



Designing Bifacial PV Projects

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Brief About Bifacial

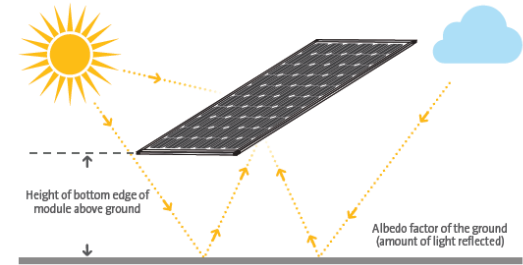
- Bifacial solar modules can collect sunlight not only on the front side but also on the rear side

- Bifaciality Factor

$$B = \frac{P_{mpp, rear}}{P_{mpp, front}}$$

- Albedo

$$\text{Albedo of the surface} = \frac{\text{Reflected light}}{\text{Incident light}}$$



- The amount of additional energy yield of a bifacial module depends on two main factors: **the light reflectance of the surface beneath the module** and **the tracker leg height/pitch considered**
 - Direct or diffuse light is reflected from the ground, while a portion is scattered onto the rear cell of the module

HOW TO MEASURE ALBEDO

The measurement is through an Albedometer, which consists of Pyranometer, which measures the irradiation of the incident and reflected light, at different heights.

ALBEDO –THE BRIGHTER THE BETTER

- Albedo describes the reflectivity of a **non-luminous surface**. It is determined by the ratio between the light reflected from the surface and the incident radiation.
- The higher the reflectivity of a surface, the higher its albedo. For example, a black surface that absorbs a large amount of light has a low albedo, while a white surface that reflects a large amount of light has a high albedo.

Surface Reflectivity	Reflectance (%)	Equivalent Power up to
Snow	70%	+35%
White Gravel/White painted Concrete	55%	+25%
Sand	50%	+20%
Concrete	16%	+7%
Green Grass	20%	+10%
Surfaces of Asphalt and Gravel	10%	+5%
Dark roads	4%	+2%

- The greater the installation height of the bifacial photovoltaic module—the greater the additional energy yield

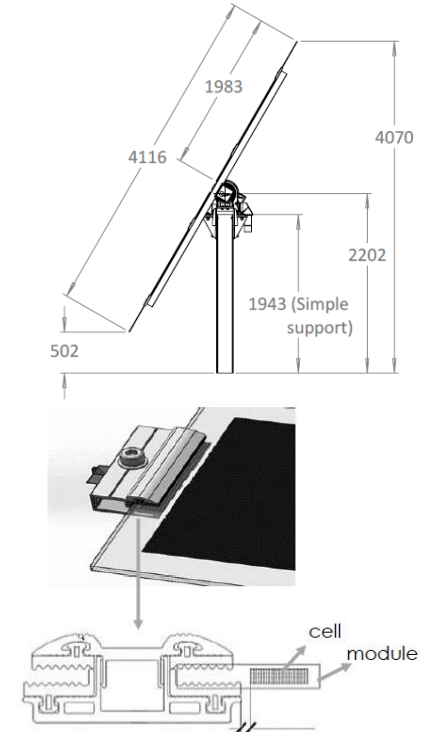
Impact

Impact on Installation

- Important to understand the installation of modules on the trackers, at tracker leg height of close to 1.8 m or above the ground.
- Proper cable management behind the modules, in order to avoid any shading effect
- Clamps are used similar to the installation of Glass to Glass Monofacial modules

Impact on BOS

- Less no. of Trackers, considering higher Wp modules for Bifacial
- Y connectors cannot be used, due to higher current rating
 - Hence the no. of inputs in the Combiner Boxes doubles
- DC cable increases
 - DC trench increase



Understandings required

- Clear understanding of the Albedo through the tests (albedometer)
- Clear understanding on the losses considered in the PV Syst report, and its basis (e.g. Rear shading losses)
- Cleaning of rear side of the Modules, and how the soiling loss can be factored in the simulations
- Any methodology of increasing the Albedo of the soil , against the cost implication

Thank you

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