Lowering LCOE with bifacial PV in Italy

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9 years' experience in the Solar industry.

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ATA RENEWABLES

We supply independent technical services in Renewable Energy Sources (RES) with highest quality advisory, engineering, construction supervision for PV Solar, CSP and Wind Power Plants.

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- Engineering Services (OEs, Design Review, Construction monitoring)

Global success with Local expertise

50 countries

70 expert engineers

5 offices

80 GW worldwide experience

500 RES projects successfully financed

ata renewables

WHY BIFACIAL TECHNOLOGY IN ITALY?

Mainstream

Innovation

Prices

Consideration about the LCOE / Project Design

Bankability (albedo measurements)

LCOE

- **Land costs** land costs in EUR per area as known input variable
- **Module distance** small distances will limit the rear side irradiance
- **Ground Albedo** two sites with comparable latitude, show difference in bifacial gain due to the higher diffuse light.

Strategical Scenario Analysis

Module costs PV module prices have been decreasing for many years

OPTIMISING LCOE

- **GCR% (Ground Coverage Ratio)** The ability to provide longer trackers can increase GCR in the north-south dimension.

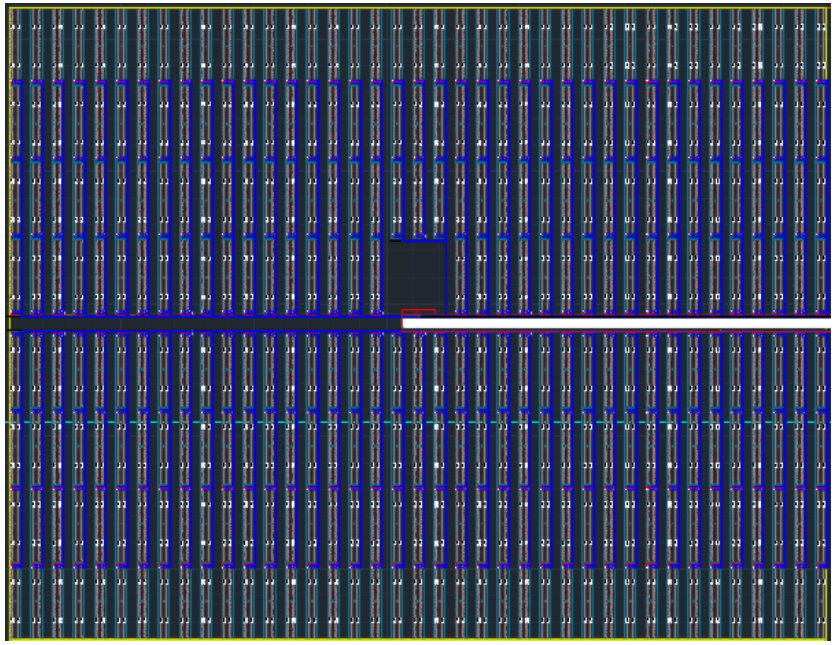
↑ ↑ **GCR%**
↓ **Land is needed**

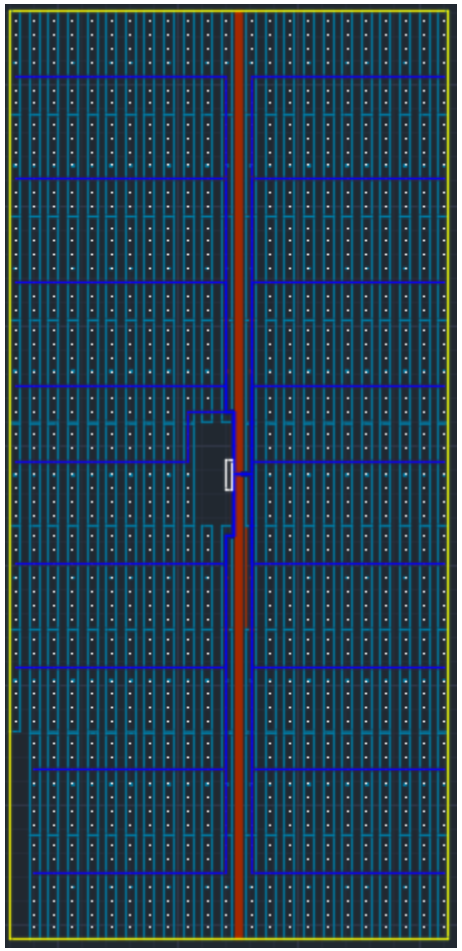
- String boxes VS DC Harness
- PV Tracker configuration (1P x 90 modules VS 2P x 45 modules)

