SOLAR THERMAL LEVELISED COST OF ENERGY

JENNY CHASE

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LEVELISED COST OF ELECTRICITY H1 2014: METHODOLOGY NOTES (1 OF 2)

Definition

The Bloomberg New Energy Finance definition of levelised cost of electricity (LCOE) is the long-term offtake price required to achieve a required equity hurdle rate for the project. This report tracks the LCOEs of 24 technologies, all at utility-scale with the exception of fuel cells. (For fuel cells, in lieu of 'offtake price', we consider the avoided cost of electricity.) The LCOE model is based on a pro-forma project finance schedule which runs through the full accounting of the project, based on a set of project inputs. This allows us to capture the impact on costs of the timing of cash flows, development and construction costs, multiple stages of financing, interest and tax implications of long-term debt instruments and depreciation, among other drivers. The outputs of the model include sponsor equity cash flows, allowing calculation of the internal rate of return.

LCOE ranges driven by regional variations

The LCOEs are given as a range, with a *central scenario* within that range. The range is composed of a number of *region-specific scenarios* meant to represent key markets, with inputs corresponding to projects typical of those markets, while the *central scenario* is made up of a blend of inputs from competitive projects in mature markets. For example, in the case of PV, the *low scenario* corresponds to a typical Chinese project (including capex, capacity factors, and costs of debt typical in China); the *high scenario* corresponds to a Japanese project (capex, capacity factor, cost of debt typical in Japan); and the *central scenario* reflects the LCOE of a project with German capex, 17% capacity factor, and a Western European average cost of debt. The *central scenario* thus does not reflect a project characteristic of any particular market, but rather incorporates a blend of inputs from a range of competitive and active markets. Because we have used this methodology consistently since 2009, the *central scenario* can be used to show how these costs of these technologies have evolved over time.

Empirical data sourcing

For the most competitive PV and onshore wind markets, we use proprietary price indexes to build bottom-up capex assumptions, paired with region-specific data for financing, macroeconomics, and resource quality. For example, for UK onshore wind, we derive the LCOE using the BNEF Wind Turbine Price Index for the UK, along with operations and maintenance (O&M) figures from our Wind O&M Index. The full capex also accounts for regional permitting and land acquisition costs. For PV and onshore wind projects in less competitive markets, and for all other technologies, we use a combination of reported project-level costs (as captured in our Industry Intelligence database), local input from our regional analysts, and data from publicly available primary research.

LEVELISED COST OF ELECTRICITY H1 2014: METHODOLOGY NOTES (2 OF 2)

Exclusion of subsidies

The LCOEs shown in this report represent the gross cost of building, operating and financing electricity generation technologies. As such the analysis excludes all subsidies and incentives (eg accelerated depreciation, grants, production tax credits) but includes conventional taxes such as corporation tax. This approach enables a direct comparison of the cost of generating electricity from different sources. These LCOEs are therefore from the price at which a developer may wish to sell the electricity, as the sale price would be net of any subsidies.

Lumpy nature of certain technologies

While cost evolutions can be tracked consistently for widely deployed technologies such as PV and onshore wind – creating a coherent time series – this may not be the case for other less mature technologies such as solar thermal and marine. Heavy dependency on support mechanisms and highly localised costs means that *central scenarios* reflecting current costs for these projects may move erratically as the geographic centres of deployment shift over time.

