
Evaluación avanzada para la industria fotovoltaica

EXPO ERNC, Santiago – 21/11/2018

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LABORELEC CHILE SPA



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



01

Introduction

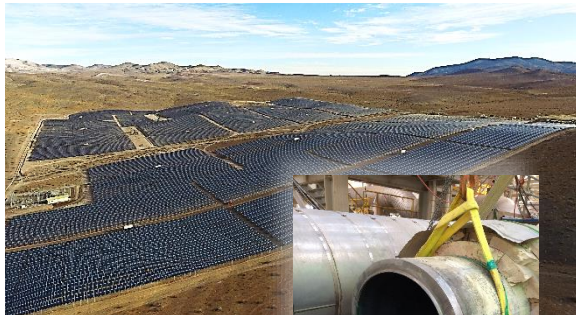


LABORELEC

A few figures

Turnover **56 M€**

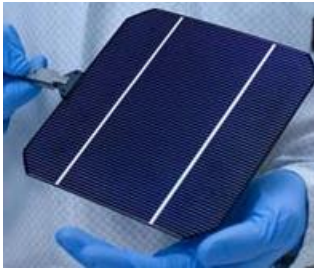
- Services & products **80%** | R&D **20%**
- For ENGIE **70%** | for third companies **30%**
- In Europe **75%** | outside of Europe **25%**



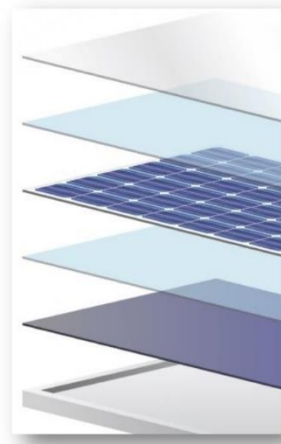
- **240** highly specialised engineers and technicians
- **Global presence**, activities in more than **60** countries
- 5 offices:
 - > Belgium (headquarters),
 - > the Netherlands,
 - > Germany,
 - > Chile
 - > the United Arab Emirates.
- More than **55 years of experience** in the power business.

Research on Photovoltaics overview

21% eff. SOLAR CELL



18% eff. MODULE



15% eff. STRING



Small gain in efficiency
by improvements in
processes

Strong "cell-2-Module
loss"

