



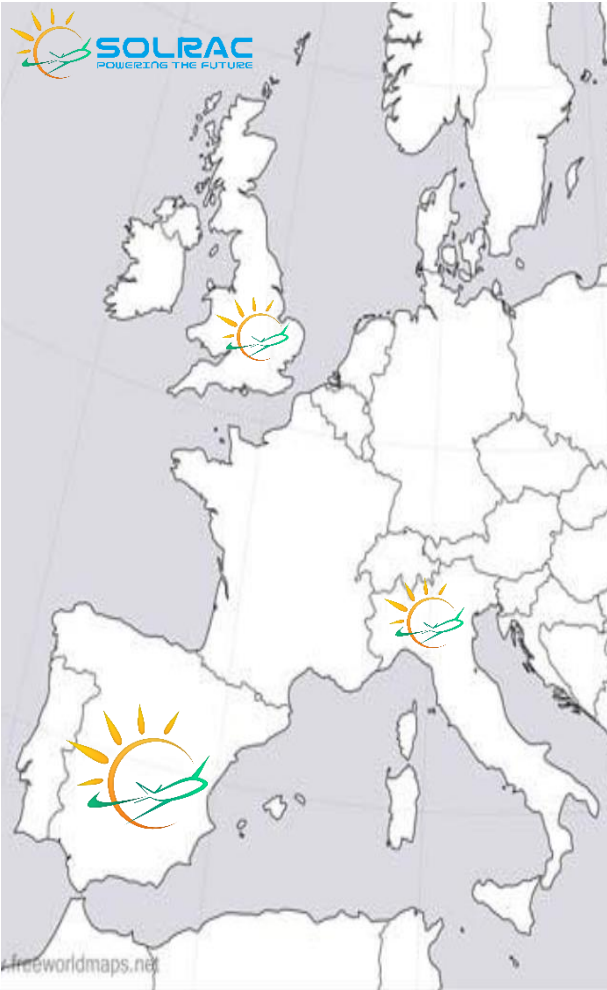
inter
solar

connecting solar business

EUROPE

Munich 2021

Solrac Company Introduction



Solrac is a young company with the aim to support developers and investment funds on the new era of the subsidy free in solar. Translating technical risks onto financial impacts, Solrac measures the Capex and the Opex on both assets under construction and operating ones. Solrac covers Design, Quality assurance and Operational aspects of the lifecycle of the projects.

Solrac is differentiating its services investing on different areas of the solar engineering, with a highly scientific contribution. The mobile laboratory to test solar PV panels on site (flash test and electroluminescence) and the fleet of drones for different applications (3D mapping and thermal) are examples of the effort that Solrac is making to reach the excellence on its services and contribution to the scientific community.

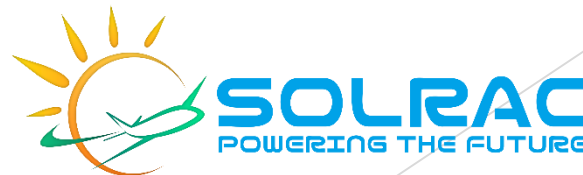
Our Values

- **Education:** At Solrac we value the innovation and creativity that diversity of thought brings. The one thing we all have in common is our focus on high performance.
- **Respect:** Solrac is an equal opportunities employer and does not discriminate on the grounds of age, disability, sex, sexual orientation, gender reassignment, gender identity, marriage, civil partnership, pregnancy, maternity, race (including colour and ethnic or national origins), religion or belief.
- **Fair Business:** Solrac is compromised with his customers, employees and sub contractors to value their work on a fair rate bases. We do not accept any suspicious behaviour in terms of miss paying or underpaid works.



The Team

- **Carlos Javier** is an experienced engineer in renewable energy in general. He has over 13 years in Engineering, negotiation and strategic sales, with in excess of £750m in deals originated and/or delivered across Spain, United Kingdom and Italy on clean energy. As Head of Engineering at UK based Lark Energy (2012-2015) he has designed, and overseen the installation of, more than 200MW of UK based projects. Carlos' projects have won prestigious Solar Power Portal Awards in 2013 (Most Successful Large-scale Ground Mount) Wymeswold Airfield (33 MW) and in 2014, Ground Mount (<10MW) for Ketton Cement works where the judges praised the scheme for its innovative design stating that "The project's innovative active power management sets a standard for difficult connections". Carlos holds an executive MBA and has considerable experience in portfolio management and project finance and was the Technical Director at Next Energy Capital, one of the largest renewable energy funds in the world with over 750MW of assets under management. Oversight of a large UK based asset base means Carlos is uniquely placed to have a comprehensive understanding of asset performance in the UK climate and has worked on scheme enhancement and productivity improvements.
- **Davide Orio** has extensive experience in the photovoltaic industry. Graduating with an BSc and MEng in Renewable Energy at the University of Exeter, he worked in inverter manufacturing, asset management and R&D. Davide holds 4 years of experience working as an engineer on the renewable industry. During his time in the asset management sector, the portfolio grew exponentially, also thanks to the exceptional service provided in the technical department. The total size grew from 150MW to more than 800MW, driving WiseEnergy to be one of the largest Solar Asset Managers in Europe. Davide lead performance analysis, results and solutions presentation to clients, site work organisation and improvement implementation. He was also responsible to increase the level of automation in the technical department, discovering ways to track KPIs, raise automatic alarms and carry out systematic analysis. Not only did this save time to the company but also improved the quality of service provided. This set of skills is implemented at Solrac in every job to ensure high quality, well presented results with a view to the operational needs of each client.
- **Pedro Maestro** is a Digital & Image Engineer expert on CAD and image processing (Electroluminescence). He has been involved on sun simulators and spectral reaction on the Solrac mobile laboratory. Also, he is experienced in post processing the images captured by the drone for 3D modelling and mesh treatment for CAD designing.
- **Jose Miguel** has been involved in solar Electrical and Thermal projects as qualified electrician. At the moment he is involved in operation and maintenance because his high quality operational standards. He is in charge of operating the mobile laboratory for Solrac, that includes calibration, maintenance, testing and data management.

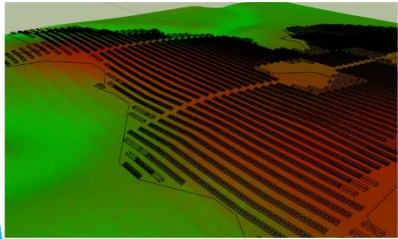
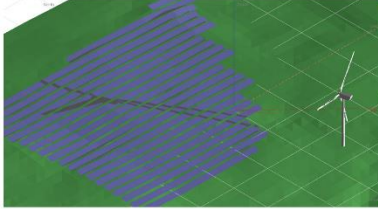


Solrac Services

Designs and Calculations

► HIGH PERFORMANCE SOLAR FARM DESIGNS AND SIMULATIONS

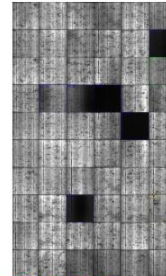
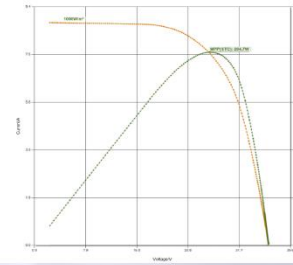
- Accurate EYA with 3D PVsyst
- Components revision
- High precision simulations
- Designs and CAD, from high level drafts to Ready to build.



Quality Assurance Plans

► QUALITY ASSURANCE PLANS (PANEL TESTING)

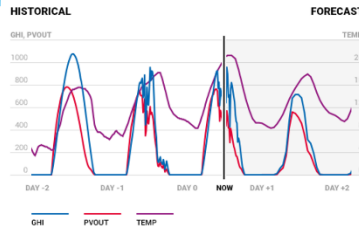
- Flash test on site and Electroluminescence.
- Own mobile laboratory A+A+A+
- Compatible with PERC and panels over 2 Meters
- Certified according to IEC 60904-9 Ed3 and Ed2



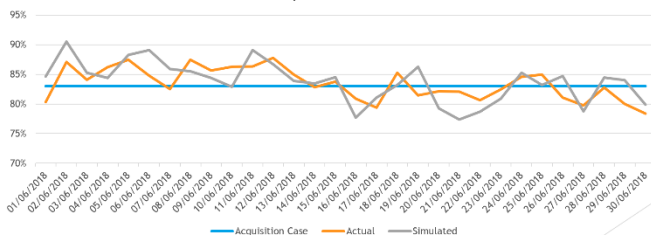
Asset Management Support

► REAL ACTIVE ASSET MANAGEMENT

- Forecast based on 3D simulations
- Availability and PR management
- Quantitative and qualitative analysis
- Supportive engineering services



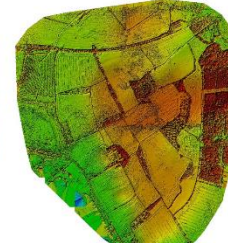
Actual vs Expected vs Simulated PR



Feasibility analysis

► Topographical analysis (3D MAPPING)

- In house RTK drone fleet.
- Mobile ground station (D-RTK)
- Thermal inspections available





