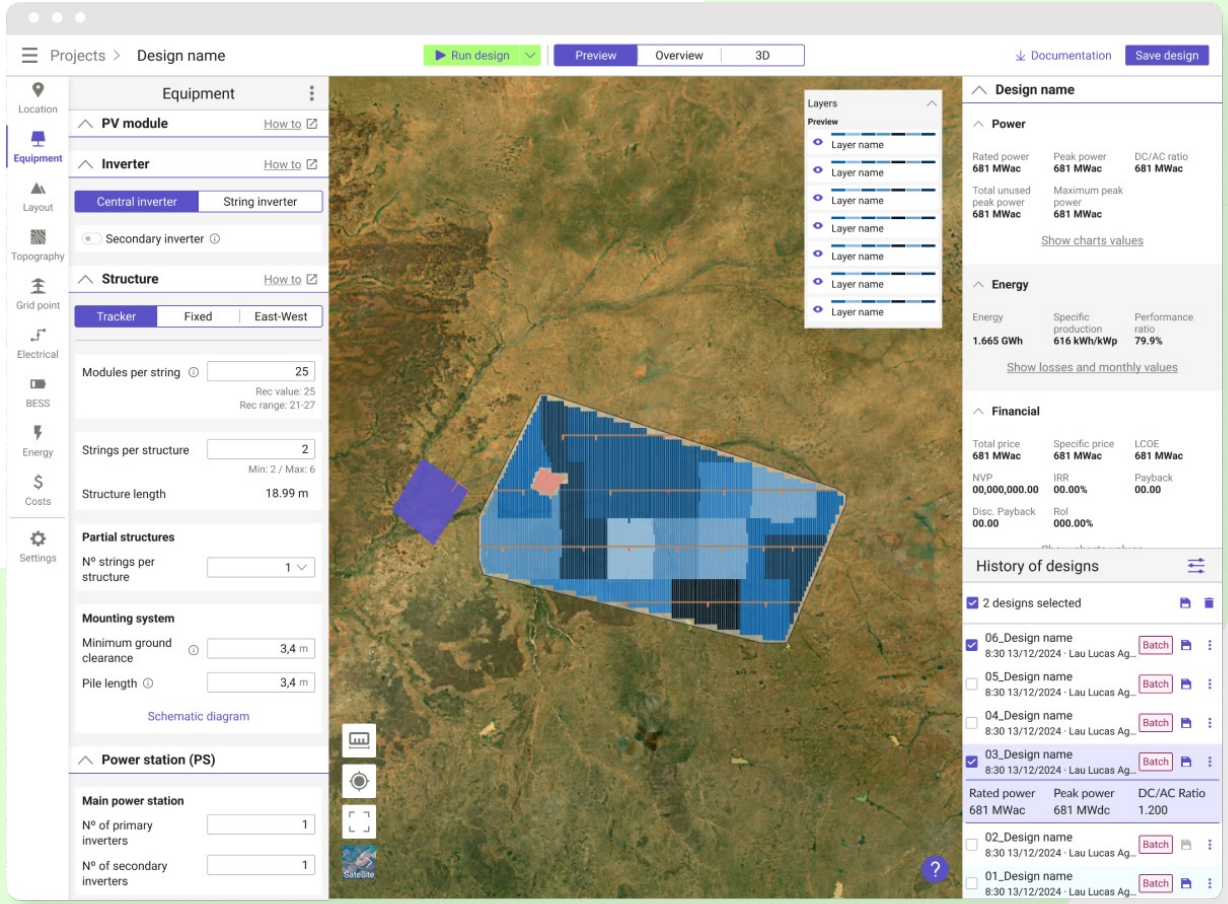
RatedPower
A PART OF ENVERUS

Smart energy *flow*



Topography Analysis

Your speaker today

Ming Cheng
Technical Advisor

Ming has over 7 years of experience in solar field, now working closely with the industry from China, Oceania, and Japan.

mcheng@ratedpower.com

RatedPower
A PART OF ENVERUS

Index

01. Site Data

02. Traditional work flow

03. RatedPower's Approach

04. Q&A


Solar farms on challenging terrain
RatedPower
A PART OF ENVERUS

Topography Analysis

Collect & Prepare Site Data

Survey the site

On site mapping, drone LiDAR, DEM resources for point cloud of the terrain, sometimes with geo survey and site investigation

Define Solar Layout & Grading Philosophy

Decide panel layout and decide grading tolerance

Account for the slope limits, row spacing, shading, access roads.

Keep slope constructable – Choose between mass grading or spot grading

Create Proposed Surface

How the ground look like after construction.