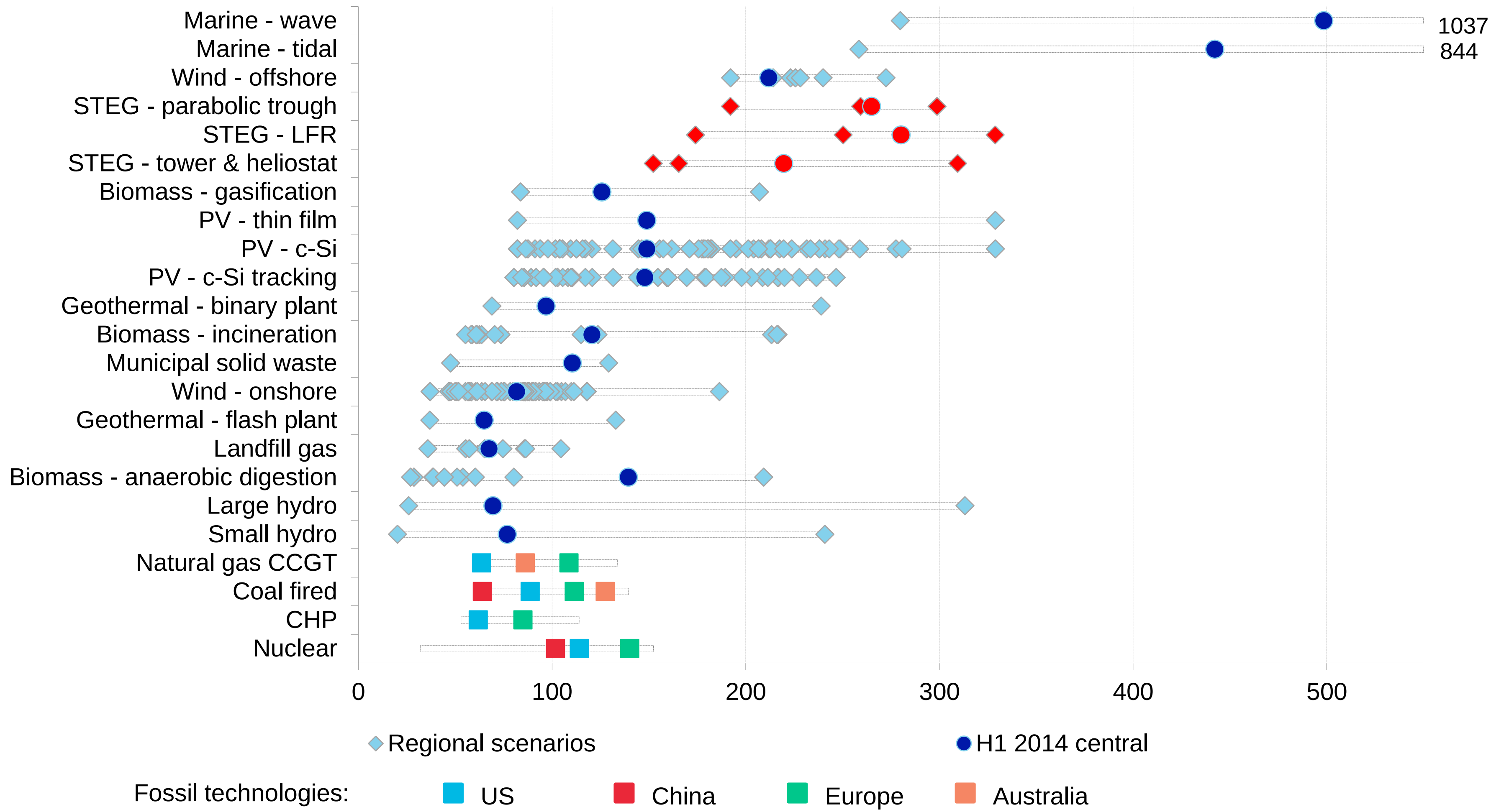
Macroeconomics and universal assumptions

For each individual country scenario, we apply the market's standard corporate tax rate and an inflation rate equal to the average of the IMF's forecasted CPI rate for that country, or the previous five years of actual inflation if a forecast is unavailable. For our *central scenario*, we have necessarily made certain simplifying assumptions: a single corporate tax rate of 35% and an annual inflation of 2%. We also assume that all projects are depreciated using a straight line approach. LCOEs are calculated assuming a development timeline that commences today. Today's LCOE is then inflated each year to reflect that project revenues are typically inflation-linked. This analysis is done in nominal dollars.

The use of debt

A key driver of the LCOEs for all renewable energy technologies is the cost of finance, and specifically the cost of debt finance. The cost and availability of debt is a function of project risk and market conditions. The technology-independent portion of debt costs is the level of the underlying interest rate from which debt costs are calculated. The specific market in which a project is being financed can also have an effect on debt spreads through lenders' perception of market-specific sovereign, policy, regulatory or economic conditions. The higher the perceived risk, the higher the cost of debt.