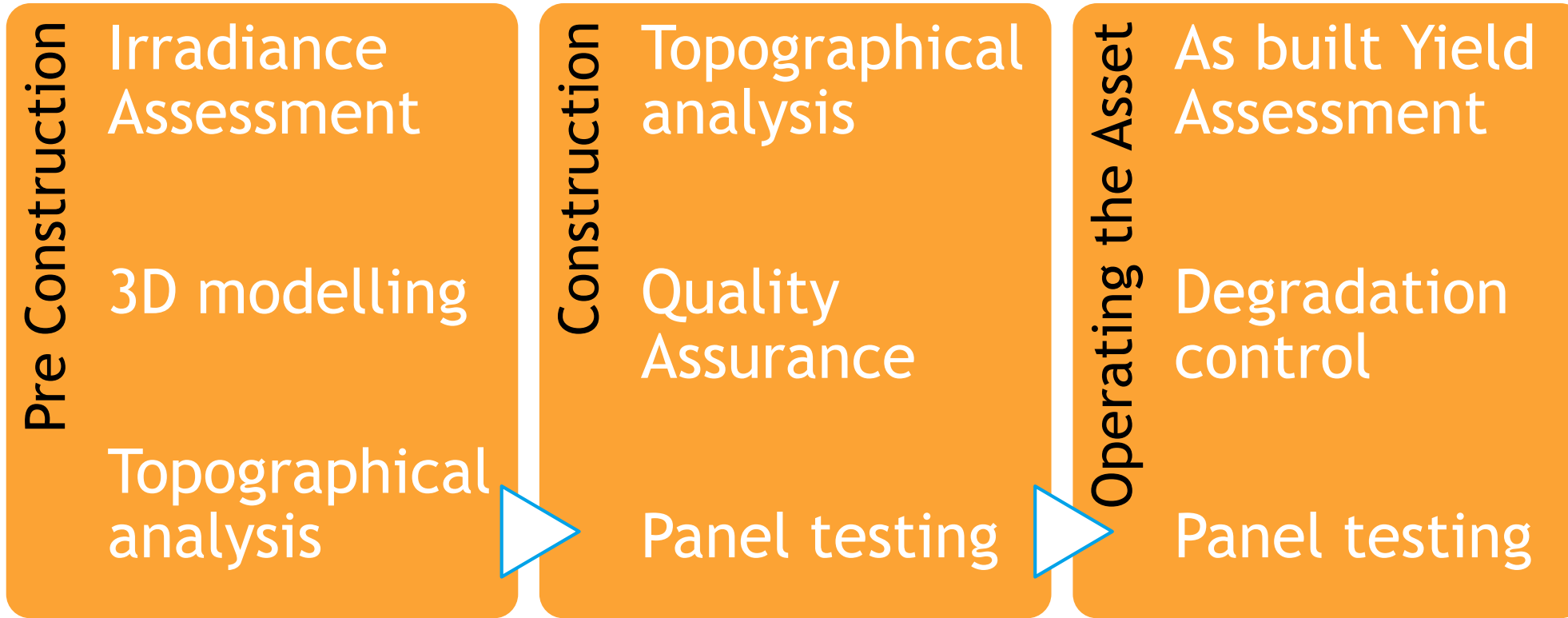
Energy Forecast and Plan, Based on Data
from Field

inter
solar

connecting solar business

EUROPE

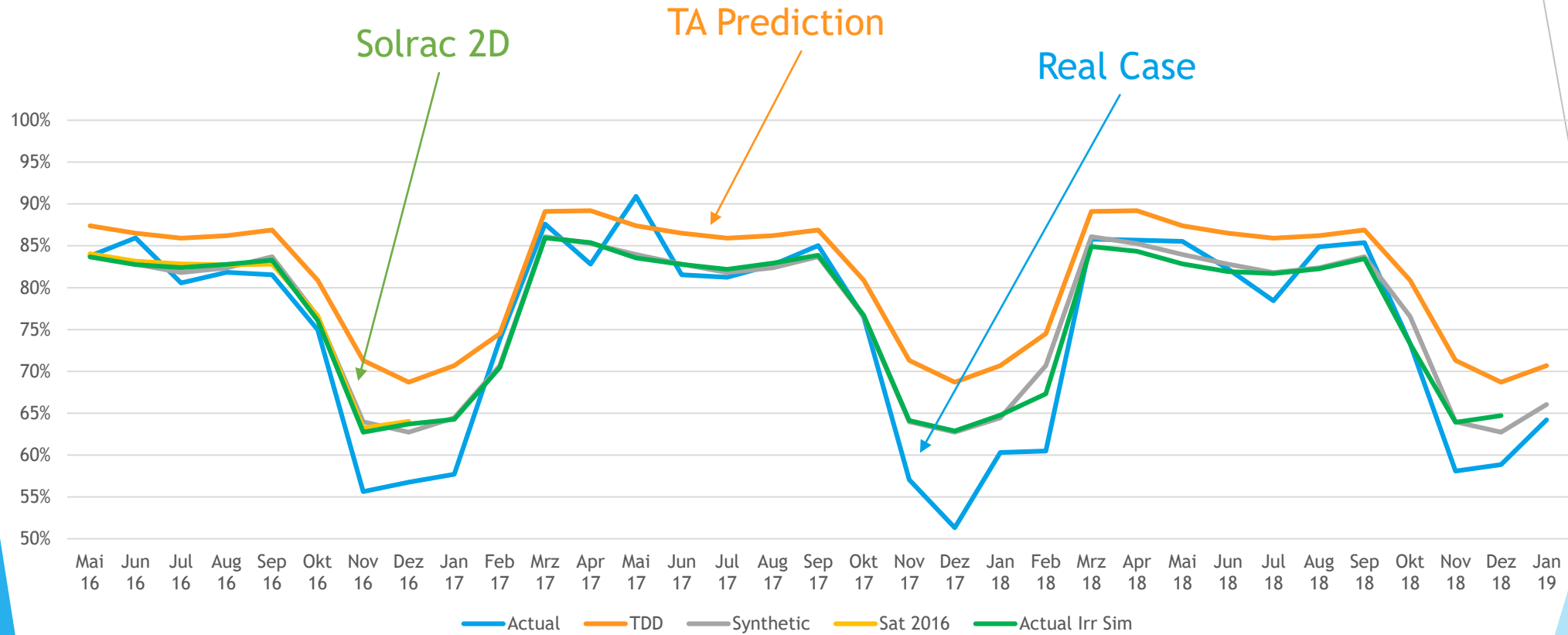
Three different Stages



- ▶ Energy Yield Assessments
- ▶ Quality Assurance - Panel testing
- ▶ Degradation and Panel losses & problems

Performance Accuracy

- ▶ Are we overperforming or underperforming?

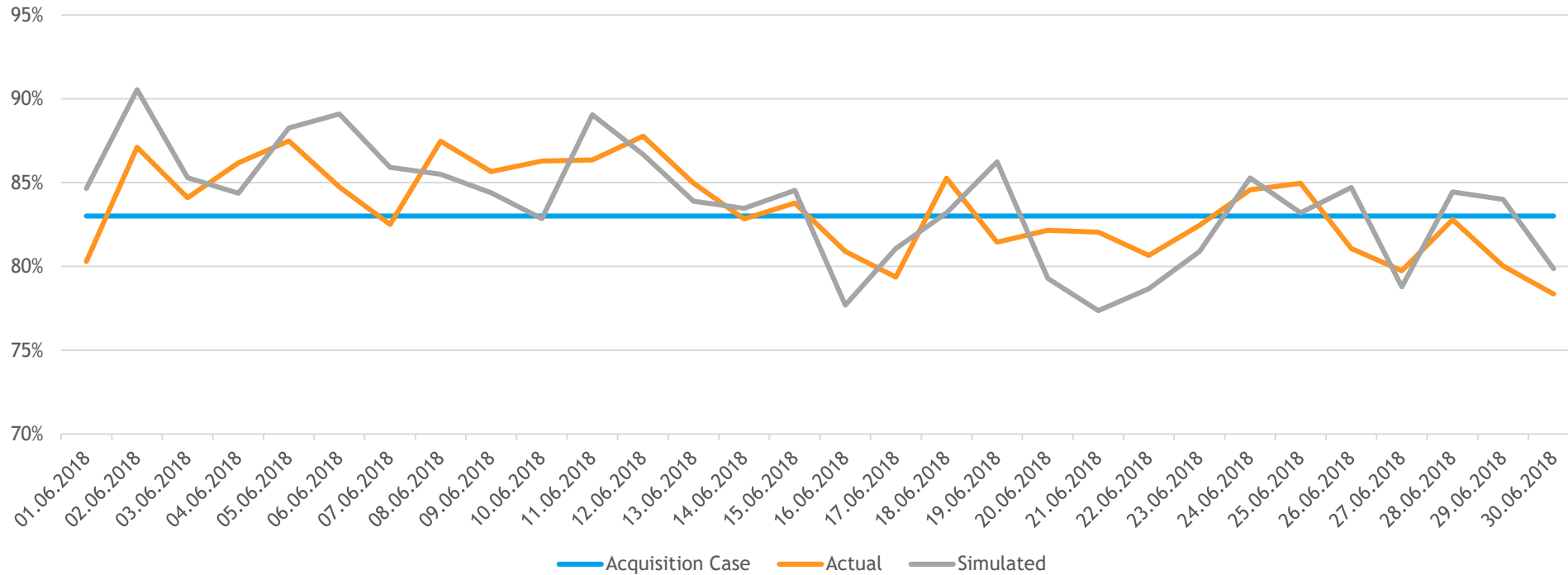


- ▶ Correct Irradiance Assessment
- ▶ 3D modelling / Shadings Analysis

Performance Accuracy

- ▶ Still considering flat PR?