Overlay panel layout and terrain.

Compare Existing vs Proposed Surface

Quantify how much cut and fill for earthwork.

Review the balance to minimize trucking costs

Output Construction Plans

Grading plans, profiles and cross-sections.

RatedPower
A PART OF ENVERUS

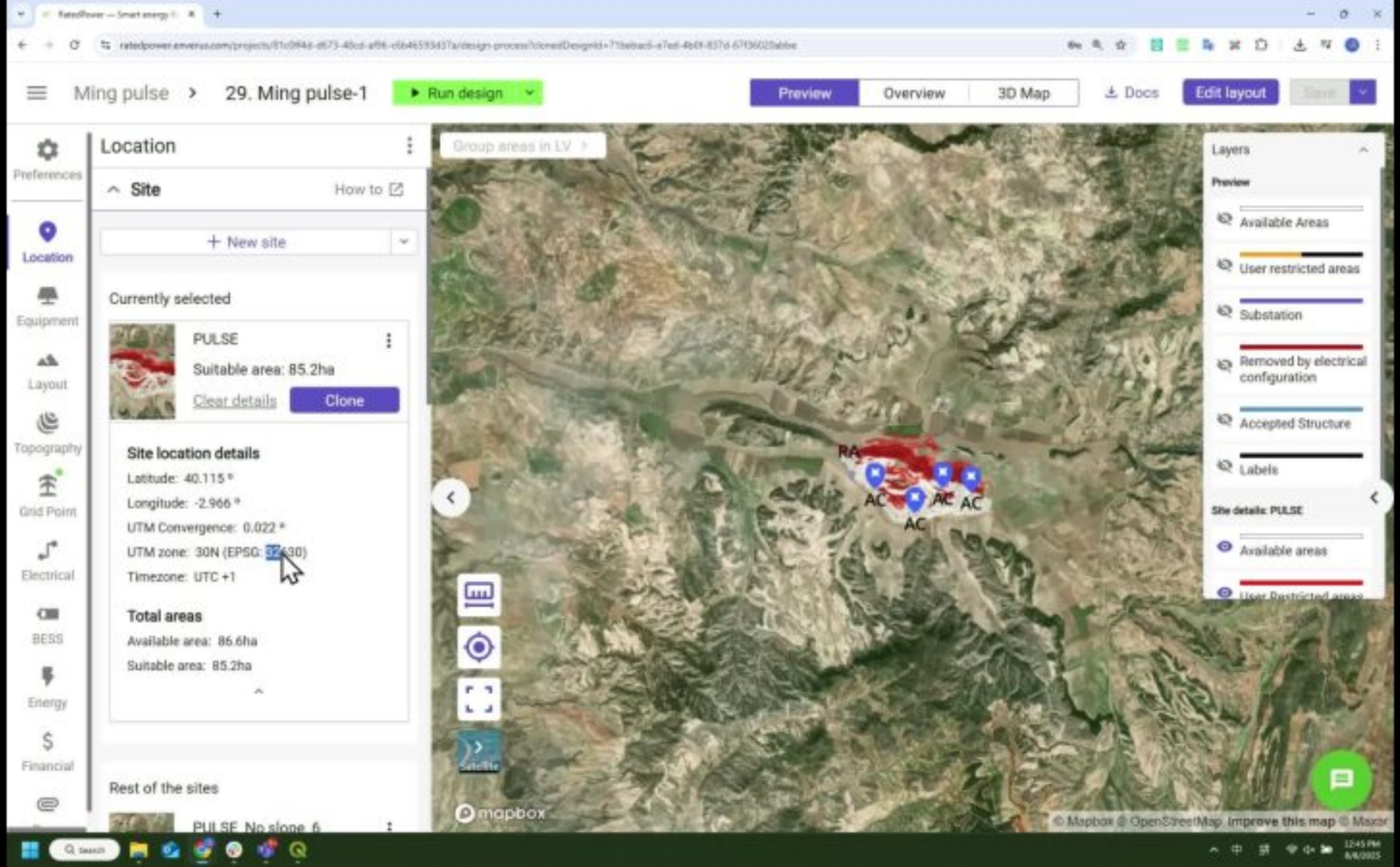
Smart energy *flow*

01. Collect & Prepare Site Data

Collect&Prepare Site Data

- DEM: SRTM(Shuttle Radar Topography Mission) - 30m resolution DEM free via NASA, USGS, QGIS etc.
- LiDAR data – if available from local governments, much higher resolution
- Drone photogrammetry – current high-res imagery, terrain models
- Soil investigation – geotechnical suitability
- Ground truthing – checking for shading objects, access routes, legal constraints

