gained from the other experts. The process is iterative and usually runs until the moderator is satisfied that the answers share the same premises and are bias-free.

Exhibit 2 illustrates the results of a Delphi method we recently used to gather the inputs necessary to calculate the evolution of the LCoE (Levelized Cost of Energy) in the Middle East for several renewable energy configurations.

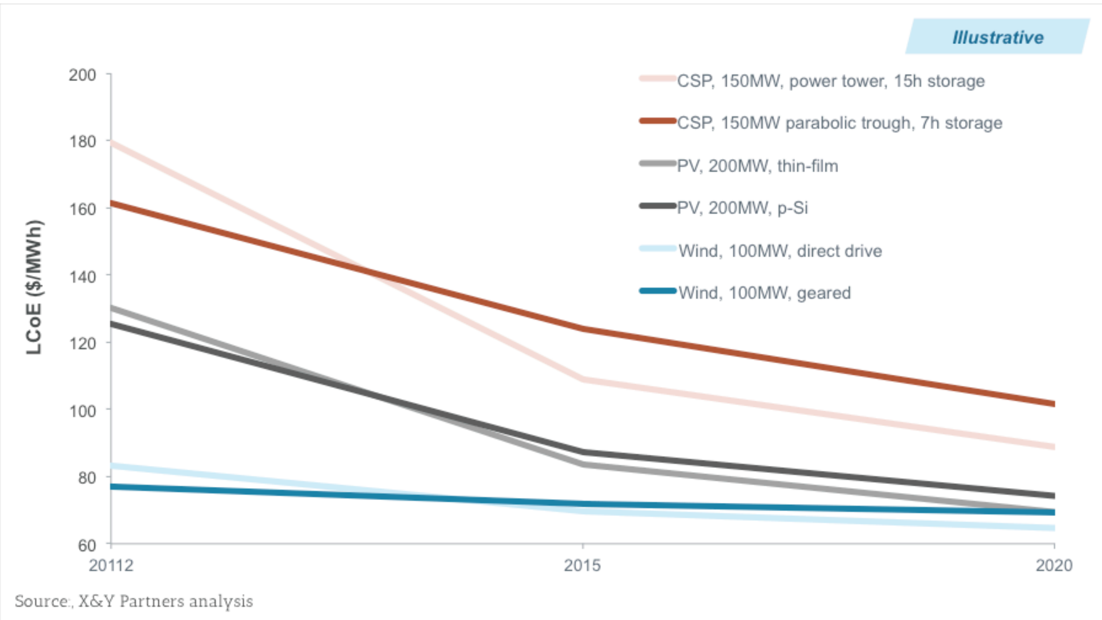


Exhibit 2 - Example of a Delphi method applied to estimating the LCoE of several PV, CSP and wind energy specific plant configurations

2. Make a sanity check

History is a poor indicator of what will happen in the future, so forecasts are inherently inaccurate. They can however be made more precise by combining different estimation methods, or by running a sanity check to confirm that the final figure is coherent. This will not guarantee better results (only a crystal ball would do that) but will help to identify flaws in logic, unrealistic assumptions and inaccurate data.

As an example, Exhibit 3 compares a bottom-up forecast for wave energy deployment (made by summing up individual regional forecasts) with the historical early wind energy deployment. Benchmarking forecasts against historical data from other sectors is a good way to quickly spot unrealistic assumptions, and to keep in check compounded errors that often affect bottom-up estimates.

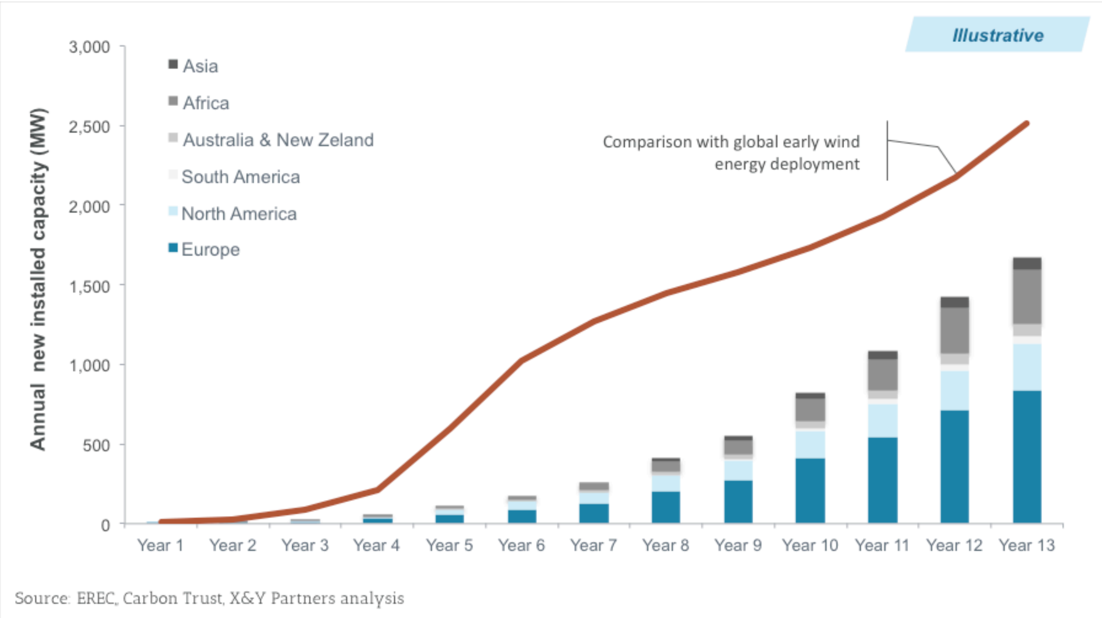
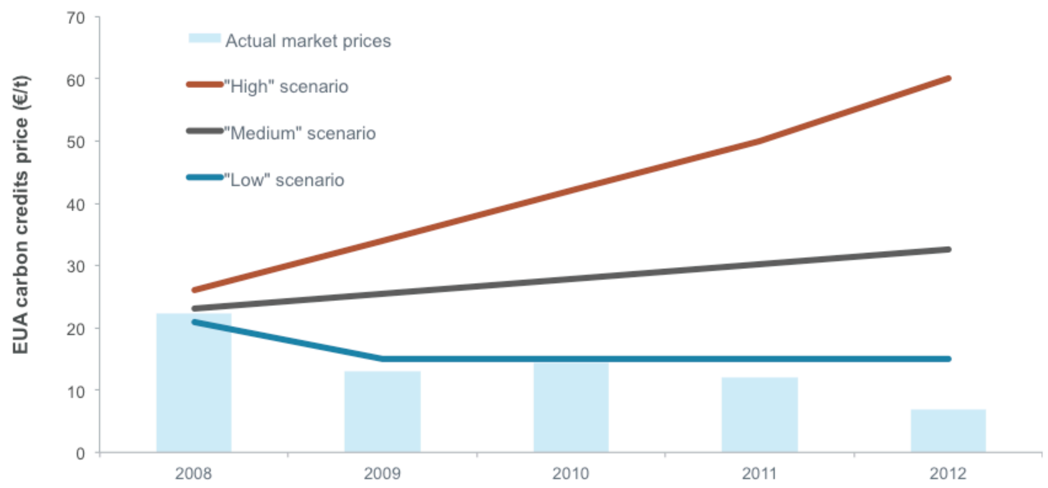


