



ELECTRICITY MARKET REPORT – SOLAR PV

Portugal wholesale price and PV Capture Price projections (2018 – 2050)

Portugal’s Solar PV sector is on the brink of transformation. Grid-parity having been reached and the boost of new EU renewable targets will mean that one of Europe’s sunniest regions is about to experiment unprecedented levels of PV deployment over the next 20 – 30 years that will transform the energy landscape.

Our report provides a one-stop-shop for investors looking to understand the risks / opportunities of investing in operating or developing Solar PV assets.

In this report, EKON Strategy Consulting (formerly ONYX) provides its independent price forecasts (wholesale price and PV capture price forecasts under three scenarios, as well as our expert opinion on the Portuguese energy market (regulatory and market risk analysis) and its likely future development.

This report has been prepared by a coordinated team of experts based in Madrid, with real on-the-ground knowledge of the Portuguese Solar PV market.

Our reports and price projections have been used by leading Utilities, Infrastructure Funds, Lenders and Independent Promoters in investment decision processes, negotiating debt or re-financing as well as in commercial and investor/state arbitrations.

Key Report take-aways

- Portuguese pool price / PV Capture price, 3 scenarios,
- Analysis of key drivers (Market /Regulatory),
- Regulatory and Market risk analysis (economic as well as the energy sector indicators),
- Risk analysis by asset type: operational, developing (merchant),
- 130-page report + xls spreadsheets and workshops.

Regulatory to market risk transition

The last 10 years have seen the Portuguese Solar PV industry transition from a scenario of full exposure to regulatory risk (receiving 100% regulated revenues), to one of market risk (receiving 100% revenues from the market (pool).

The key reason for the risk transition (from regulatory to market risk) has been the drop of the PV LCOE (Levelized Cost of Electricity) which in turn has been caused by the drastic drop in Solar PV CAPEX. All the while that the PV LCOE has been above the Portuguese pool price (prior to 2017), the Government has provided a FiT to incentivize new investments in PV and other renewables, this is no longer the case.

Reaching grid-parity means that developing projects are essentially merchant assets.

The capture price spread

We identify the difference between the base-load pool price and the actual hourly price realized by a specific technology, in this case PV, from the energy sold into the wholesale electricity market (pool). The report provides our analysis of the impact of future development of Solar PV, which will lead to a cannibalization effect (an increase in negative capture price spread).

PPA, the new financing tool

This transition has also led to the development of PPAs as tools to minimize price volatility. PPAs have served to facilitate the financing of PV projects, as such, the relevance of accurate price projections becomes essential to minimize the associated risks and ensure satisfactory agreements are reached.

Regulatory uncertainties

The regulatory measures that have been published recently as well as the new rules published to organize the new developments (Portaria 62/2018) are analyzed in the Report.

Bespoke services

As regulation and market experts, we have a broad understanding of business requirements to deliver bankable reports and models, with the option of providing the following bespoke services:

- Tailored price sensitivities using Client’s assumptions,
- Portfolio and plant specific assessments to determine capture price, and
- “Lenders case” analysis based on Low Risk market case.