*How to import Spanish topography data from the IGN (National Geographic Institute) in RatedPower


Ming pulse
29. Ming pulse-1
Run design
Preview
Overview
3D Map
Docs
Edit layout
Preferences
Location
Equipment
Layout
Topography
Grid Point
Electrical
BESS
Energy
Financial
Location
Site
How to
+ New site
Currently selected
PULSE
Suitable area: 85.2ha
Clear details
Clone
Site location details
Latitude: 40.115 °
Longitude: -2.966 °
UTM Convergence: 0.022 °
UTM zone: 30N (EPSG: 32630)
Timezone: UTC +1
Total areas
Available area: 86.6ha
Suitable area: 85.2ha
Rest of the sites
PULSE_No slope_6
Group areas in LV
Layers
Preview
Available Areas
User restricted areas
Substation
Removed by electrical configuration
Accepted Structure
Labels
Site details: PULSE
Available areas
RA
AC
AC
AC
AC
mapbox
© Mapbox © OpenStreetMap Improve this map © Maxar


3D Terrain Visualization
AC
MV
RatedPower
ENVERUS

RatedPower
A PART OF ENVERUS

Smart energy
flow

02. Traditional Workflow

Traditional Workflow

Define Solar Layout & Grading Philosophy

2D solar layout

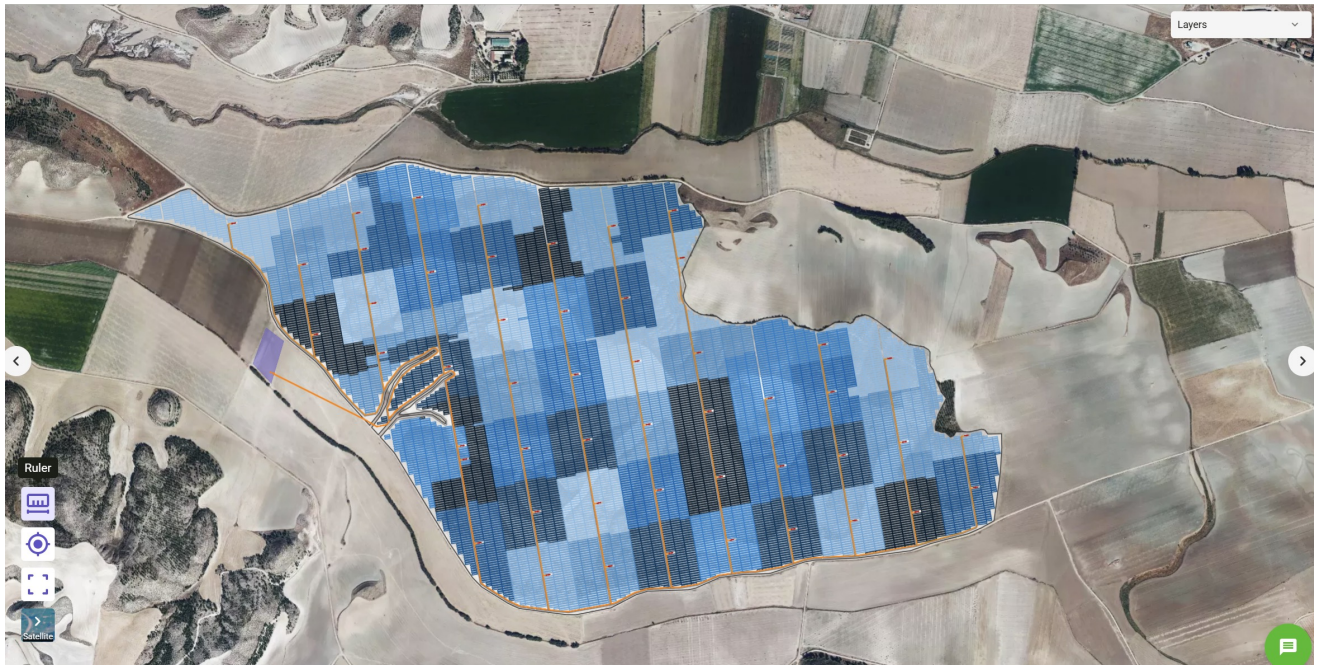
Grading plans

Drainage plans

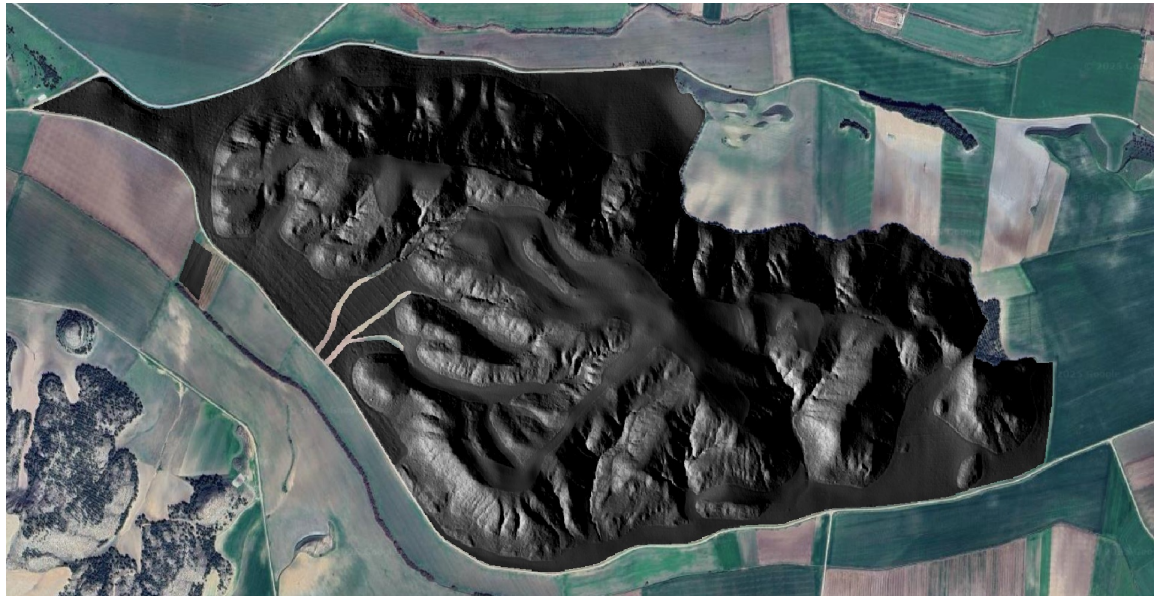
Optimiz ation

Generating 2D layout:

- Area: 176.63 ha, Location: Barajas de Melo, Spain
- Module: Bifacial 610W
- Structure: 2V Fixed
- Peak Power: 257.923 MWdc
- RatedPower: 215 Mwac
- CAPEX: Land lease 3 €/m² for 20 years
  - Civil work cut cost: 15 €/m³
  - Civil work fill cost: 10 €/m³
- LCOE: 44.08 US$/MWh



Hill shades Analysis



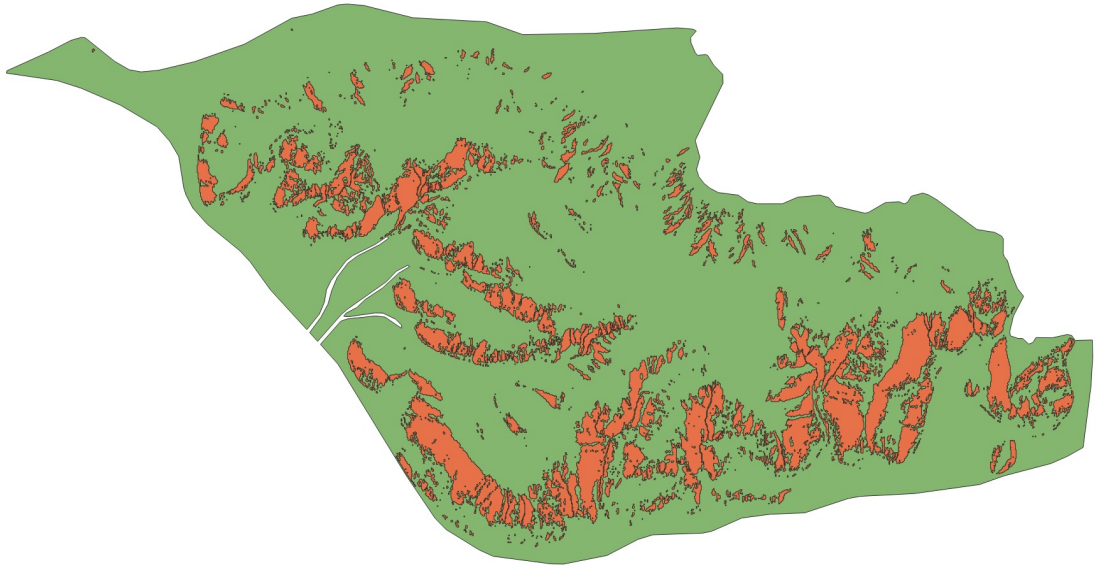
Just an hour before sunset on Dec 21 with long shadows from the west.

