ORUGA® by sener

ORUGA® CIVIL WORKS MODULE

Minimize the Earthworks and the Pylon Length of your PV plant

Valid for any tracker and fixed structure in the market

ORUGA® Civil Works module was created to provide a reliable solution to the growing demand in the market to reduce uncertainty in the definition of the CAPEX of PV plants on complex terrains.

Using advanced algorithms, ORUGA® minimizes the Earthworks and Pylon Length, being valid for any tracker and fixed structure in the market. The software has the additional capability to optimise plant design from the point of view of the LCOE.

Cross-checked against real project measurements, the surfaces automatically generated by ORUGA are realistic and constructible.

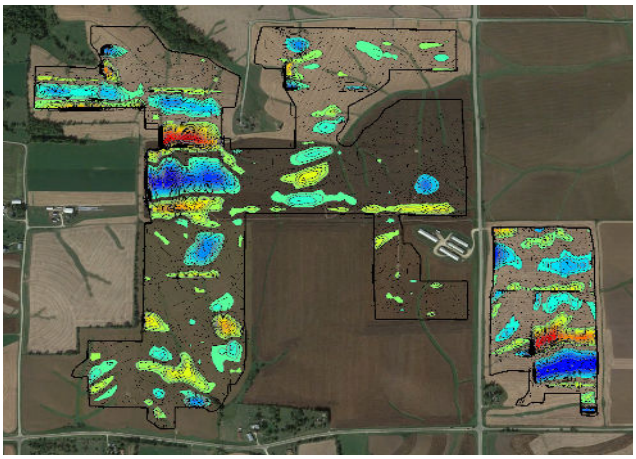


STRATEGIC DECISIONS
What is the optimum tracker for this terrain?

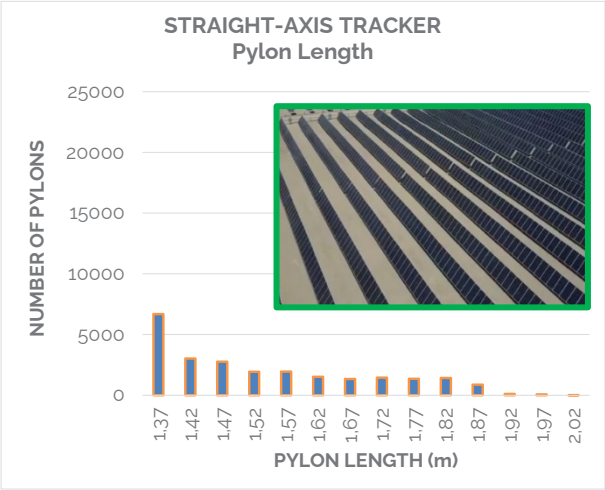
The selection of the optimum tracker is a task of particular importance in complex terrains because of its influence on the CAPEX of the project.

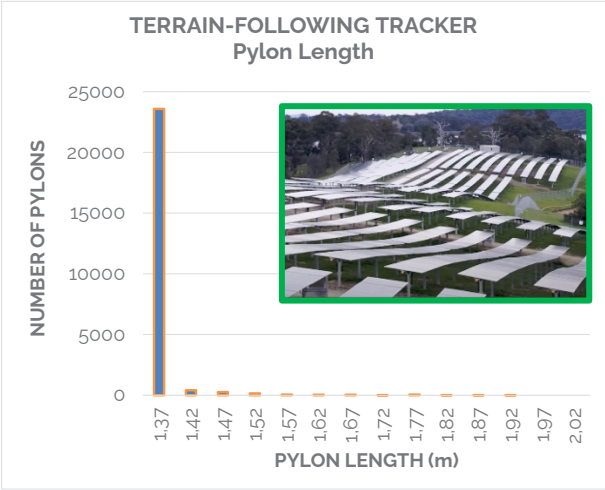
In this 82 MWp plant, 2 tracker models from the same manufacturer were studied: straight-axis and terrain-following.

The results clearly indicated that the terrain-following tracker generated savings of 3.2 MEUR (6.3% of project CAPEX) due to the lower Earthworks and the reduction in Pylon Length.









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The calculation process

The Civil Works Optimization process in ORUGA® for a given layout starts with the definition of the original topography of the terrain (blue area in the figure below) and the forbidden areas within site limits (those where trackers cannot be installed and/or Earthworks cannot be performed).

Later, design conditions are defined, such as trackers construction tolerances and the requirements for the Earthworks (Cut/Fill ratio, maximum volumes allowed...). The result of the process would be the target surface (green area in the figure), which fulfils 2 main targets: positioning the trackers within design tolerances and minimizing Earthworks volumes (or, better, the total cost of Earthworks).