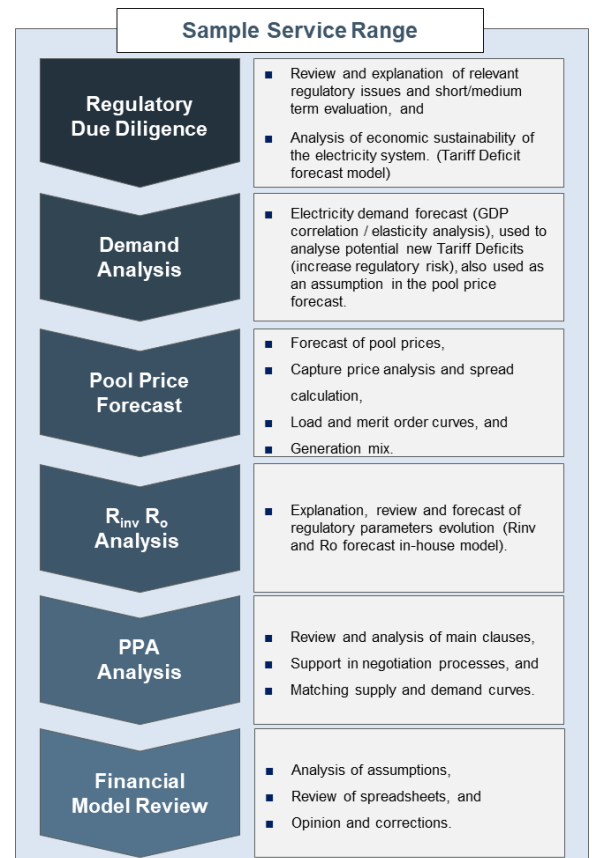
PMM Power Market Model

Our pool price / PV capture price model is based on a deterministic dynamic linear programming approach with the objective of minimizing the present value of fuel, maintenance, and capital investment costs across the whole forecast horizon. Resulting prices, dispatch, fuel use, and capacity expansion are optimal for each set of input parameters.



Our Philosophy

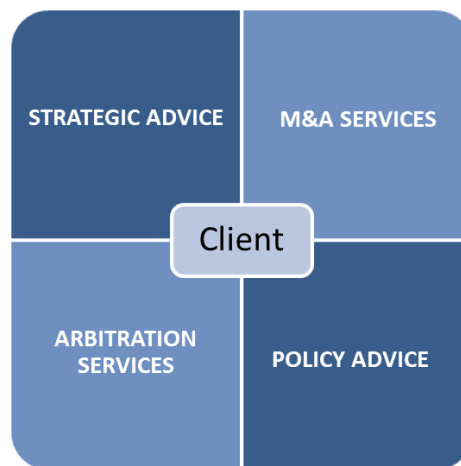
- Work on complex and large transactions, offering a full range of services from a high level red-flag report, all the way through to complete advisory services to buyers and sellers of assets or energy related businesses.
- Leverage on our experience in both conventional (coal, CCGT, cogeneration and nuclear) and RES (hydro, wind, solar) generation, electricity and gas infrastructure (electricity distribution, gas pipelines and regasification terminals), PPAs (power purchase agreements) and GSAs (gas supply agreements).
- Offer in-house models, internally developed, for long term (>25 years) pool price projections in order to be able to provide a full scope of services on an asset by asset or a portfolio basis, or an entire business.
- Provide robust and traceable financial models that can be easily audited but also allow for complex valuations.
- Work closely with the client and their financial, legal and technical advisors in preparing the deal or assisting in the negotiation phase.



Our Services

EKON carries out market assessment and screening as well as economic due diligence involving market price forecasts, review of fuel supply, O&M and other contracts, operating margins and financial loans contracts review.

EKON is specialized in arbitration at an international level. EKON, as an independent adviser and expert witness, has participated in some of the renewable arbitration claims from financial investors against the Spanish State.



EKON works on complex and large transactions, offering a full array of services that can range from a high level red-flag report, to complete advisory services to buyers and sellers of assets or energy related businesses.

EKON has provided advisory on understanding the regulatory framework of a number of European markets by assessing the impact on all players in such markets, (i.e., Incumbents, IPPs, End users and RES generators).

EKON Strategy Consulting (formerly ONYX Energy Consulting) is based in Madrid and provides key services in the Energy Sector that cover a broad range of Strategic and Operational Services for our Clients (Banks, Utilities, IPPs and Governmental Agencies and Authorities).

EKON's regulatory and market due diligence reports (including our price projections) have been relied upon by leading banks, utilities and infrastructure funds when investing and/or seeking finance for large energy investments. Our experts have participated in international arbitration and investor/state disputes.

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