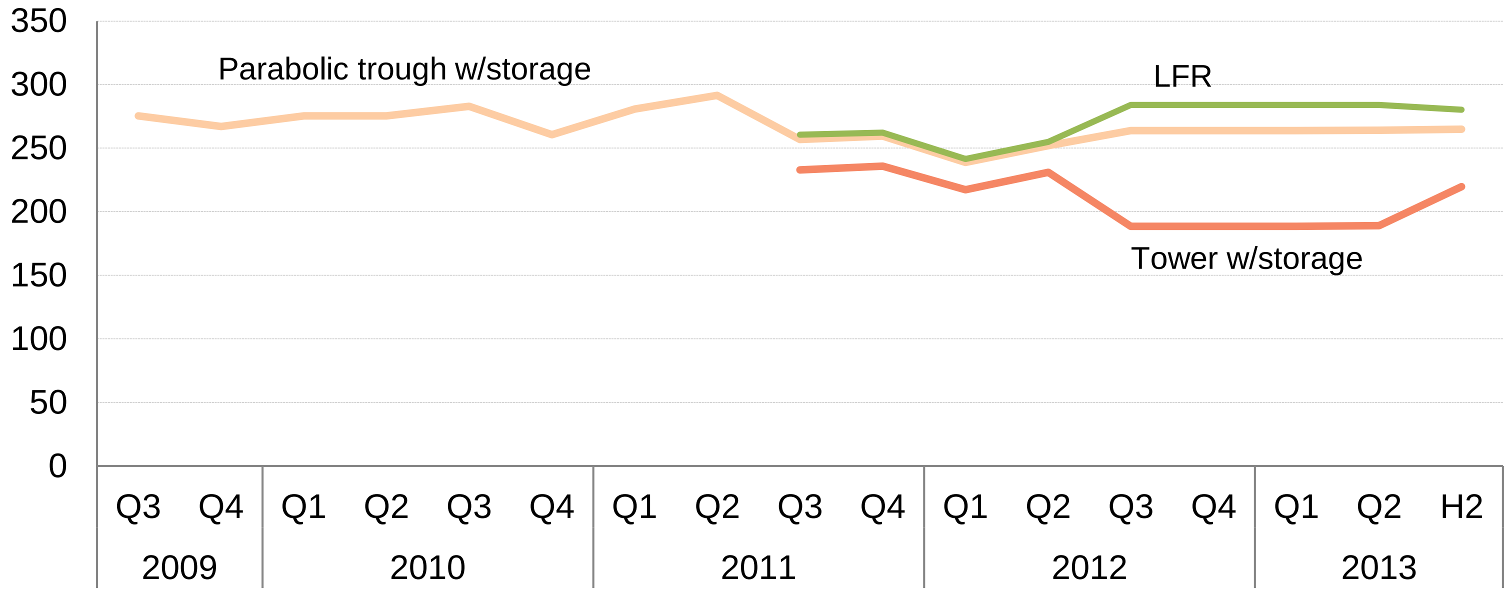
LEVELISED COST OF ELECTRICITY, H1 2014 ($/MWH)



Note: LCOEs for coal and CCGTs in Europe and Australia assume a carbon price of $20/t. No carbon prices are assumed for China and the US.

Source: Bloomberg New Energy Finance

LCOE: SOLAR THERMAL – *CENTRAL SCENARIO* ($/MWH)



- Solar thermal LCOEs range have shifted since our last update, reflecting that global deployment is currently focused in South Africa. The announced costs of recently tendered projects there suggest that tower & heliostat projects with storage have become more expensive, while parabolic trough and LFR projects have remained relatively consistent
- South Africa held a Round 3 tender won by two STEG projects with an effective PPA of about $240-270/MWh (they have a time of day pricing component)

Note: Prices are in nominal dollars

Source: Bloomberg New Energy Finance

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SOLAR THERMAL LCOES

JENNY CHASE, JCHASE12@BLOOMBERG.NET