

Digitalization for solar installers

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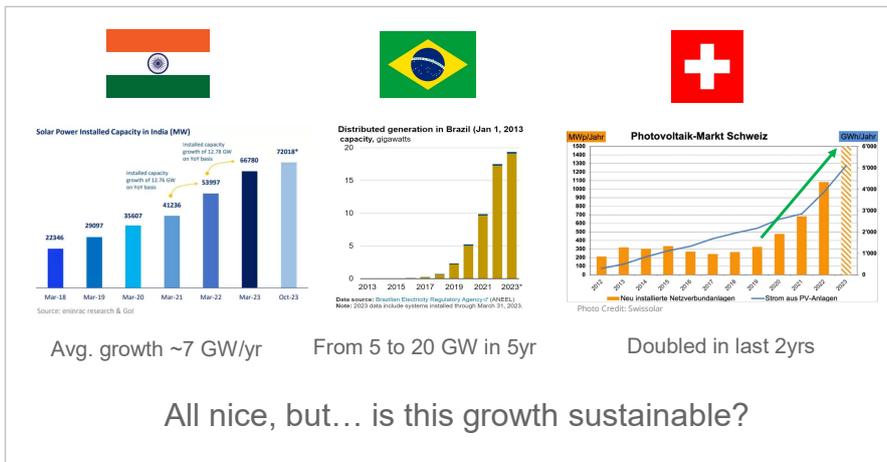
Lausanne, 22nd March 2024



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Solar installed capacity growth Distributed solar is booming!



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PV challenges

Why is PV rooftop scaling so fast?



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PV challenges

Have I seen that before?

Business case

Overdesigned PV + battery + low consumption

Paybacktime ~35 yr...

Installation

Shadow

De-rating and clipping

Connectors & wiring

O&M

Soiling

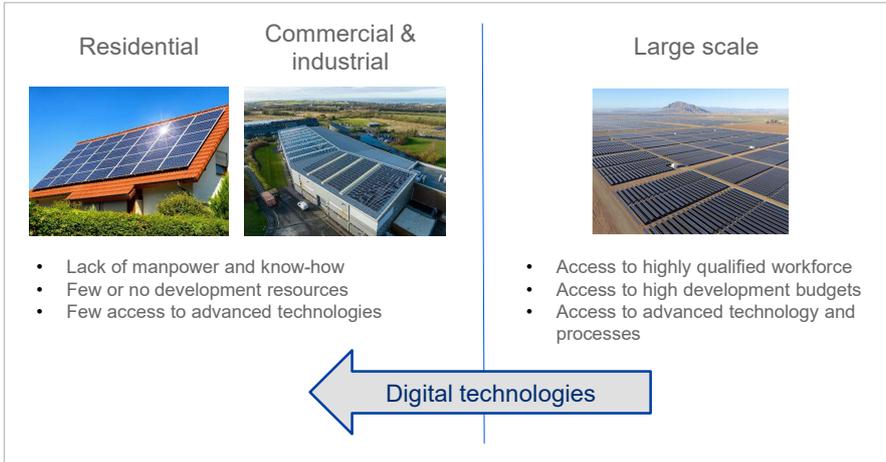
Kimber et al. (2006): soiling losses in USA between 6.2 % to 27 % in 30 days

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PV opportunities Learning with the big players

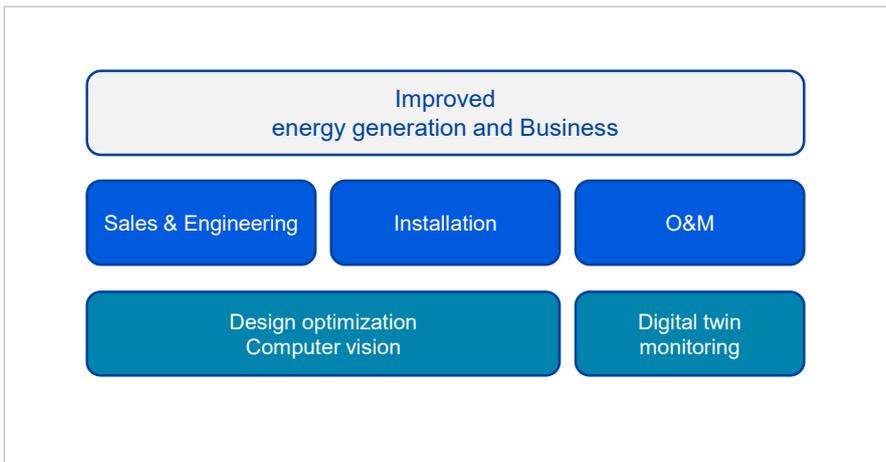


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PV digitalization Digital transformation for solar installers