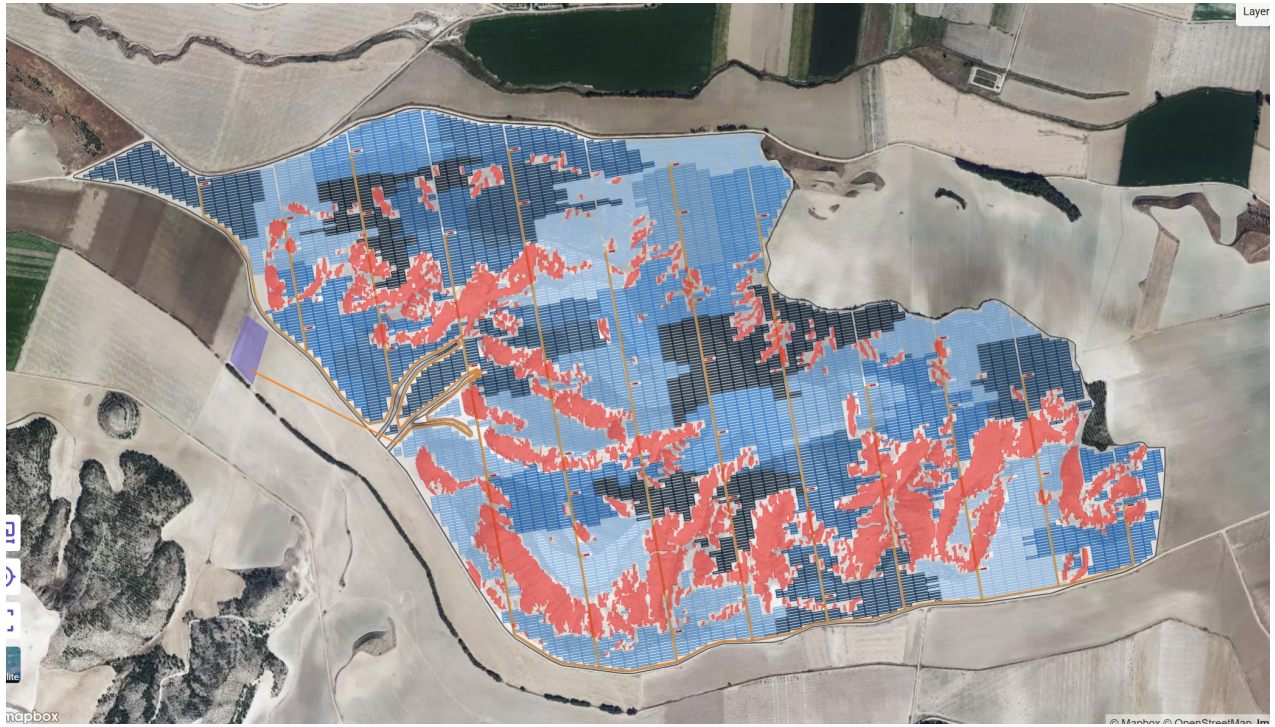
Azimuth sun angle: 250 °
Vertical sun angle: 7 °

Just an hour after sunrise on Dec 21 with long shadows from the east.

Azimuth sun angle: 120 °
Vertical sun angle: 7 °

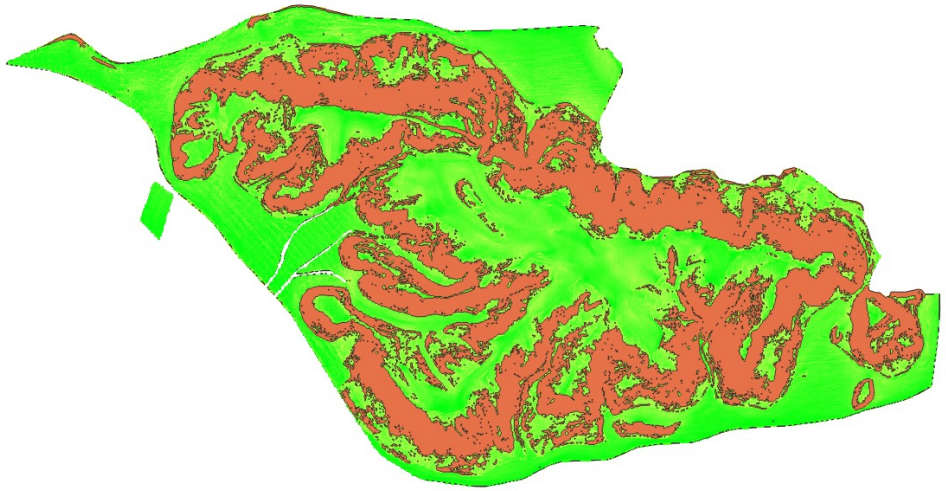
Eliminating heavily shaded area from our layout