Degradation, Soiling,
inverter & system
losses

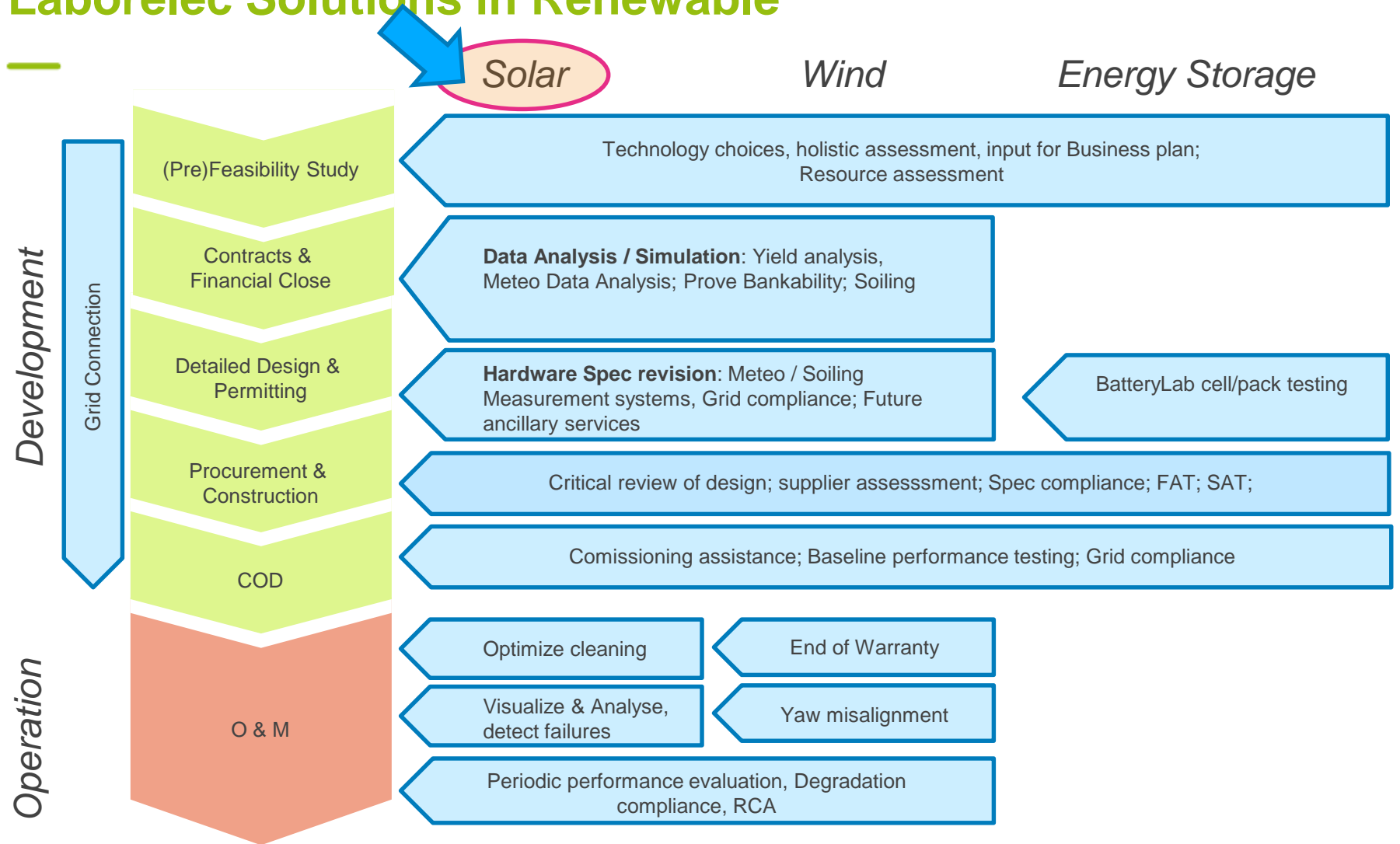




Quality Assessment of PV plants by Laborelec



Laborelec Solutions in Renewable



Why we need Quality assessment?



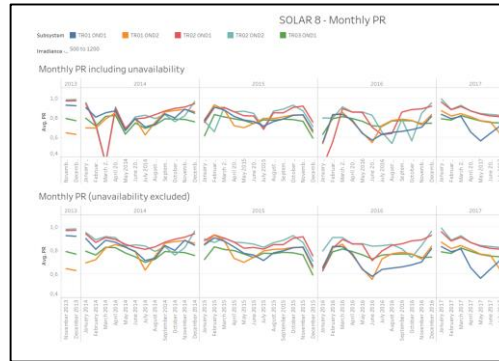
Advanced evaluation of utility scale PV plants by Laborelec

PHASE I. Data analysis

Remote & fast analysis

GOAL

- Early failure detection
- Smart cleaning tool (soiling)

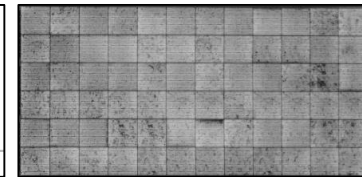
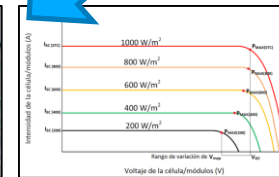
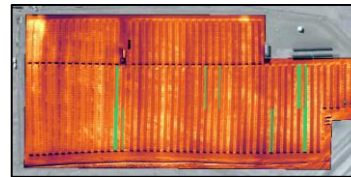