Actual vs Expected vs Simulated PR

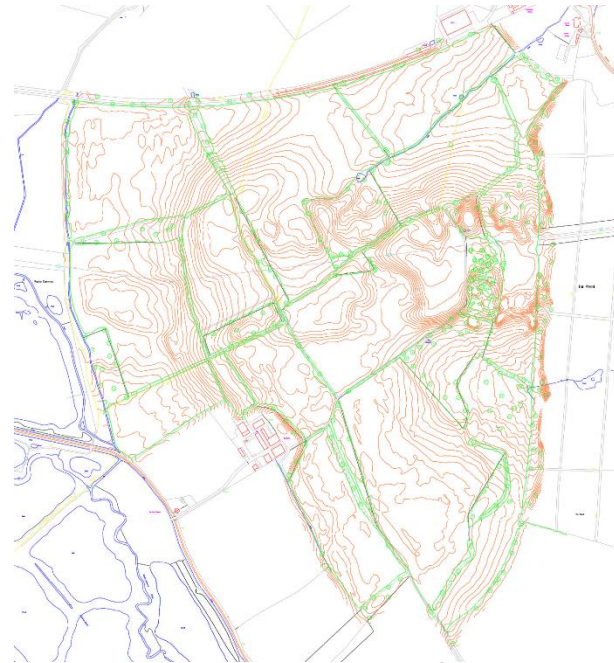
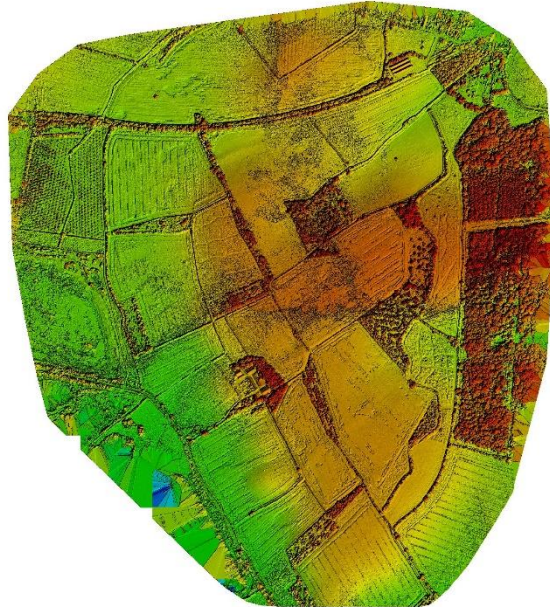


- ▶ Extrapolate the annual PR into Monthly/weekly
- ▶ 3D modelling / Shadings Analysis

Feasibility analysis

- ▶ Topographical analysis (3D MAPPING)

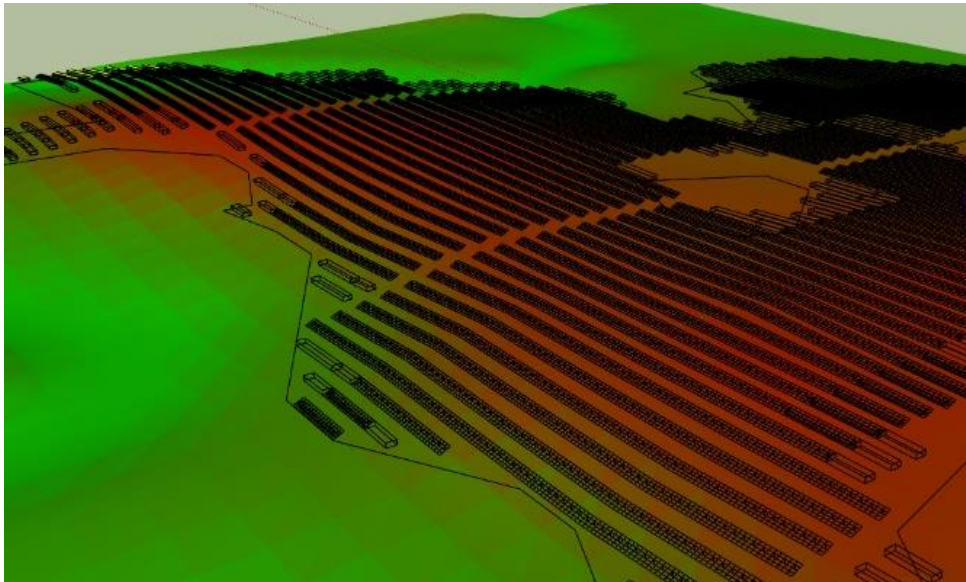
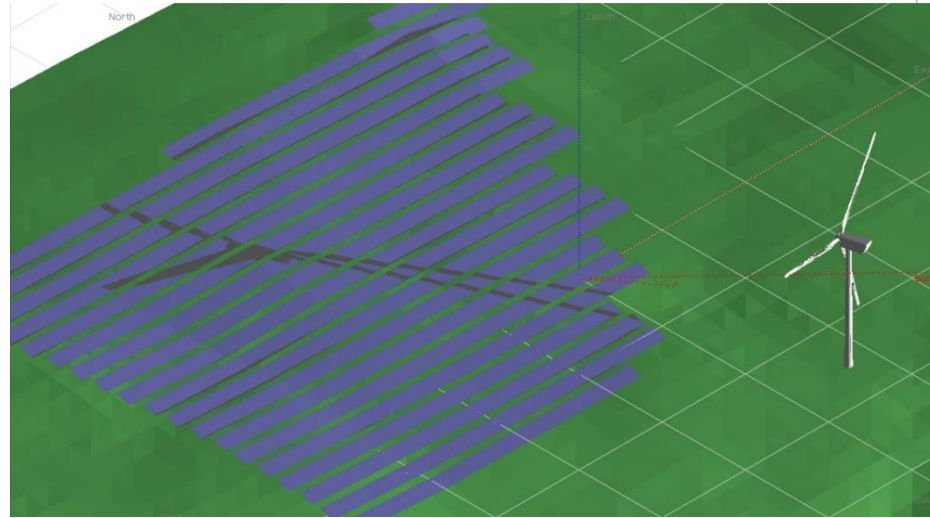
- ▶ In house RTK drone fleet.
- ▶ Mobile ground station (D-RTK)
- ▶ Thermal inspections available



Designs and Calculations

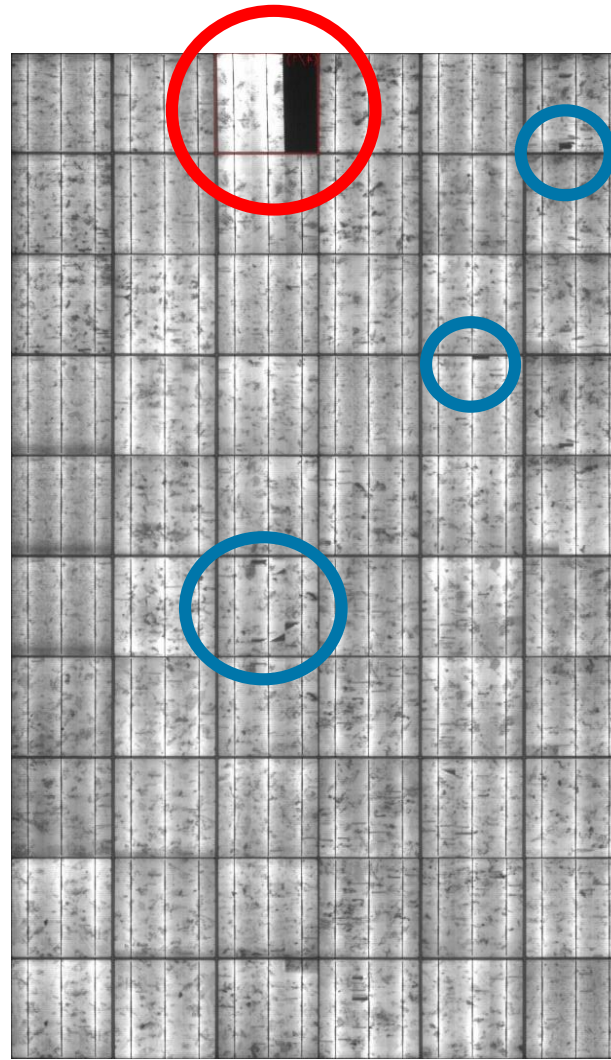
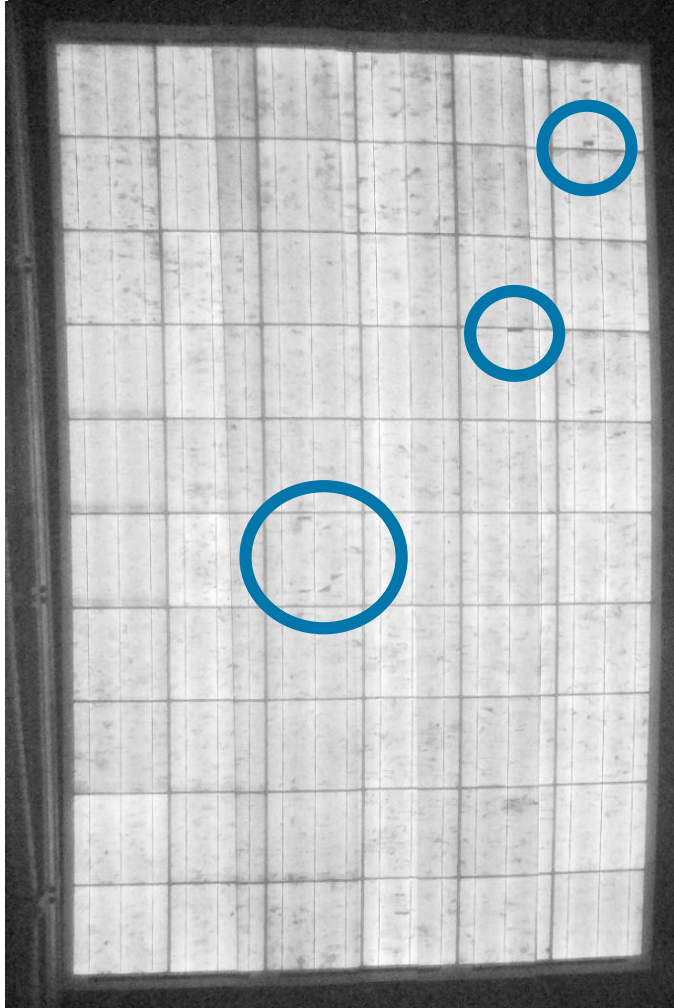
► HIGH PERFORMANCE SOLAR FARM DESIGNS AND SIMULATIONS

