R&D Outdoor Laboratory @ Atacama Desert

Fraunhofer CSET Workshop, Santiago – 4/4/2019

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LABORELEC CHILE SPA

ENGIE Laborelec

We provide worldwide solutions to help our customers successfully come through the energy transition

01

Introduction

ENGIE Laborelec

- **240 international experts**
- **Strong expert knowledge and operational experience**
- We offer **independent and objective unique solutions**

- Offices **Belgium, Middle East, Germany, Mexico, and**
- **Chile: examples**

Paneles fotovoltaicos bifaciales: Inauguran innovador proyecto de energía solar en Arica [FOTOS]

Se trata de un proyecto piloto, implementada por Laborelec, filial de ENGIE, fue instalado en el laboratorio del parque solar "El Águila" que permitirá aumentar el rendimiento energético.

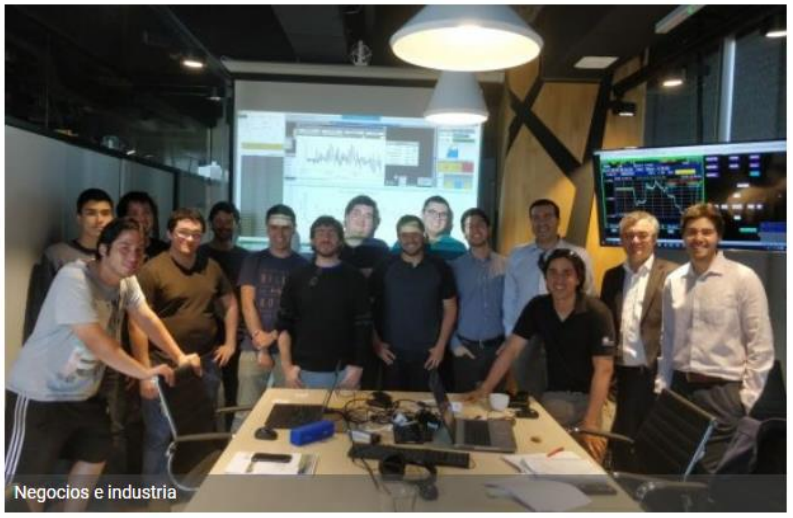
Por Comunicado
988 Lecturas

21 de Marzo, 2019 09:03
Comentar

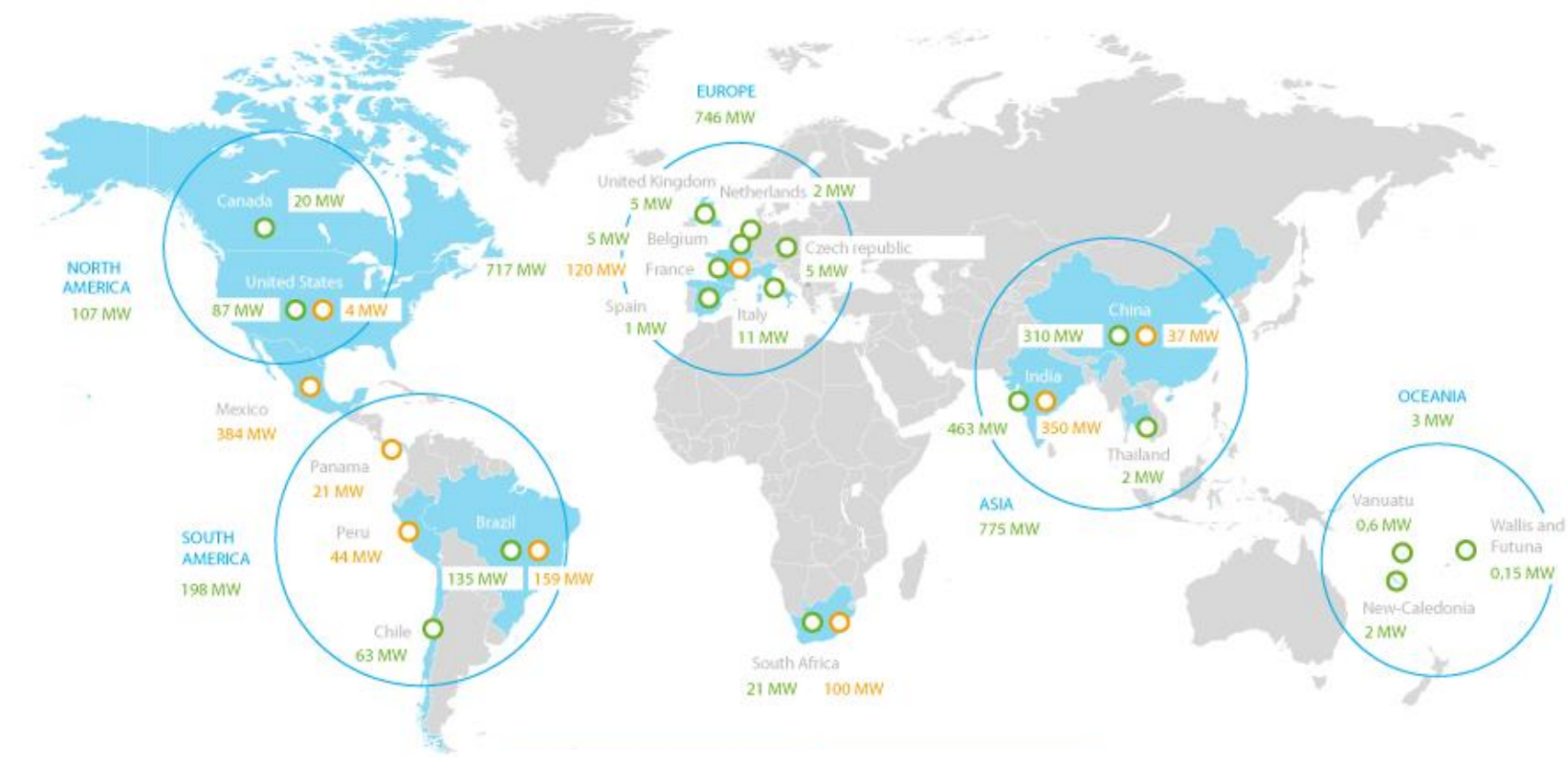