PHASE II. On-site inspection

Analyse damaged blocks

GOAL

- Find & replace damaged parts
- Manage asset degradation

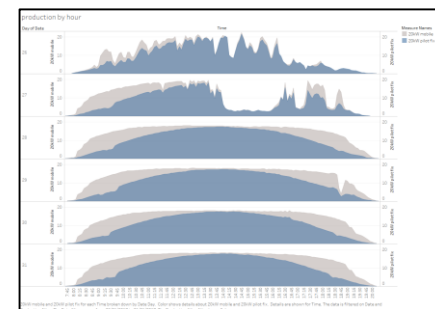


PHASE III. Monitoring

keep remote track of assets

GOAL

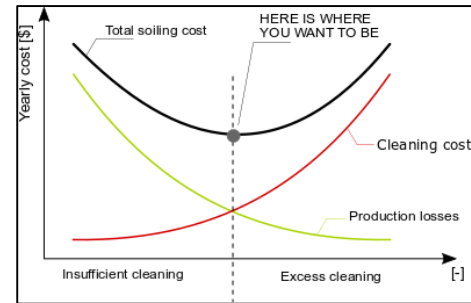
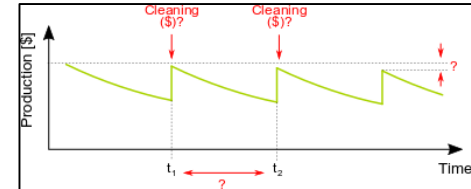
- Anticipate failure issues
- OPEX optimization



Soiling assessment tool

Through our independent & multidisciplinary big data analysis we provide you

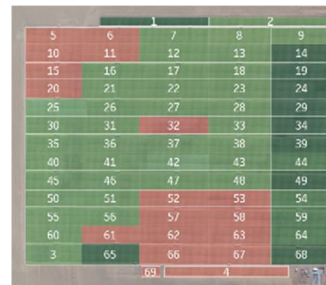
- **Smart cleaning:**
clean only what needs to be cleaned, when its optimum for the business.
- **Fault detection:**
find failure and react fast to increase production
- **Asset degradation over time:**
improve financial planning through acute asset degradation tracking



Weather data

Production data

On-site (optional)



Heavy soiling

Light soiling



Soiling Rate	Possible Cost reduction if current cleaning... times per year in kUSD							
	1	2	3	4	5	6	7	8
0,50%	94	0	35	103	183	271	361	454
1,00%	320	31	2	37	98	172	253	340
1,50%	583	100	6	9	50	111	184	263
2,00%	866	189	30	0	22	71	134	206
2,50%	1.161	290	66	4	7	42	96	161
3,00%	1.466	400	111	17	0	23	67	126
3,50%	1.777	517	164	37	1	10	45	97
4,00%	2.093	639	221	62	7	3	29	73
4,50%	2.414	766	283	92	17	0	17	54
5,00%	2.739	896	349	125	30	1	8	39



Testing Cleaning solutions based on local soiling (sensor)

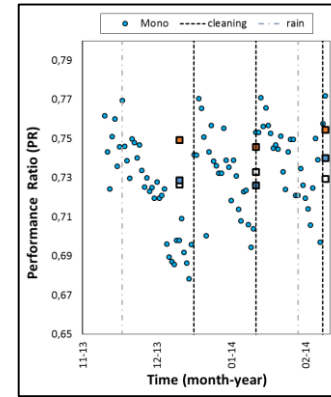
Manual Cleaning



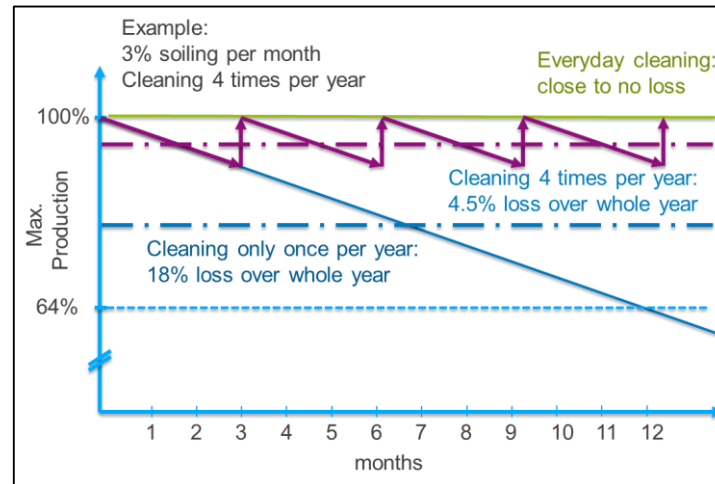
Semi-Auto Cleaning



Robot Cleaning



Soiling-meter



- **CAPEX optimization**
Tech selection and electrical layout, Compliance with future grid regulations
- **OPEX optimization**
Soiling, degradation anticipation, quality of components and monitoring
- **Goal:**
Optimization total cost of ownership, Guarantee full operational asset lifetime, Mitigate later corrections / optimization

