ORUGA® by sener

ORUGA® 3D BACKTRACKING

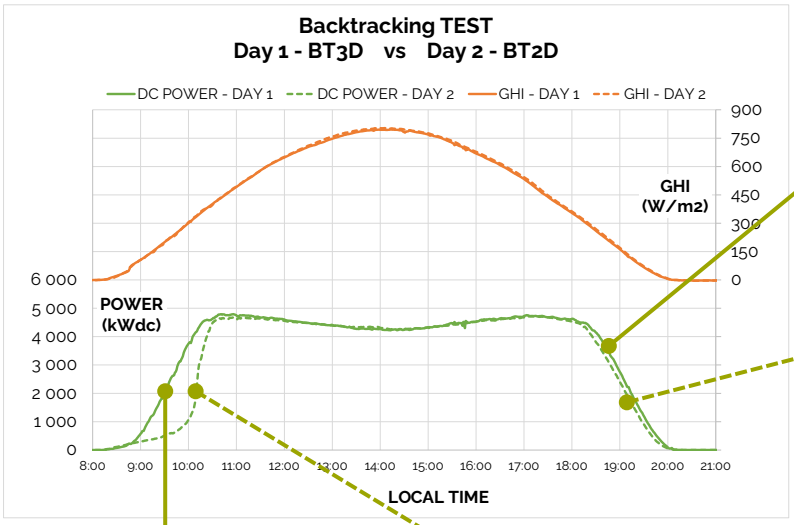
The most disruptive BT3D algorithm on the market, proven in commercial plants

UNIQUE: the corresponding increase in production is predicted by a commercial software

ORUGA® 3D Backtracking is a game changer in control technologies for photovoltaic plants:

- Maximizes the performance of any PV project on a complex terrain and, furthermore,
- the increase in production matches the value calculated previously with a commercial software: ORUGA® Performance Model, certified by a Technical Advisor.

ORUGA® 3D Backtracking algorithm was first implemented in a commercial plant in September 2023; since then, it has been proven through thousands of hours of operation[1].



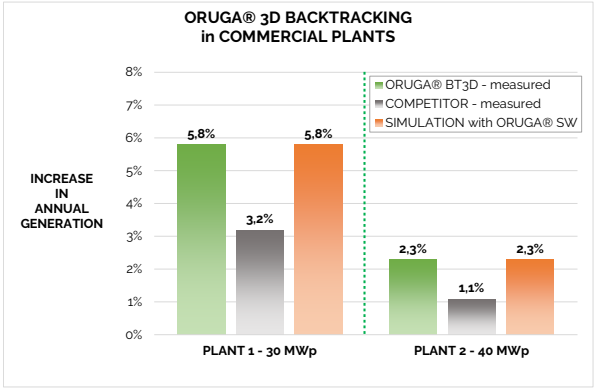


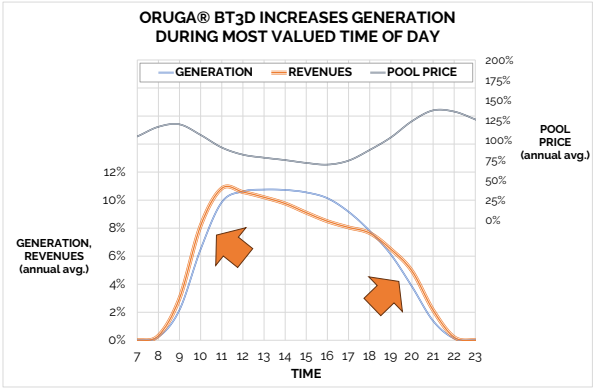


MEASURED DATA AT A COMMERCIAL PLANT

ORUGA® BT3D algorithm maximizes plant production at all times, outperforming current BT solutions regardless the problem: shadowing between rows (in the morning, see graph) or light strips on the ground (afternoon).

Outperforming all competitors so far, ORUGA® 3D Backtracking increases plant production when electricity price is at its highest: in the morning and in the afternoon.