En una ceremonia realizada en el laboratorio del parque solar "El Águila" de Arica, **Engie Laborelec Latinamerica** – parte de ENGIE – presentó el proyecto de paneles fotovoltaicos bifaciales, una nueva tecnología para plantas solares a gran escala. El evento contó con la participación de Cristián Fuentes, Secretario Regional Ministerial de Energía, y Manuel Rodriguez, Director Regional CORFO, entre otras autoridades.

Realizan primer ensayo de participación en servicios complementarios de una central fotovoltaica

La prueba fue realizada por Engie Laborelec y First Solar en la central Luz del Norte y sus resultados serán presentados en un seminario público a fines de este año, informó Sebastian Falkenberg, gerente general de Engie Laborelec Chile.



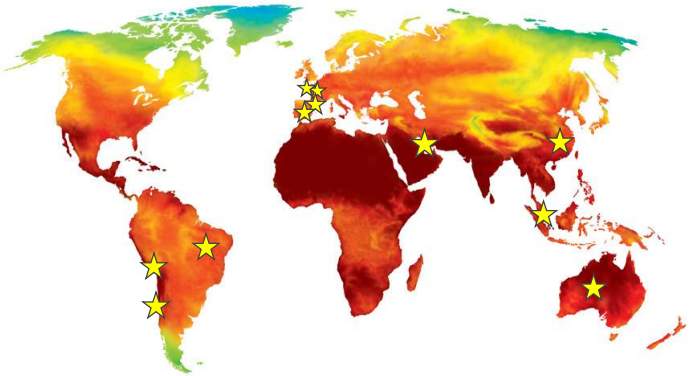
Engie – Solar production capacity worldwide



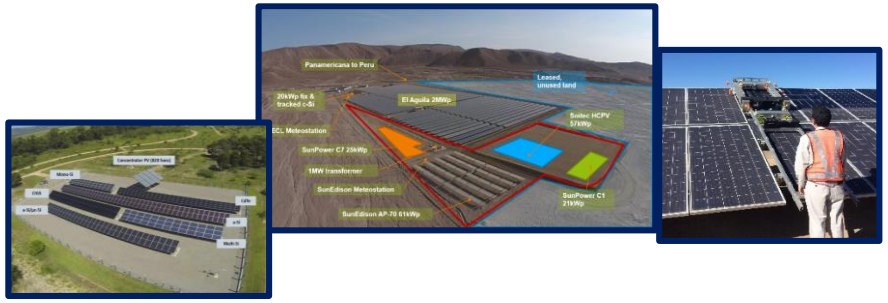
Laborelec works in **applied research** (development/validation of new solutions) & as **technical experts** (project development and operational support).