—
Other characterizations and implementations performed
—



Meteorological measurements



Albedo measurements



HSAT tracking system



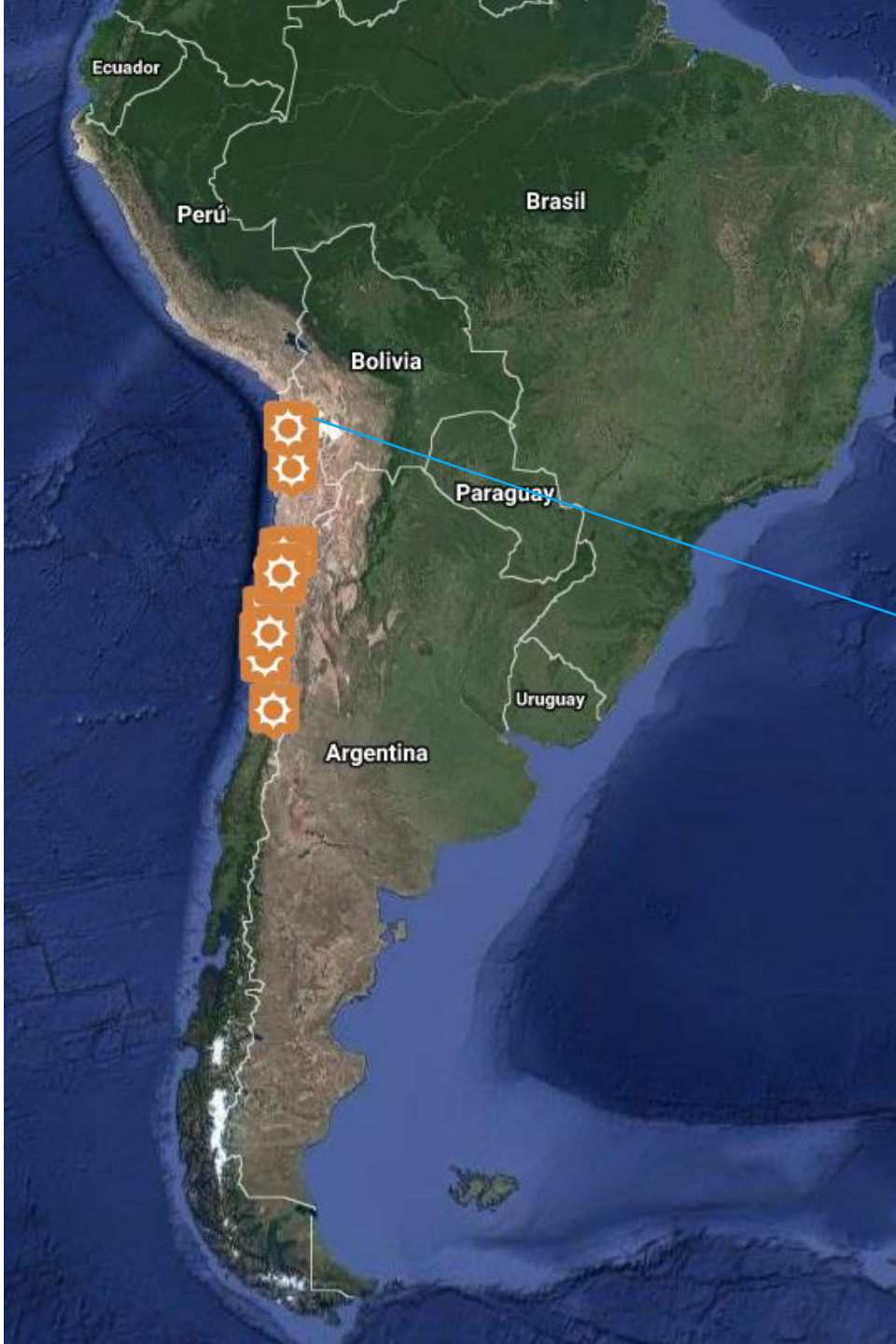
03

Solar Research at
Laborelec Outdoor PV
Laboratory



Outdoor PV laboratory

El Aguila 2.2MW PV PLANT, Arica



El Aguila PV plant and Pilots: outdoor laboratory

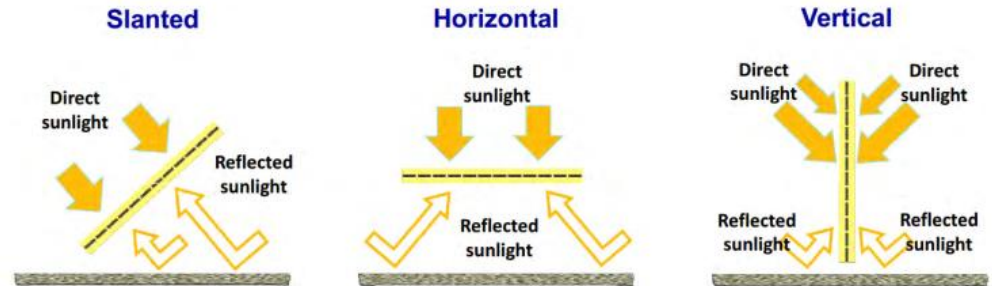


Bifacial PV? More Energy production for same area

Bifacial panel

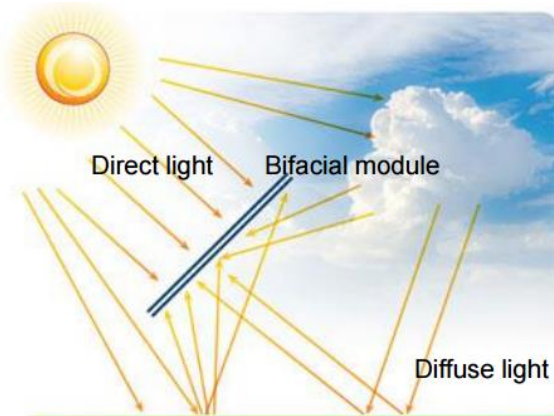


Several orientation possibilities

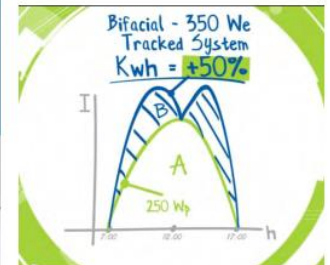


Mihailetchi, bifiPV 2012

Light absorption on both sides

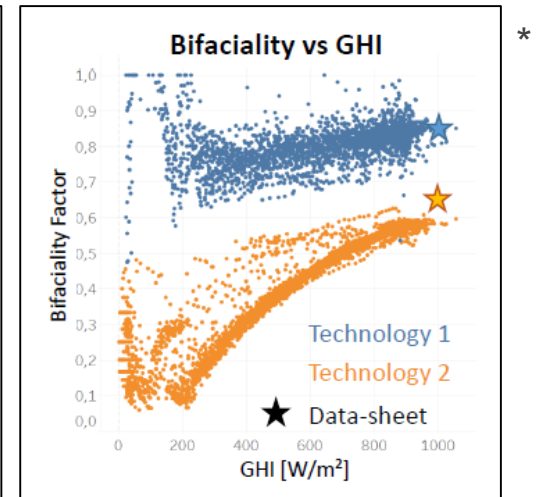
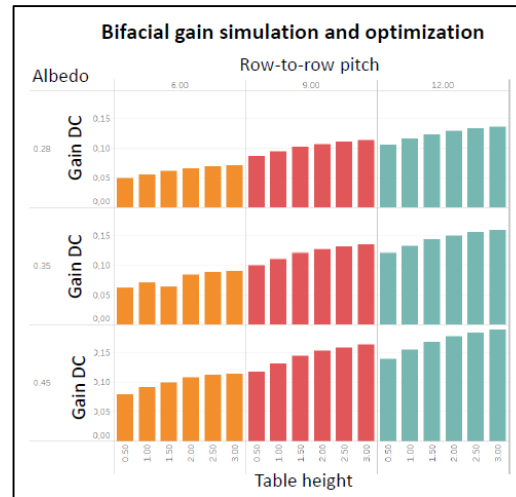