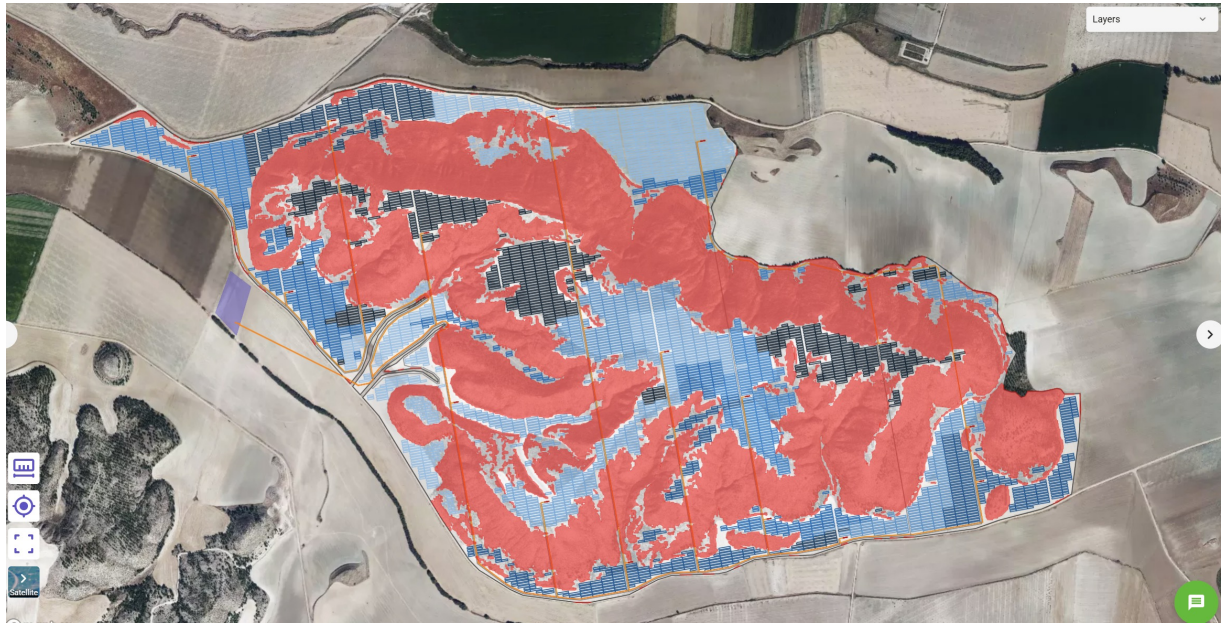




Peak Power 173.697 MWdc
Rated Power 144.695 MWac

Slope Analysis





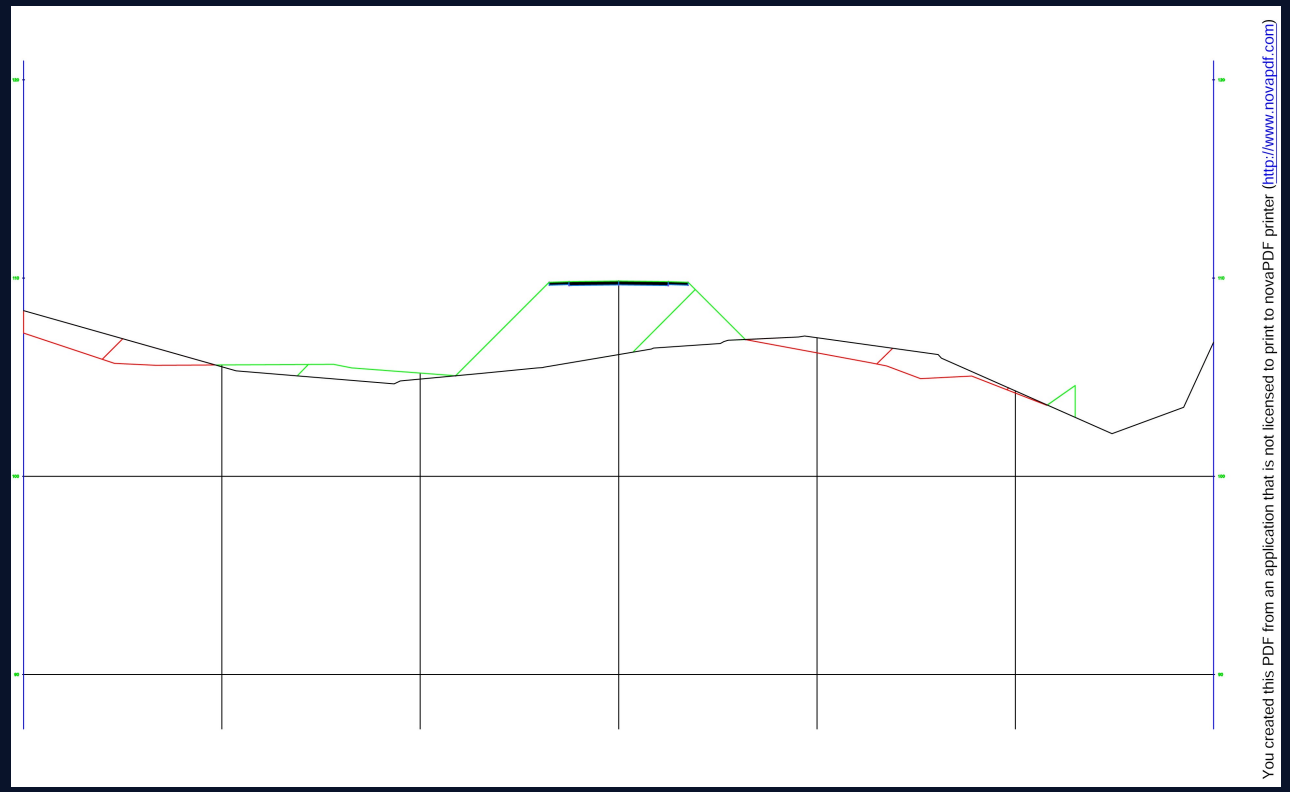