- Accurate EYA with 3D PVsyst
- Components revision
- High precision simulations
- Designs and CAD, from high level drafts to Ready to build.



Defects detection - EL vs IR

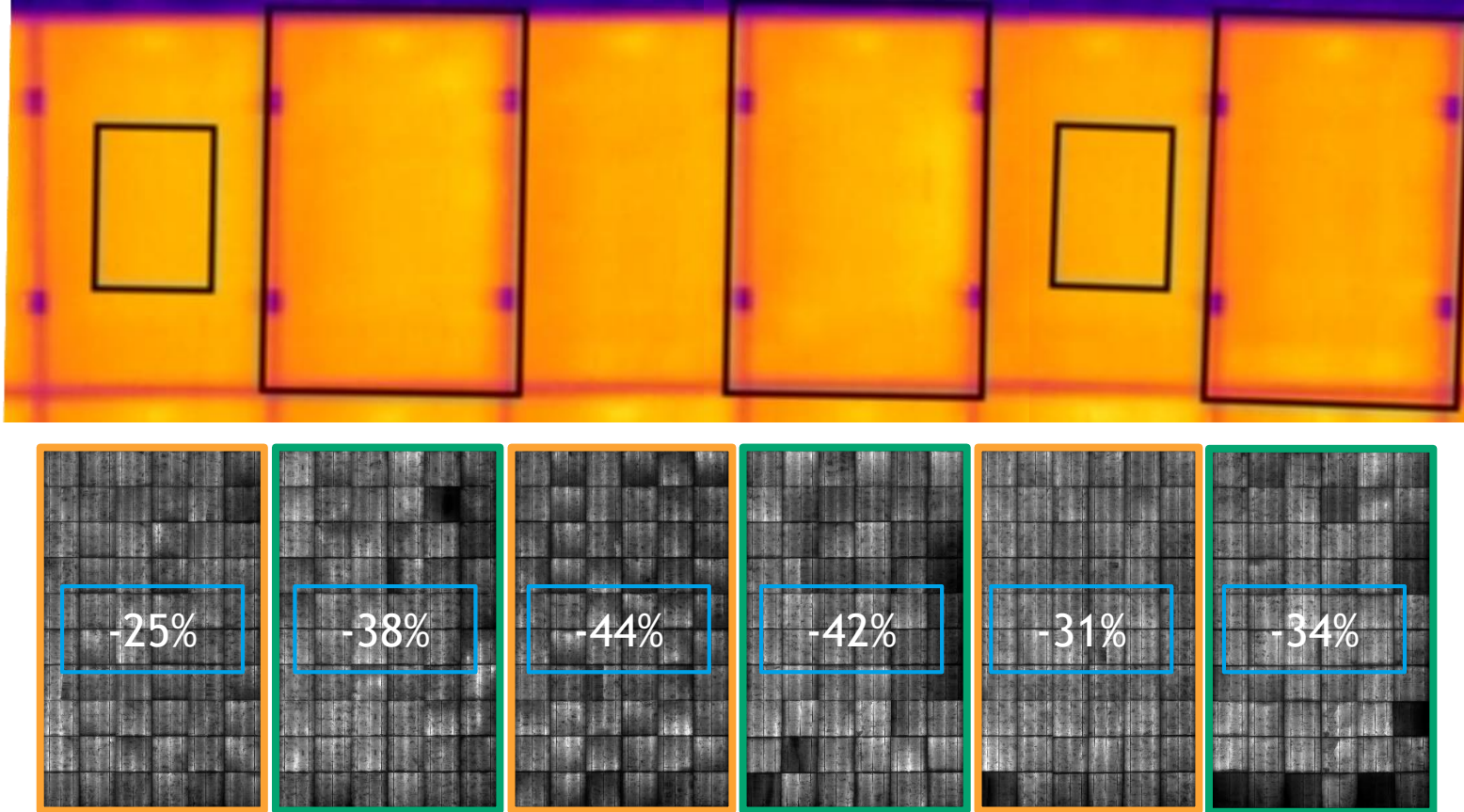
- ▶ Thermal inspections, are they reliable?



- ▶ 2.5W down
- ▶ Transportation/Manufacturing defects

Defects detection - EL vs IR

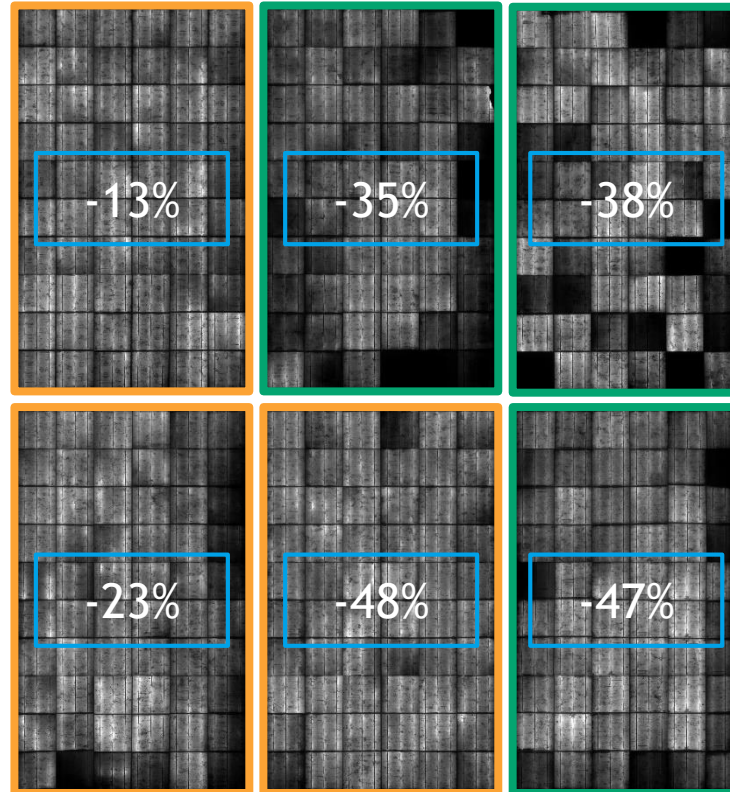
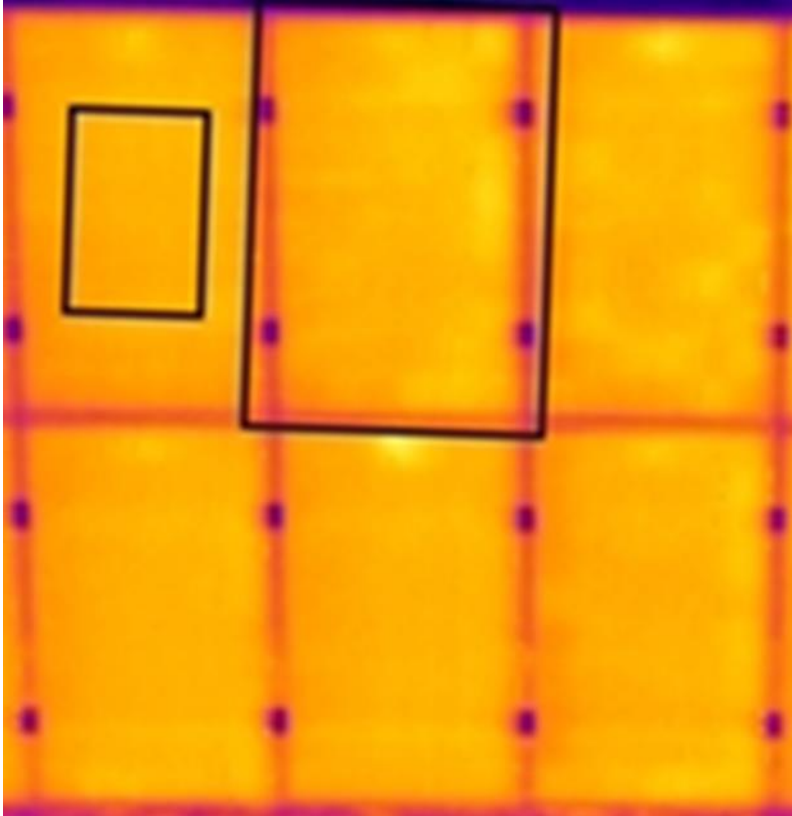
- Thermal inspections, are they reliable?