String boxes VS DC Harness (Same Peak Power and GCR%)

String Boxes & Solar and DC undergroung cabling

0,024 USD/Wp





DC Harness
DC buses (over ground)

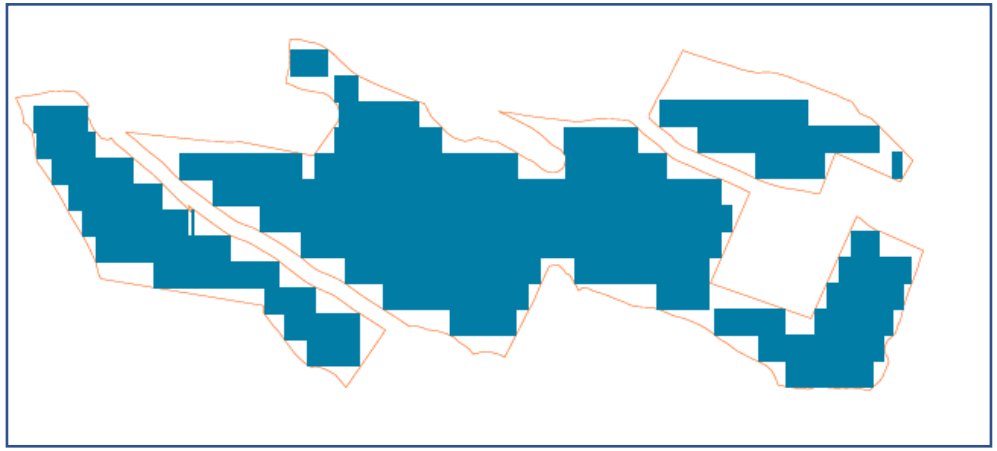
0,018 USD/Wp

↓25% CAPEX (DC system)

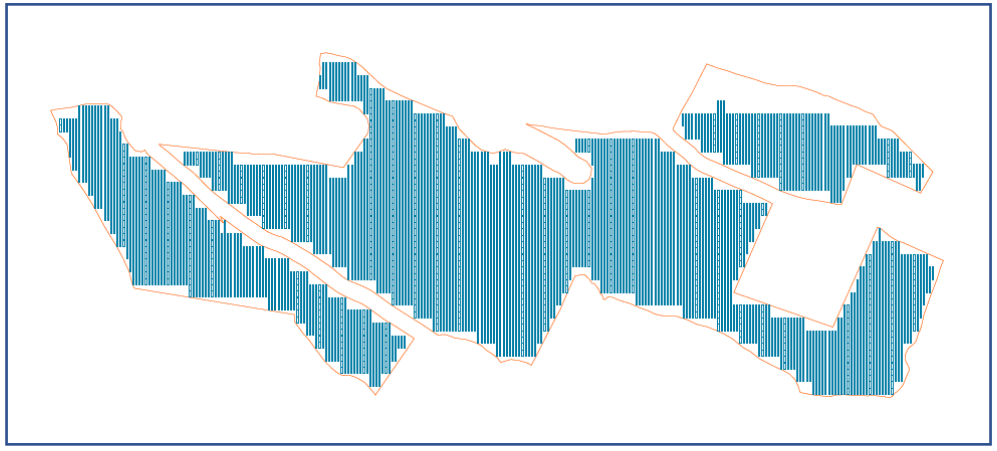
OPTIMISING LCOE

- **GCR% (Ground Coverage Ratio)** The ability to provide longer trackers can increase GCR in the north-south dimension.
- String boxes VS DC Harness
- PV Tracker configuration (1P x 90 modules VS 2P x 45 modules)

1P x 90 modules



2P x 45 module (with torque tube gap)



Albedo

Albedo can be defined as the ratio of the reflected irradiance (RI) compared to the global horizontal irradiance (GHI) received by the ground surface

Intra-Annual Variability

- Changes in the terrain (vegetation, others)
- Position of the Sun
- Solar Spectrum variations

Inter-Annual Variability

- Changes in the terrain due to climatic conditions
- Changes in the atmosphere

HOW TO ESTIMATE THE ALBEDO?