LABORELEC operates & monitors a worldwide solar testing infrastructure

*Technology monitoring in **Belgium, Chile, Brazil***



Testing of newest O&M technologies on Solar Farms



MicroGrid Integration Testing

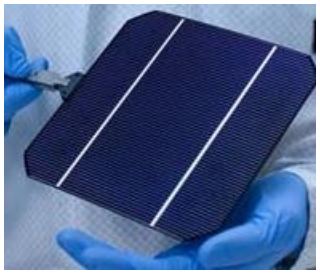
Building Integration Demonstration, ***Mexico, Belgium***

02

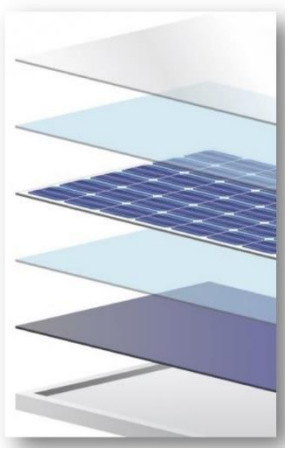
R&D Outdoor Laboratory El Aguila

Research on Photovoltaics overview

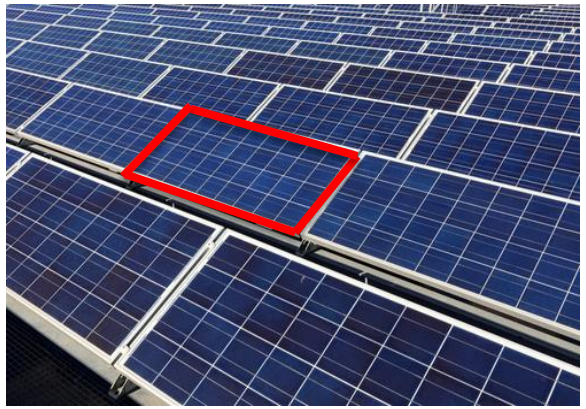
21% eff. **SOLAR CELL**



18% eff. **MODULE**



15% eff. **PLANT**

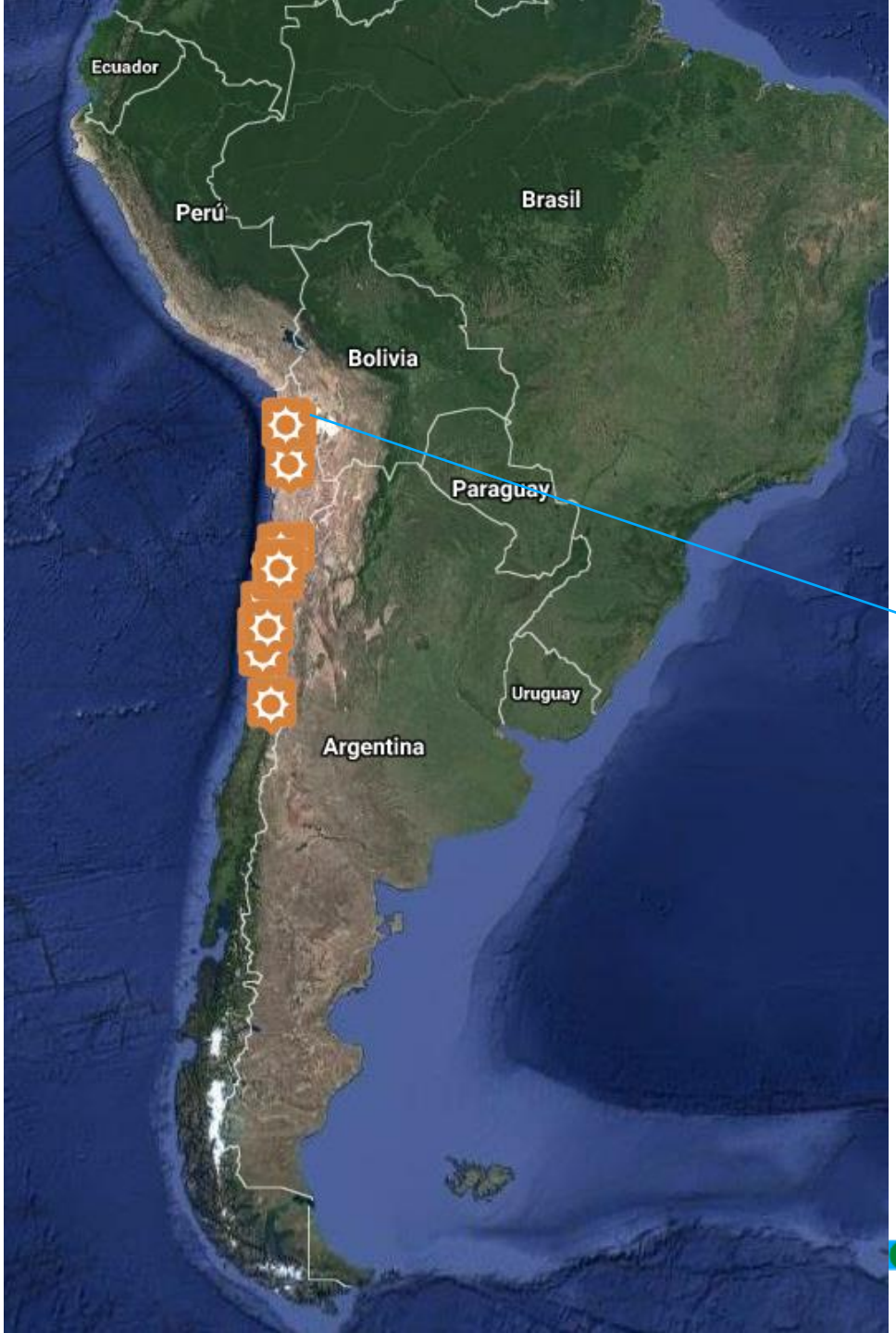


Small gain in efficiency by improvements in processes

Strong “cell-2-Module loss”

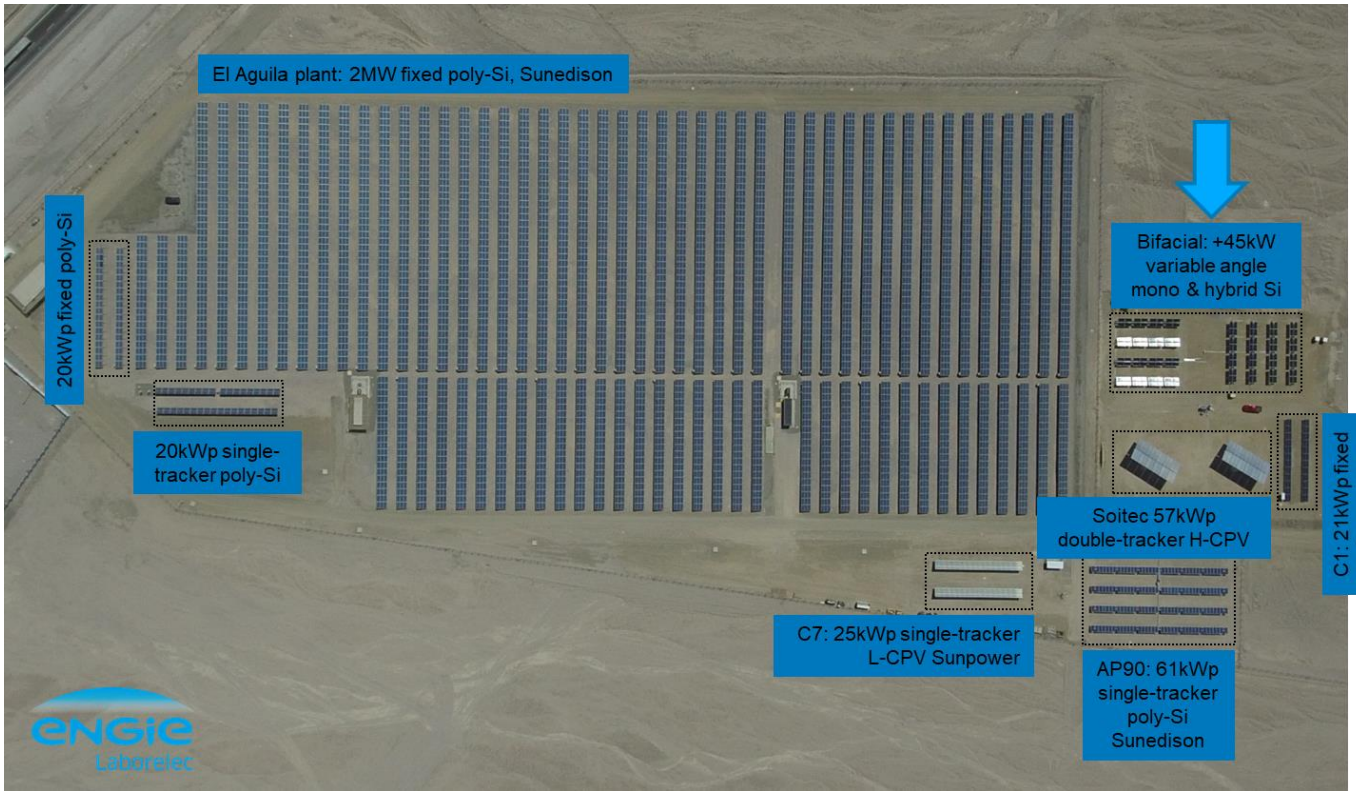
Degradation, Soiling, inverter & system losses