- PID not necessarily on negative side

Defects detection - EL vs IR

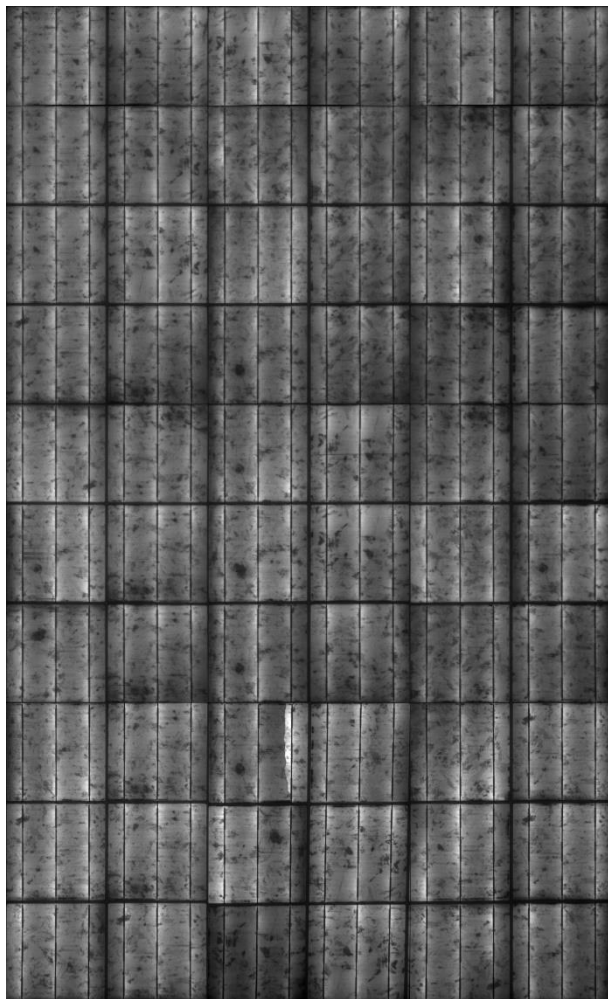
- ▶ Thermal inspections, are they reliable?



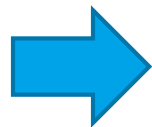
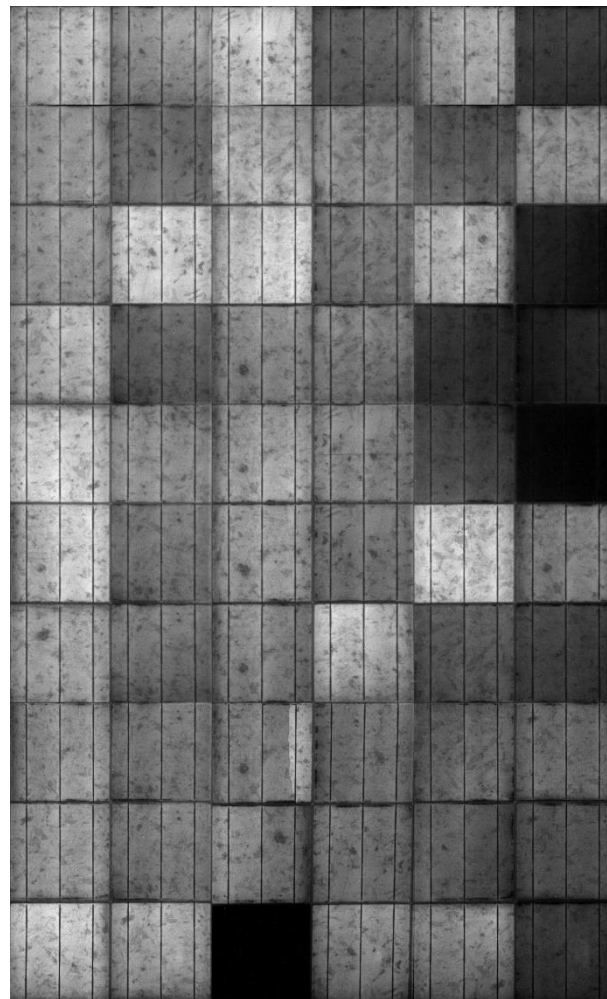
- ▶ Inspect the asset before the evidence
- ▶ Low and High Current Electroluminescence (EL)

PID Investigation - Early stage

Standard EL

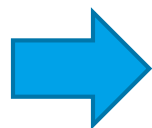
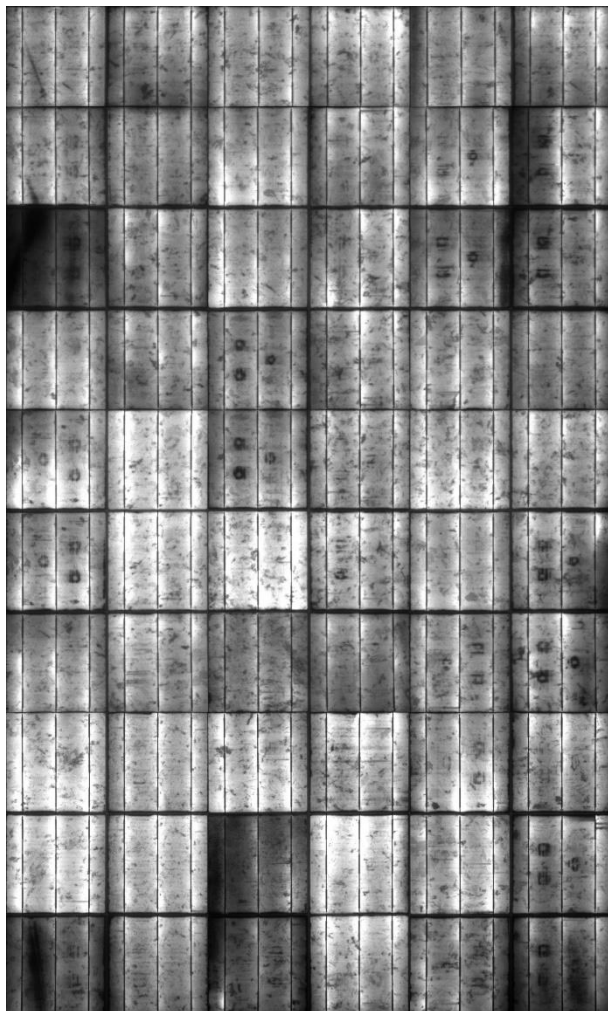