Deleting any slopes > 15° on site

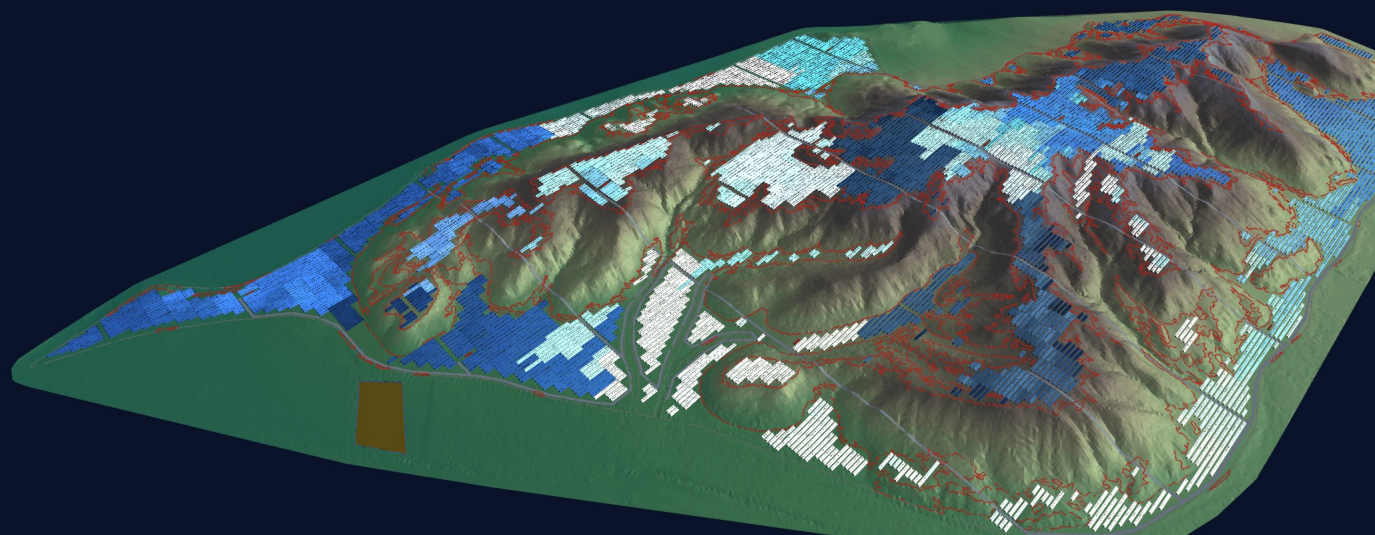
Peak Power 88.358 MWdc
Rated Power 73.53 MWac