Terrestrial Databases, however…

- Site Specific

Satellite Databases, however…

- Spatial Resolution & Uncertainties

Onsite Measurement, however…

- Long Term Campaign required

SHORT-TERM MEASUREMENT CAMPAING + CORRELATION WITH SATELLITE DATABASE

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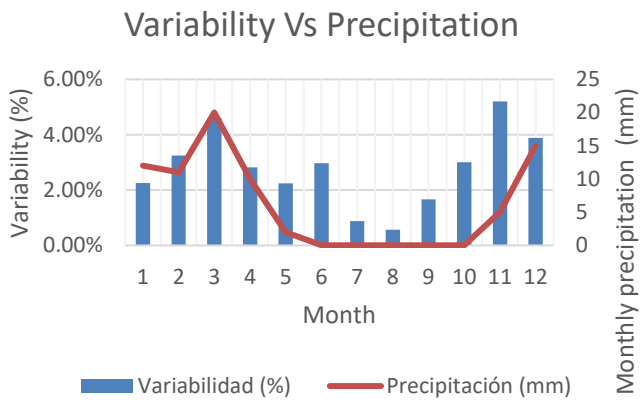
ATA'S METHOD FOR ESTIMATING ALBEDO TMY

→ SHORT-TERM MEASUREMENT CAMPAING + CORRELATION WITH SATELLITE DATABASE

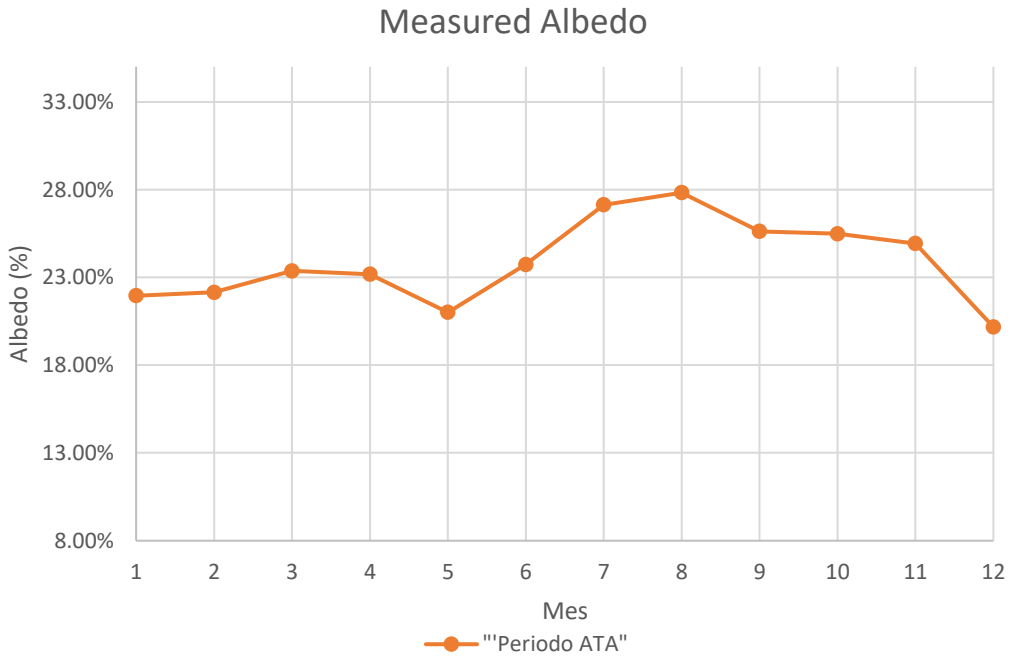
Measurement → Data Processing → **Data Correction** → Extrapolation



- Precipitation
- Others

VALIDATION OF THE METHOD

- Annual Measurement Campaign carried out on a given site



VALIDATION OF THE METHOD

- Annual Measurement Campaign carried out on a given site

- More than 15 satellite data bases and more than 70 methods tested

- It was concluded that a standard deviation of 1.39% should be considered when calculating the monthly Albedo TMY of any site

READ THE WHITEPAPER

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https://atainsights.com/ata-renewables-methodology-for-estimating-albedo