Low EL

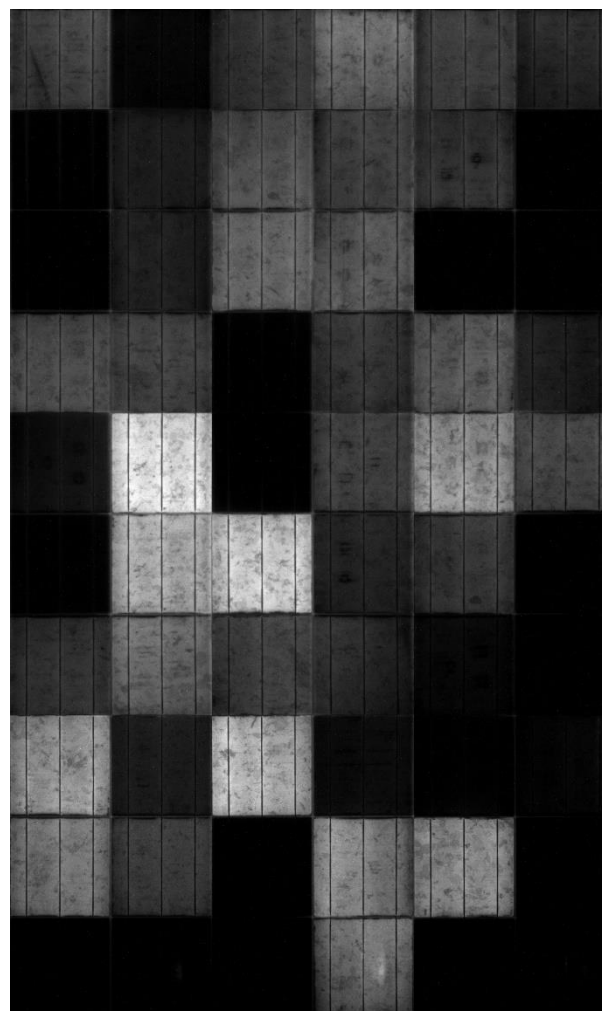


PID Investigation - Mid stage

Standard EL

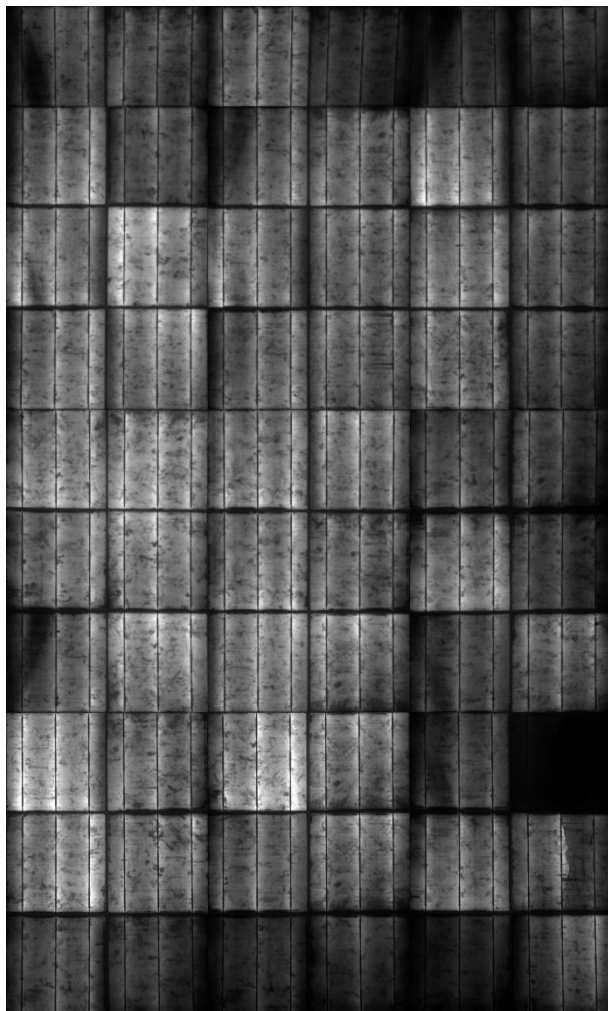


Low EL

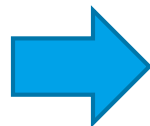
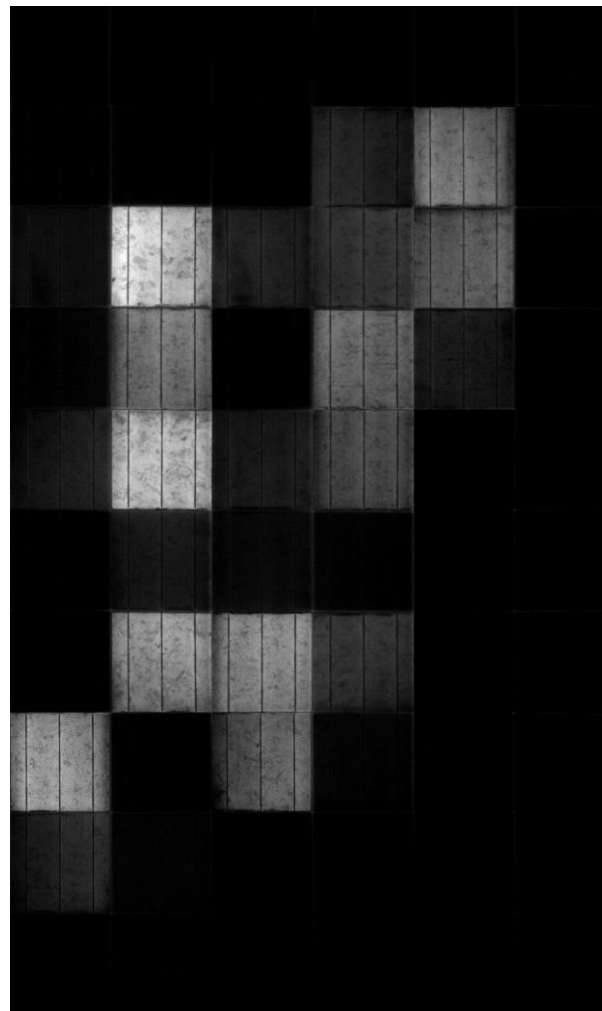


PID Investigation - Advanced stage

Standard EL

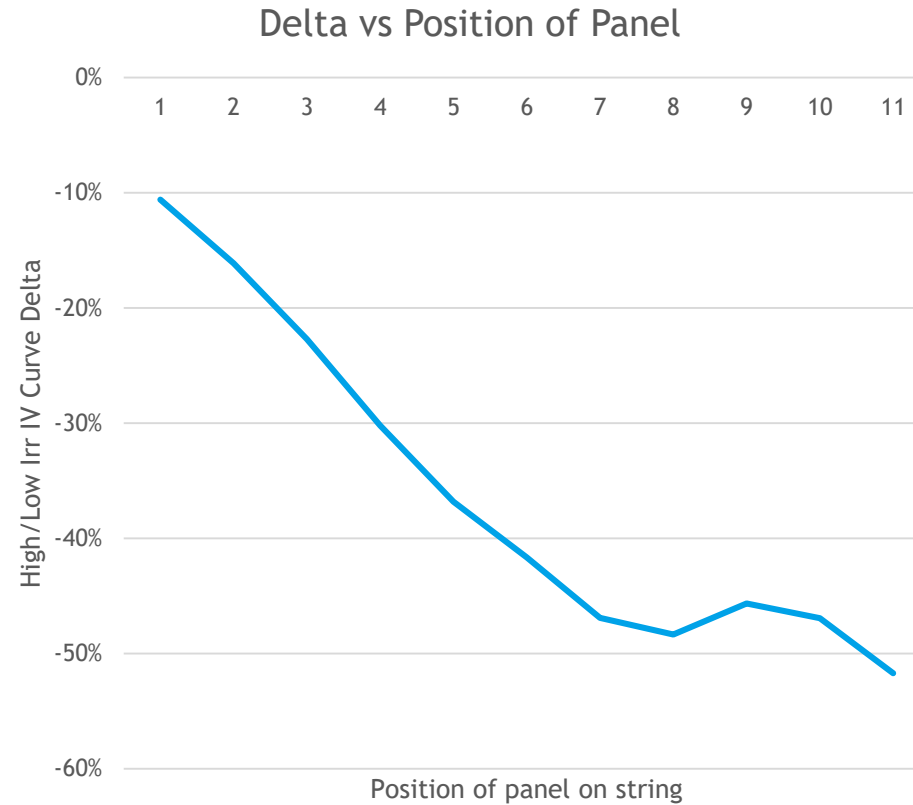
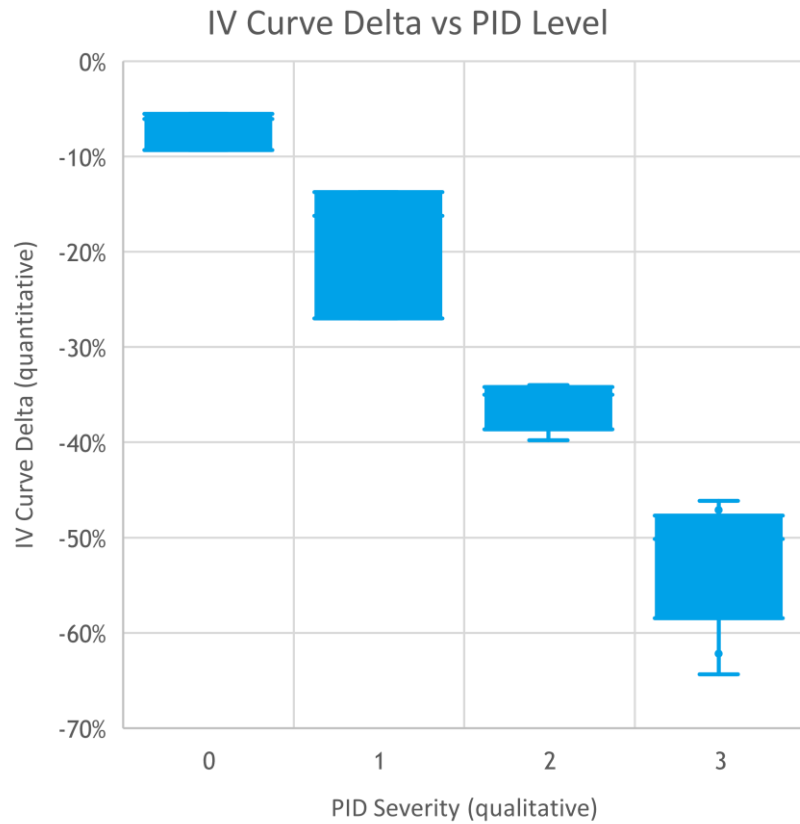