Outdoor PV laboratory



El Aguila 2.2MW PV PLANT, Arica

R&D Outdoor Laboratory in Atacama Desert – Laborelec vision



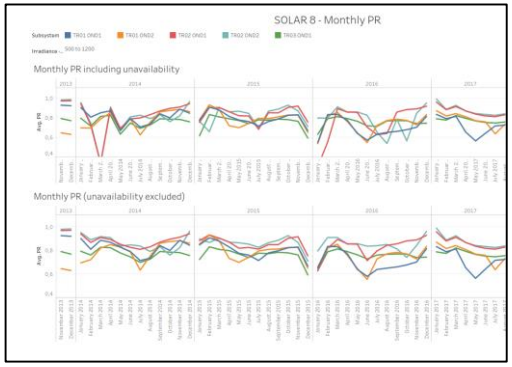
Testing
disruptive PV technologies
&
new O&M practices
under
very high solar irradiation
&
desertic climate conditions

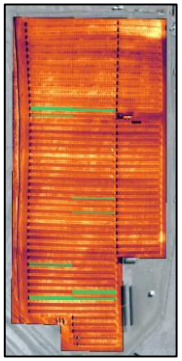
for the solar power plants of the future

Advanced O&M Services on utility scale PV plants

PHASE I. Data analysis
Remote & fast analysis

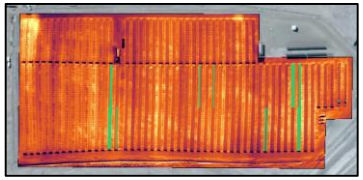
GOAL
- → Offline data analysis
- → Smart cleaning tool (soiling)
- → Drone inspection

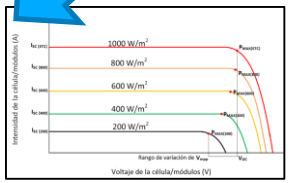


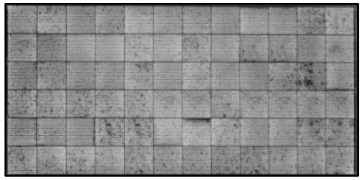


PHASE II. On-site inspection
Analyse damaged blocks

GOAL
- → On-site inspection
- → (IV, soiling sensor,)
- → Manage asset degradation