Once the target surface and the 3D model of the trackers (see figure) have been created, the production of drawings and BOQs for the Engineering team is automatic.

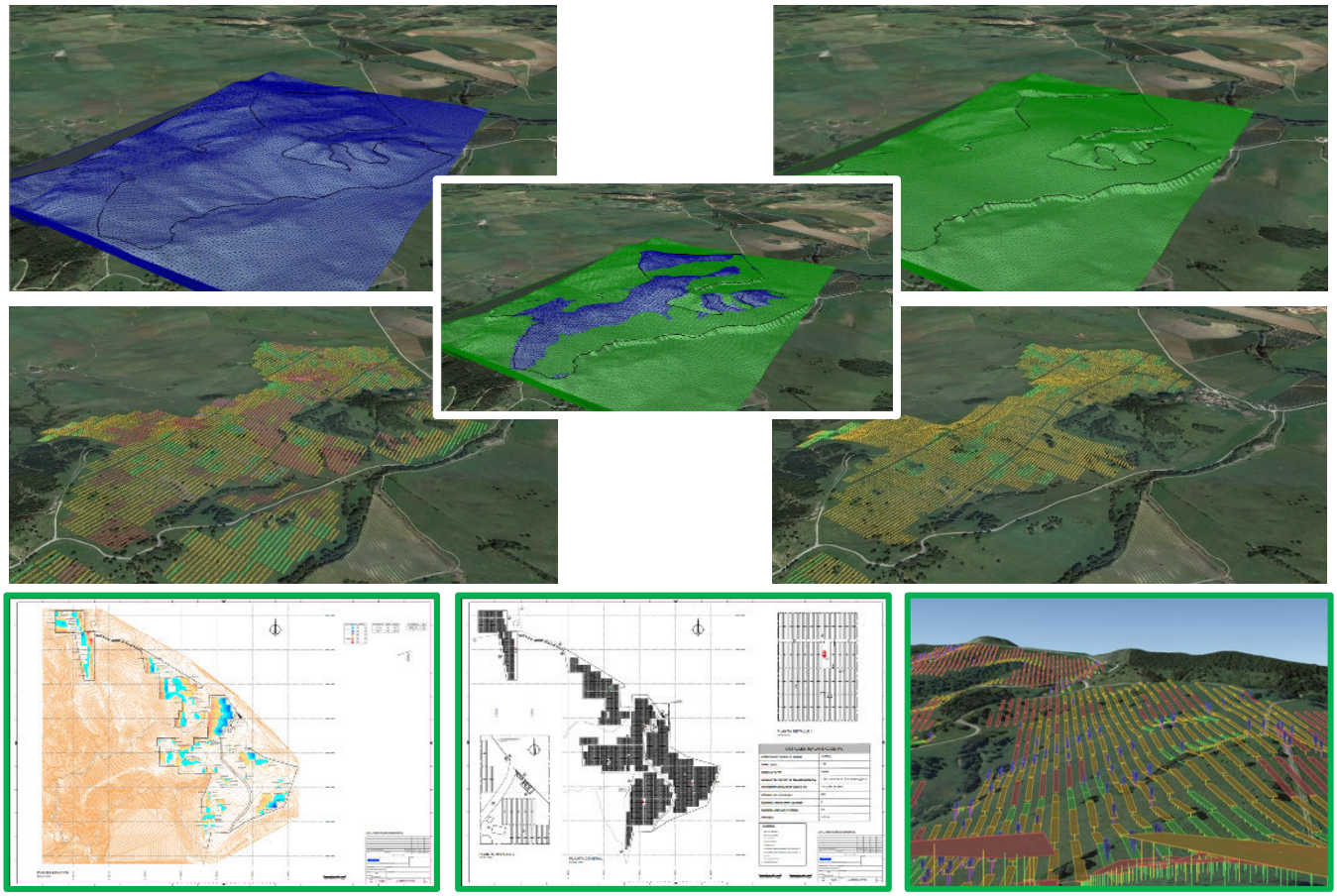


Fig. 1: Civil Works optimization process.
Left: Original topography (blue) and initial layout (trackers out of tolerance are shown in red)
Right: Target topography (green) and final layout (there are no trackers out of tolerance)
Below: Earthworks drawings with contour lines, layout and detail of the 3D model of trackers

References

Many Developers, EPC contractors and Engineering firms have already used the engineering services provided by Sener through ORUGA® Civil Works module. The purpose in each case is varied:

- To reliably determine the CAPEX to be introduced in the Business Model
- To optimise the design of the project from the LCOE point of view
- Selecting the optimal tracker for each site
- To produce accurate estimates at Tendering phase
- Having a reliable calculation of Earthworks and Pylon Length prior to the construction of the plant

So far, more than 20 GWp have been analysed in more than 200 projects.

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

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