Low EL



PID Investigation

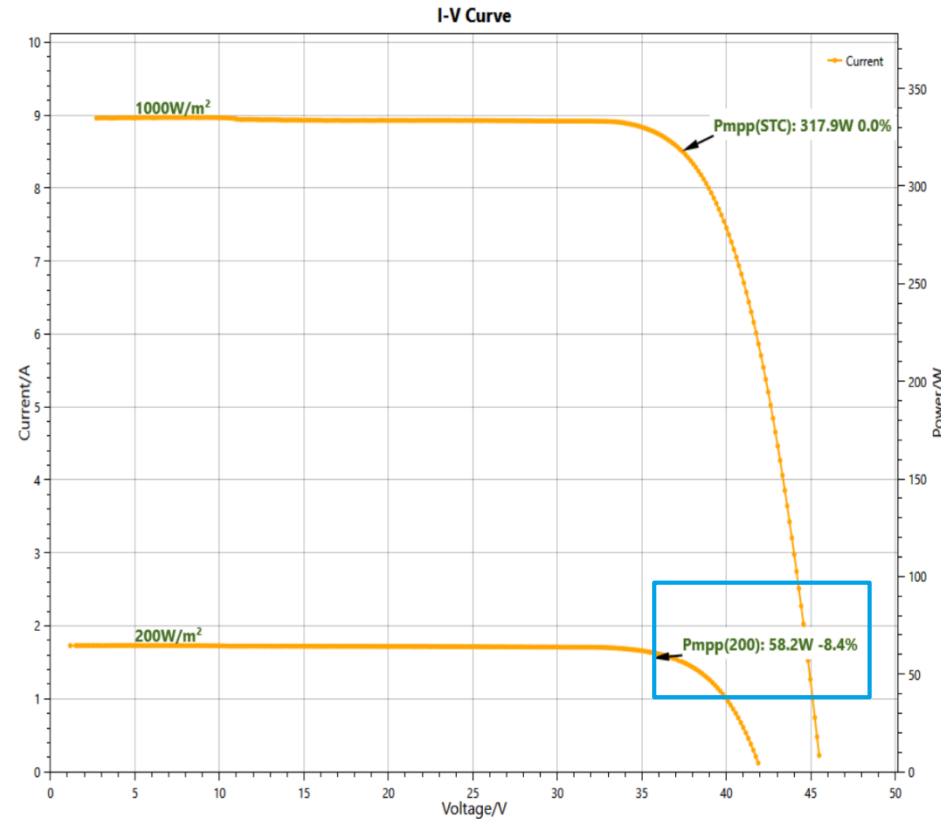
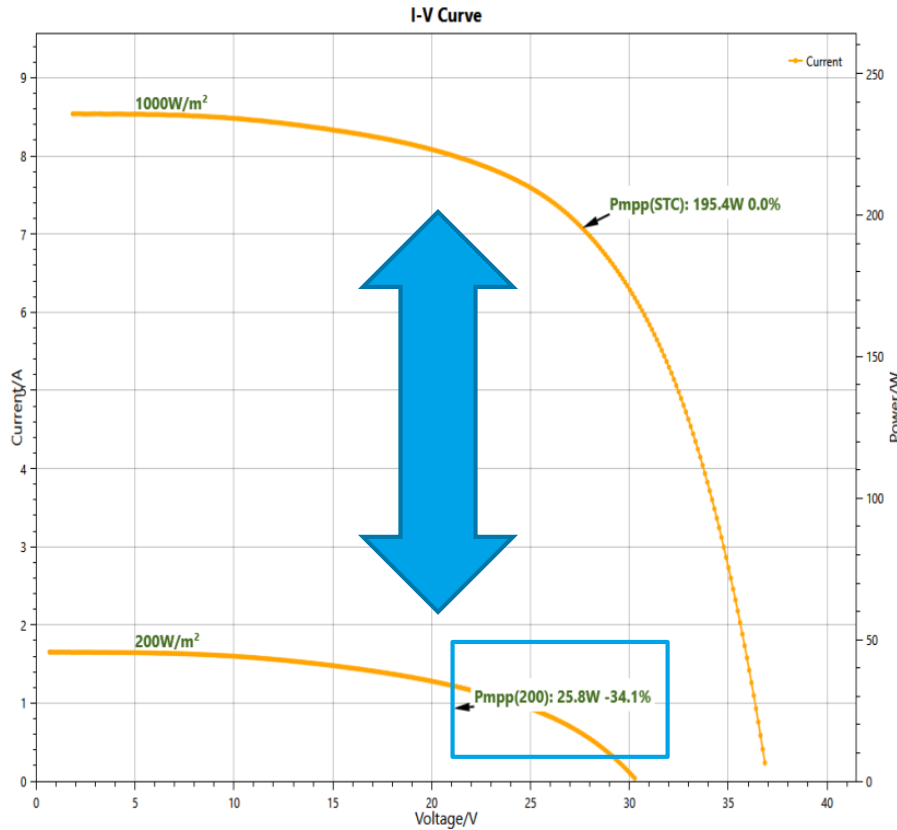
- ▶ Have you got PID? - where?



- ▶ Half of the table should be OK

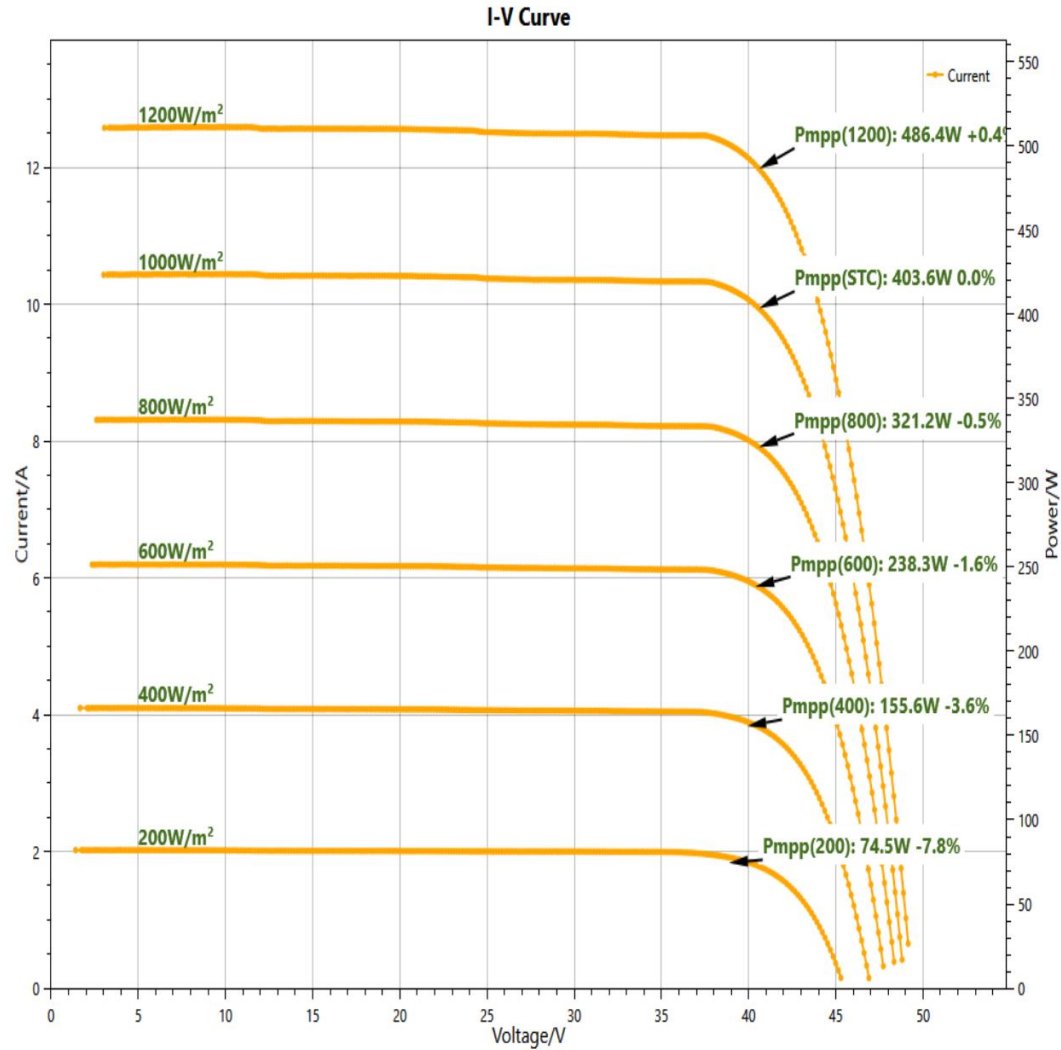
PID Investigation

- Early detection of PID?