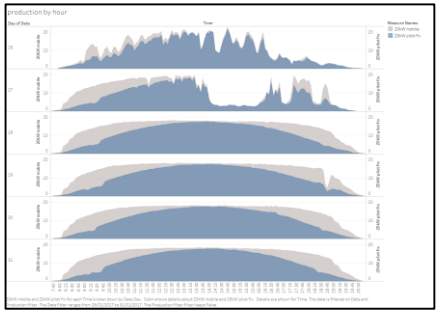




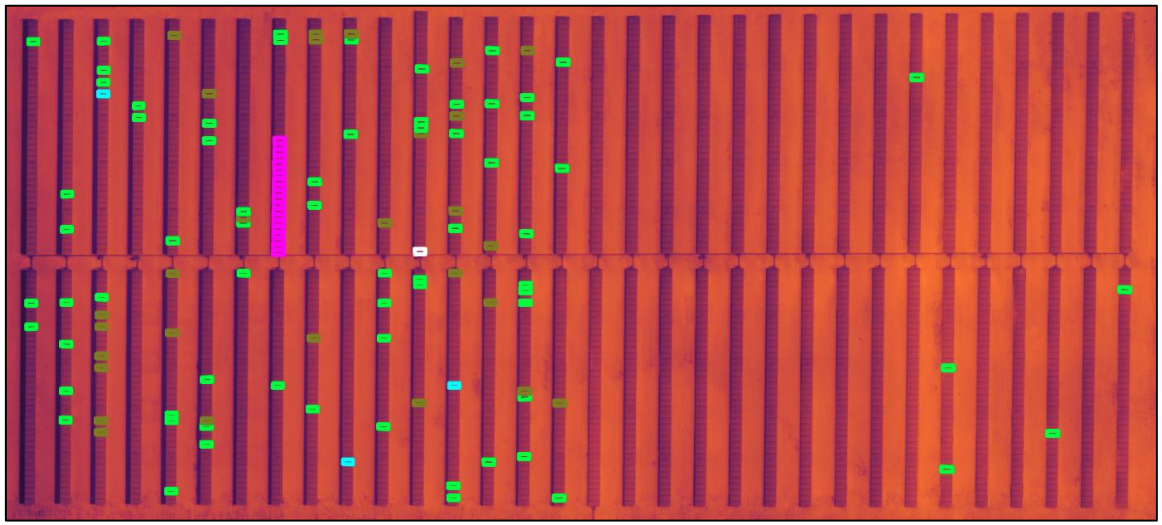


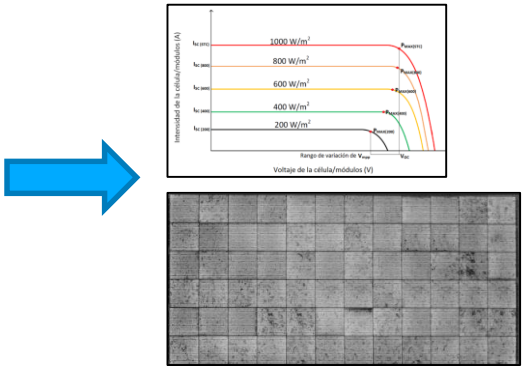
PHASE III. Monitoring
keep remote track of assets

GOAL
- → Performance improvement
- → OPEX optimization



Example 1: Drone inspection of large scale PV plant

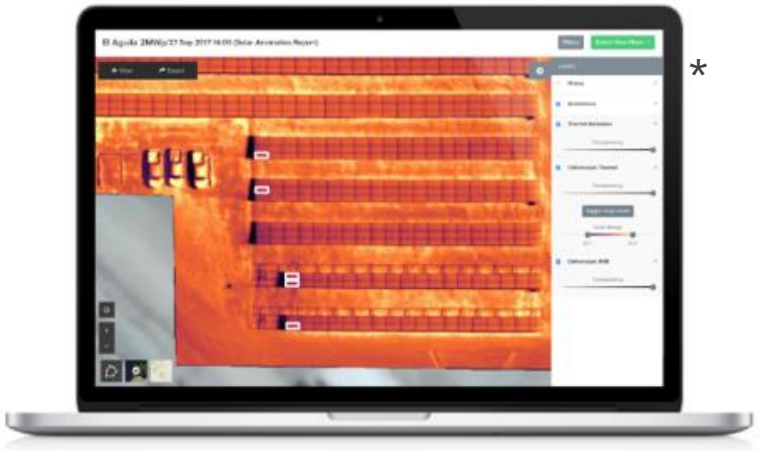




GOAL

→ Find & replace damaged parts

→ Manage asset degradation



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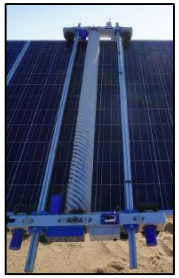
Example 2: Advanced Activities on Cleaning Technologies