Exhibit 3 - Example of using the historical early wind energy deployment as a sanity check for a bottom-up forecast for wave energy deployment

3. Build scenarios

Forecasts should not be a single data point or curve, but rather a collection of scenarios. Building scenarios will do little against *black swan events* (a term coined by Nassim Taleb to describe rare and unpredictable events with extreme impacts), but will help you understand the impact of foreseeable events with several distinct outcomes.

Exhibit 4 illustrates three scenarios for the forecast of EUA (European Union Allowance) carbon credits prices. The 'High' scenario assumed that the Kyoto Protocol was followed by a global agreement, the 'Medium' scenario was based on an extension of the Kyoto Protocol, and the 'Low' scenario assumed no significant agreement between the parties was reached.



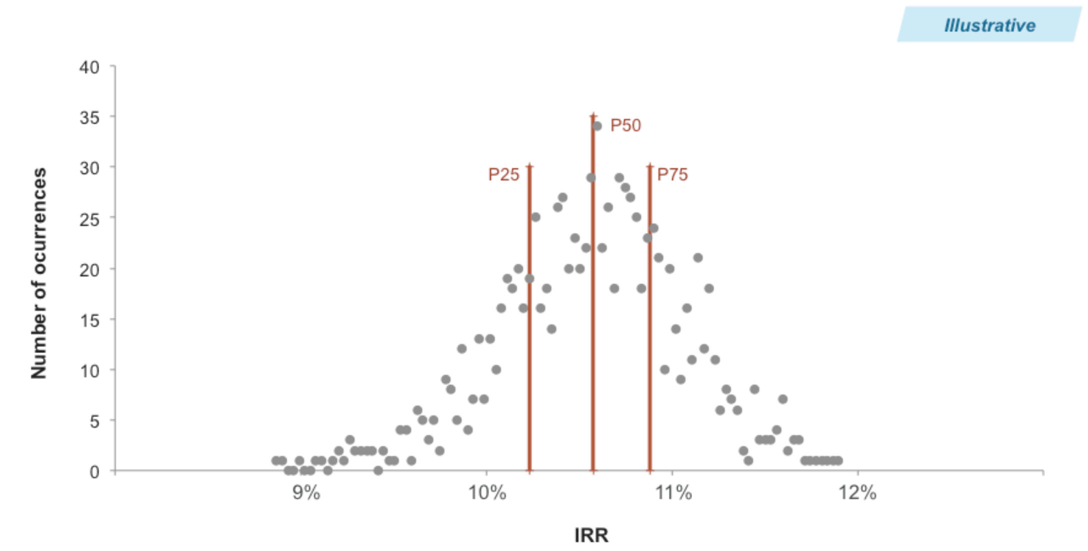
Source: Bluenext, X&Y Partners analysis

Exhibit 4 - Comparison of three scenarios for the evolution of carbon credit prices with the actual market prices

4. Run a sensitivity analysis

Even in the absence of foreseeable events that can dramatically change the direction of a forecast, there are usually a few key parameters that can cause sizeable variations in the predictions. Running a sensitivity analysis on these parameters is thus a sound idea. Pool power prices, for instance, depend on the prices of the various power sources, and on factors such as rainfall and wind (since more rain means more hydroelectric power and more wind means more wind power).

For forecasts that depend on several key parameters, it may be worthwhile to run a Monte-Carlo simulation, a method that tests the impact of simultaneous changes in multiple inputs. Exhibit 5 illustrates the application of a Monte-Carlo simulation to the valuation of a CSP (Concentrated Solar Power) plant. The simulation showed that the compounded effect of small changes in key parameters (such as energy yield, pool price, capital expenditure and interest rate swap rates) could have a meaningful impact on investor returns.



Source:, X&Y Partners analysis

Exhibit 5 - Example of a Monte-Carlo simulation applied to the valuation of a CSP plant

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