- Delta between high and low irradiance
- Performance at different irradiance

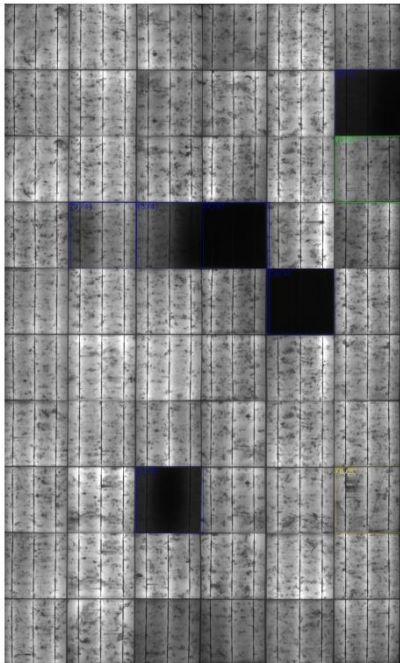
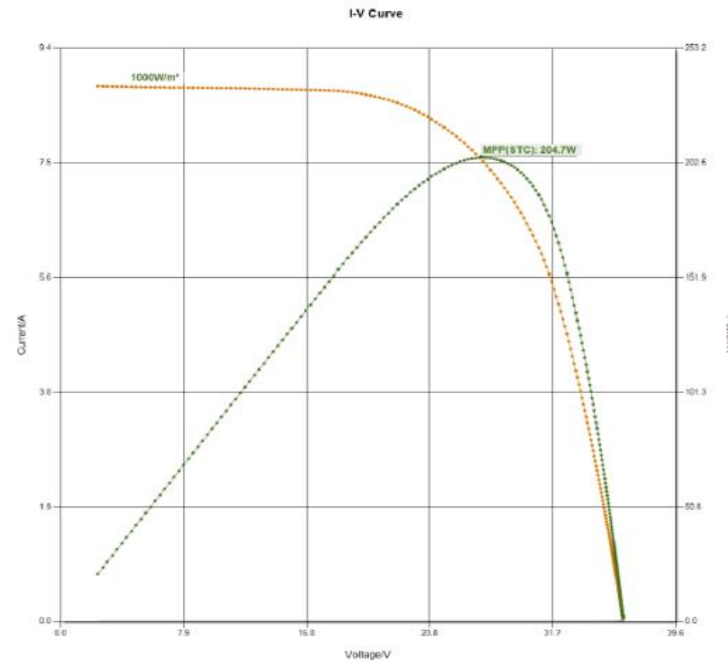
Performance at different levels



- Performance at different irradiance

Quality Assurance Plans

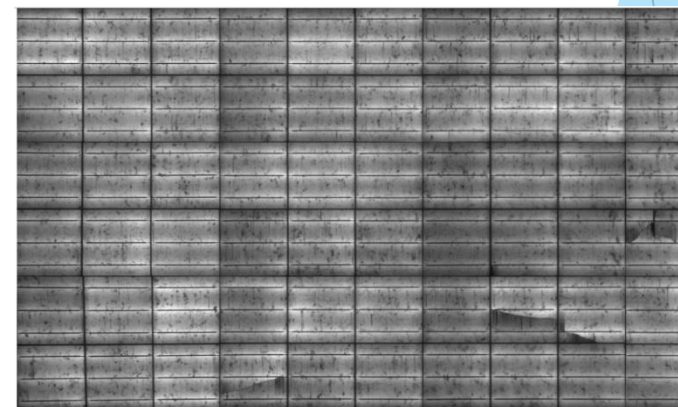
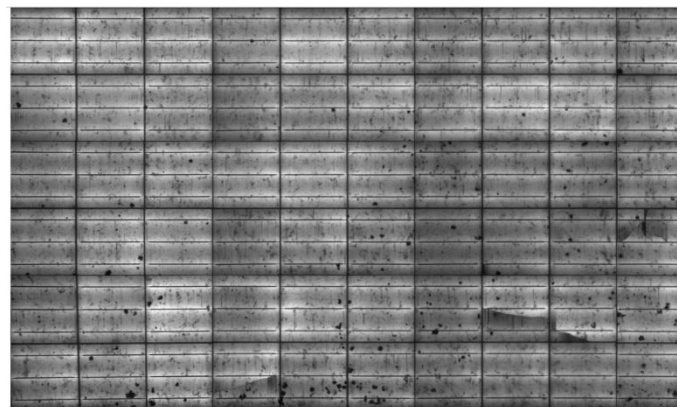
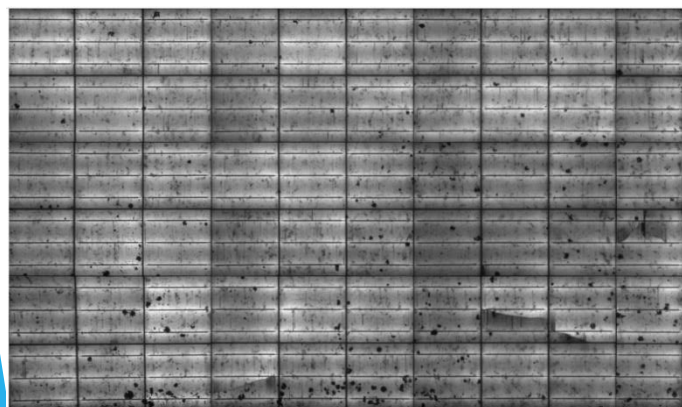
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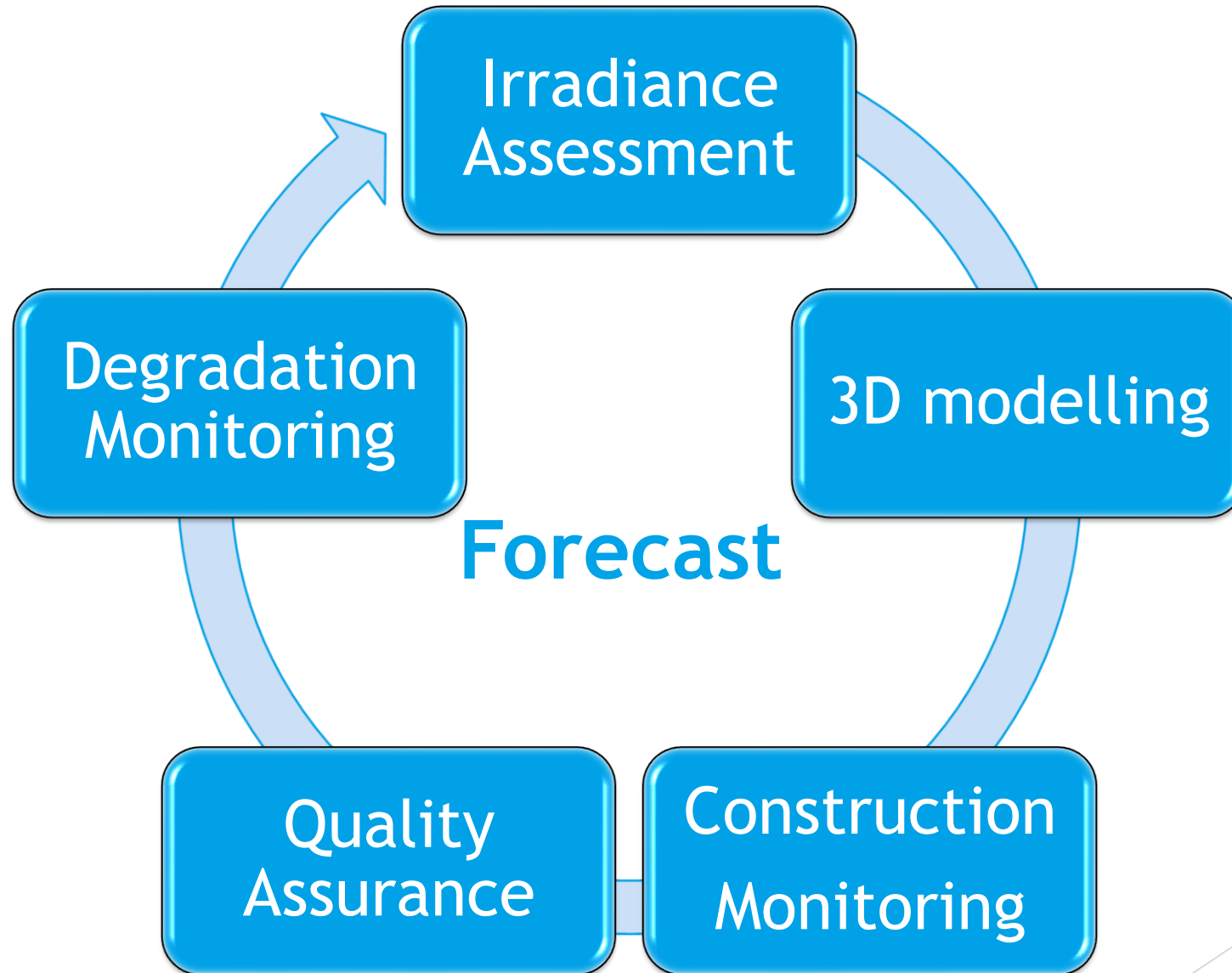
Soiling losses (Cleaned vs Dirty)



235.0W Standard Clean → 239.3W Deep Clean → 254.4W



Conclusions / Summary



Questions

THANK YOU

At Solrac we pride ourselves on providing engineering excellence. Our service is based around the quality of our team. Your commission is important to us and we are looking forward to working with you.

Please feel free to ask for more information and references.

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