15years accelerated test of automatic dry solution

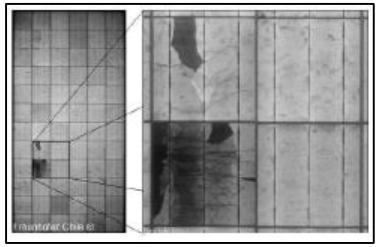


Technical and economical comparison to reference

Analysis of PV panel performance after simulated 15 years of operation
→ check of compliance to product warranty

Check PV panels Hotspots by infrared camera

Microcracs by Electroluminiscence



Check of antireflective coating optical and electrical properties

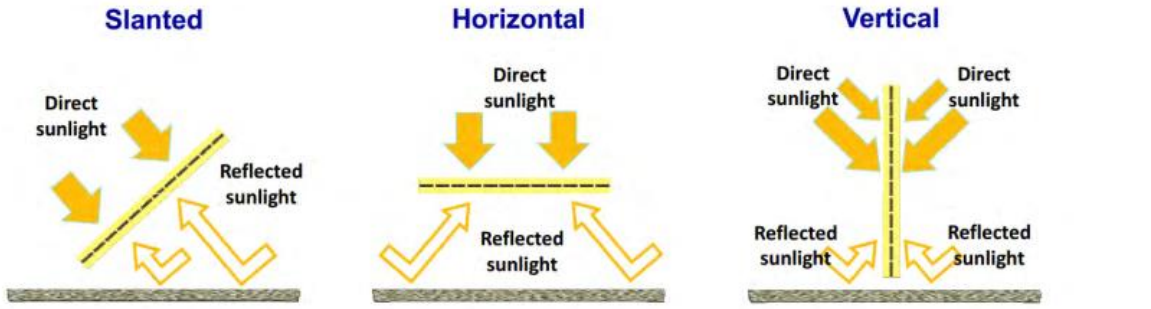
03

Outdoor Research on Bifacial PV

Bifacial PV – More energy production for the same area

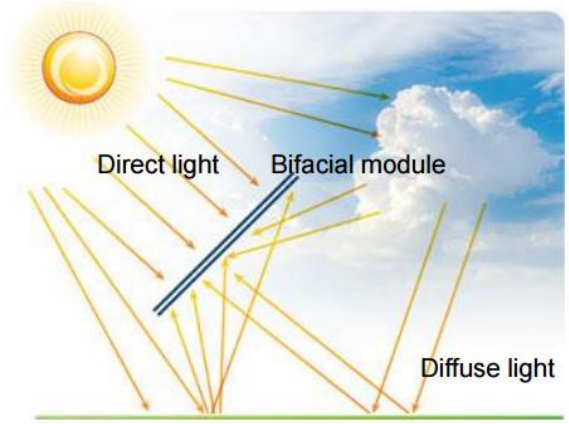
Bifacial panel

Several orientation possibilities



Mihailetchi, bifiPV 2012

Light absorption on both sides



Enhanced power output

Traverso, MegaCell website 2014

Challenges of Bifacial PV large scale power plants

- About **1 GW of PV systems worldwide are based on bifacial technology**, representing 0.25 % of global cumulative PV capacity. But there are very strong indications that this figure will grow rapidly.