[1] *Find here a video of ORUGA® 3D Backtracking installed at a commercial plant:* ***https://lnkd.in/dPwK2jc6***

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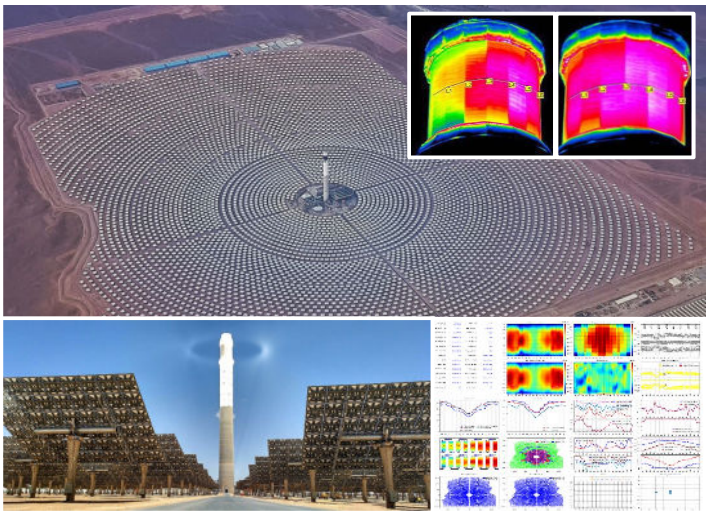
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ORUGA® Technology

ORUGA® BT3D algorithm is based on the lessons learned in the solar concentration tower projects Gemasolar (Spain, 19.9 MW) and Noor III (Morocco, 150 MW), where Sener proprietary advanced control techniques are implemented.

Specifically, a team from the Aerospace division has been the responsible for the development, testing and implementation of the control logic for the solar field of the tower plants, a major technical challenge in a technology that is an order of magnitude more complex than any photovoltaic plant.

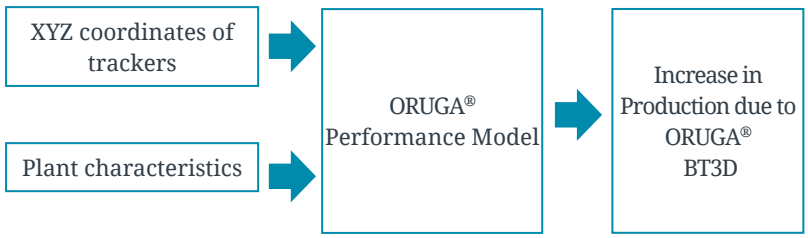
In both projects, Sener has met the expected values of annual production. This has been possible thanks to the extreme accuracy of its simulation software for solar concentration tower projects: SENSOL®, the precursor of ORUGA®.



ORUGA® Methodology

Using ORUGA® Performance Model software – certified by a Technical Advisor[2] – the Client can calculate the increase in production that will be generated by ORUGA® 3D Backtracking with respect to the 2D Backtracking or standard, the algorithm used by PVsyst software[3]. For this, just XYZ tracker coordinates and plant characteristics are required:





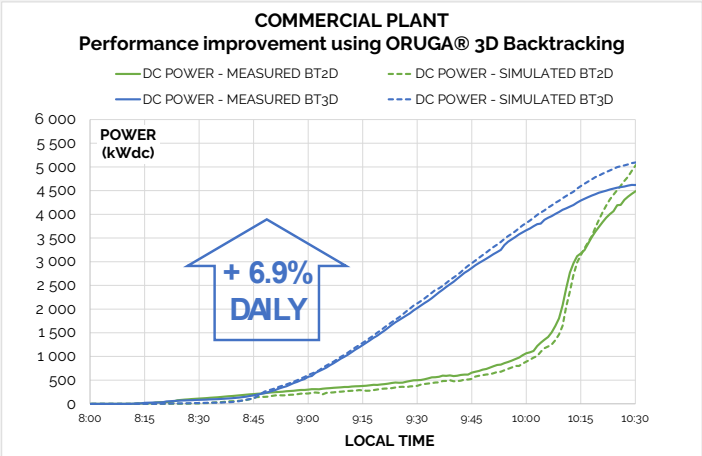
Know how your plant is performing and improve it in a bankable way

The graph shows the increase in production generated by ORUGA® 3D Backtracking at a commercial plant.

It is remarkable the extreme accuracy of ORUGA® Performance Model software in predicting the behavior of the plant in such a complex terrain as this under different Backtracking conditions.

It is clearly seen how simulation matches reality during the first hours of the day.

This ORUGA® feature is unique on the market, allowing the detailed assessment and the performance improvement of any photovoltaic.



Testing and price

Just a simple field test can prove the accuracy of ORUGA® Performance Model software in predicting plant performance improvement due to BT3D. The remuneration consists of a one-off payment that is paid back within a short period of time.

Want to know more? **orugaPV@sener.es**

[2] The Certificate is available for all potential Sener Clients interested in the use of ORUGA®

[3] For further information, read article *ORUGA® software PERFORMANCE MODULE - Comparison to the SRM*, June 23, 2023, available here: **https://www.group.sener/oruga-SRM**

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