Traditional Workflow - Grading Plans

Combining two limitations:

- Shaded area
- Slope area
- **Surface grading plan – Civil 3D or other software**
- **Drainage plan**
- Revise grading plan
- Generate 3D layout
- Civil work estimation
- Optimization on LCOE





RatedPower
A PART OF ENVERUS

Smart energy *flow*

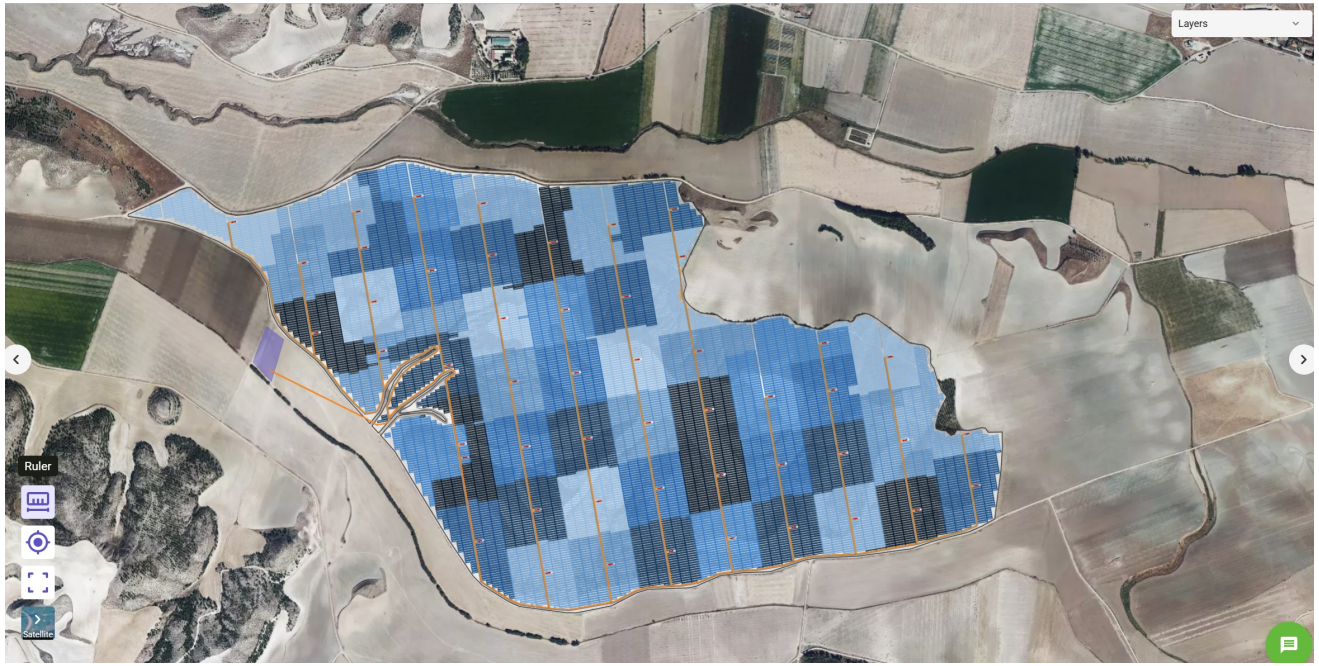
03. RatedPower's Approach

Decide panel layout and optimize grading plans all at once

- → Account for the shaded area, slope limits, terrain undulation
- → Keep slope constructable - spot grading
- → Civil work estimation and financial analysis in one step

Solar Layout

- Area: 176.63 ha, Location: Barajas de Melo, Spain
- Module: Bifacial 610W
- Structure: 2V Fixed
- Peak Power: 257.923 MWdc
- RatedPower: 215 Mwac
- CAPEX: Land lease 3 €/m² for 20 years
  - Civil work cut cost: 15 €/m³
  - Civil work fill cost: 10 €/m³
- **LCOE: 44.08 US$/MWh**



Conclusion

- Traditional workflow requires collaboration across teams and multidisciplinary expertise.
- RatedPower provides a one-stop-shop for topo analysis and civil work estimation. Anyone can complete a preliminary study of early-stage civil work on the platform.
- Optimization on LCOE based on civil limitations to mitigate risks.

RatedPower
A PART OF ENVERUS

Smart energy
flow

04. Q&A

Questions?

We're all ears! Drop yours in the question box!

Ming Cheng

mcheng@ratedpower.com

ratedpower.com
Instagram: @rated_power
Linkedin: /ratedpower

RatedPower
A PART OF ENVERUS