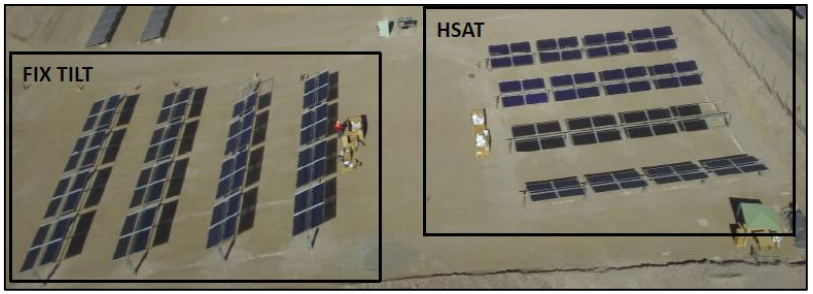
- Although the technology **exists since 1966**, it was only in 2017 that a first large commercial project **bid by EDF EN/Masdar for Saudi Arabia (300 MWac) used bifacial PV**, representing the lowest LCOE (but the project was rejected).

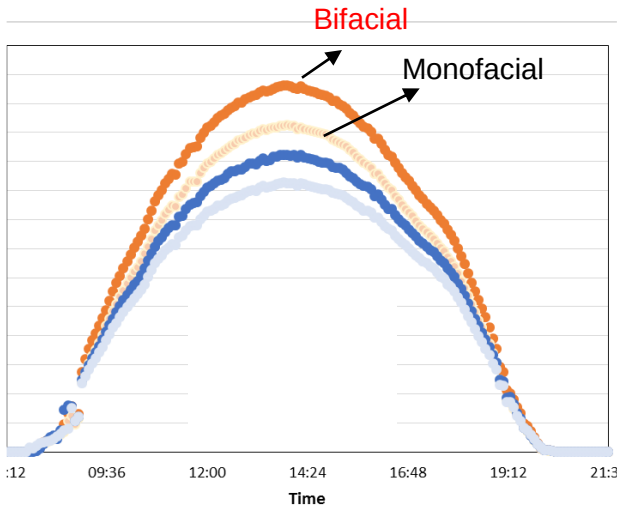
- How to realize a low LCoE with **bifacial PV**

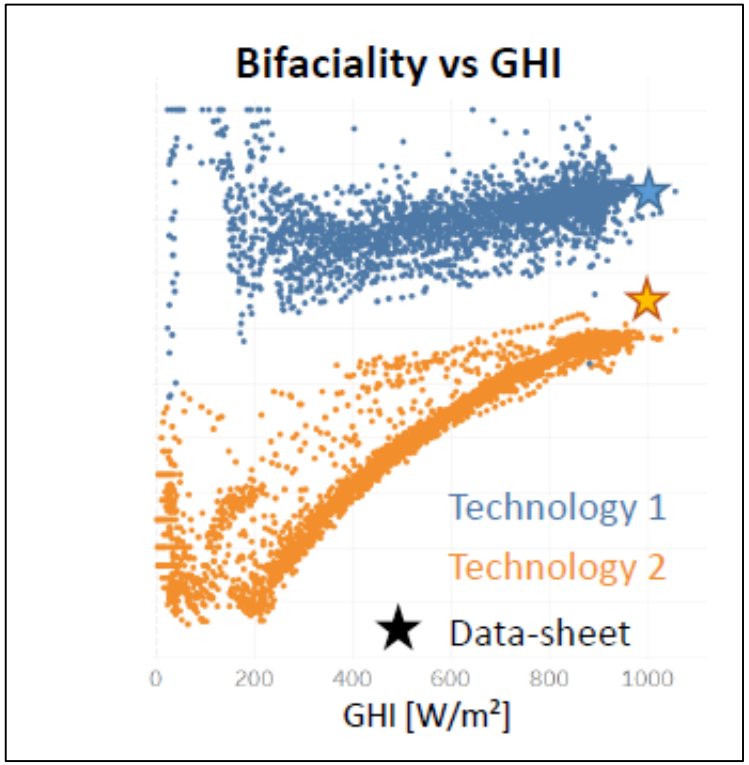
- **Prices: The largest enemy of bifaciality is the old-fashioned "Wp thinking" of customers instead of a modern "kWh mentality" ***

Ref: Radovan Kopecek, PVTECH 2015

Bifacial PV – Testing in desertic conditions







https://vimeo.com/253256855

**Ref: Müller et al. Denver Bifacial Workshop 2018*

Bifacial PV - Assesing back side irradiance and albedo

> 1 year **real data** of albedo, bifacial PV yield in **Desert Conditions**

Thank for your attention

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