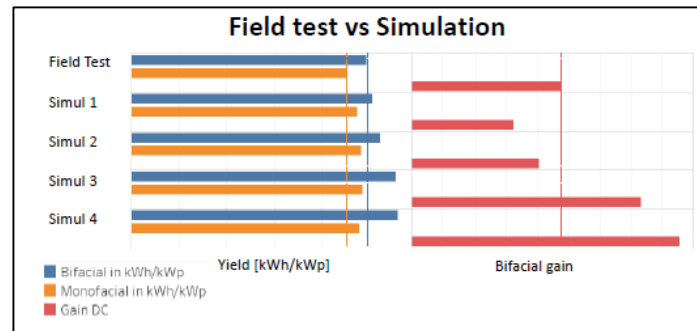
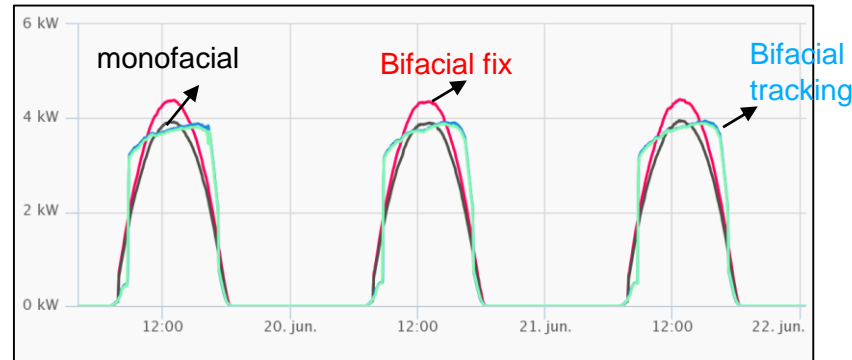
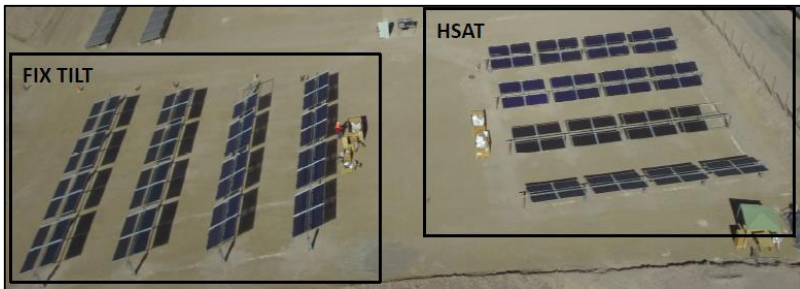


Enhanced power output



Traverso, MegaCell website 2014

Testing new PV technologies in extreme conditions – Bifacial



Bifacial yield gain varies from 10% to 15%

Bifacial PV plant in Mexico – Engie vision



The screenshot shows the website for 'pv magazine 10 YEARS'. The header includes social media icons for Twitter, Facebook, and LinkedIn, along with a 'Suscrip' button. A navigation menu lists 'Noticias', 'Comunicados', 'Newsletter', 'Revistas', 'Mercado de proyectos FV', and 'Sobre Nos'. A green banner below the navigation reads: 'A partir de octubre de 2018, DMSolar se transforma en BayWa r.e.'. The main article is titled 'En fila, dos nuevos proyectos' and discusses the start of environmental impact evaluation procedures for two photovoltaic projects in Durango and Sonora. The article is dated 'AGOSTO 30, 2018' and written by 'JORGE ZARCO'. Below the text are several category tags: 'CENTRALES FOTOVOLTAICAS', 'GRANDES PLANTAS', 'INDUSTRIA', 'INSTALACIONES', 'MÓDULOS Y PRODUCCIÓN (UPSTREAM)', and 'MÉXICO'.

- Laborelec supports Solairedirect on development and design of bifacial PV plant in Mexico



Thank for your attention

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See our new video:

<https://www.youtube.com/watch?v=7lerkButdbU>