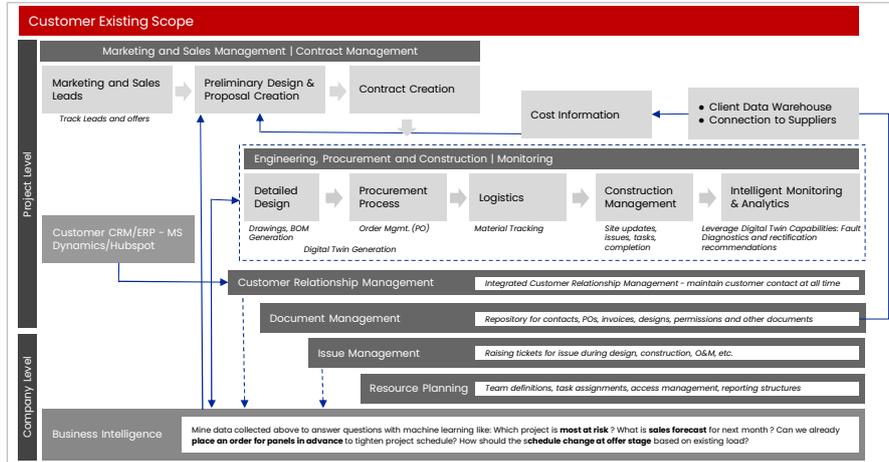


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PV digitalization Process integration



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PV digitalization Design optimization



Goal: Recommend design based on energy and financial KPIs



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PV digitalization Digital twin monitoring

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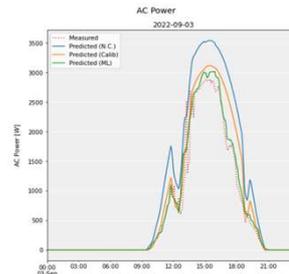
Goal: Performance tracking – is your plant performing as it should?
Failure recognition

Data driven

It correlates historical energy production with weather data and predicts

Model driven

It performs quasi real-time simulations delivering energy prediction based on weather data



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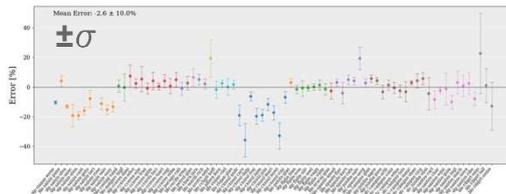
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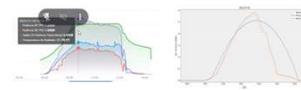
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Data driven



Month-to-month deviation → $\pm 2\sigma = 20-40\%$



Issues:

- It requires at ~1 year training.
- It is a relative comparison, if the data is bad, it will say the installation is good.
- **“It does not reflect the EEC. Losses have no meaning.”**

solytic solar analytics



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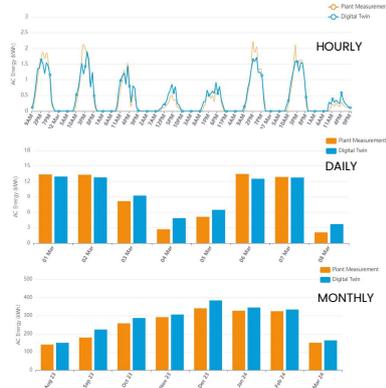


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Model driven

DIGITAL TWIN

- It does not require training.
- It reflects the EEC in several levels
- It can recognize specific failures



ADVANTAGES

- 1) Calibration of loss parameters
- 2) Calibration of cloud coverage factor for design energy forecast



Month-to-month deviation $\rightarrow \pm 2\sigma = 5\%$



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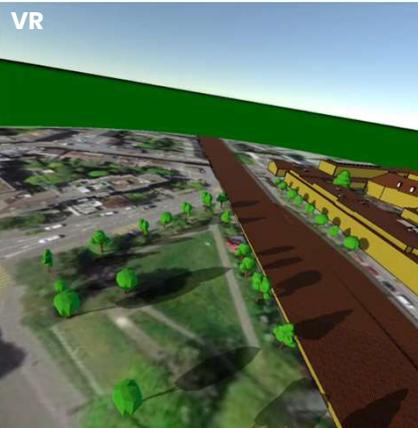
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PV digitalization Computer vision AR/VR



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ADVANTAGES

- 1) Realistic visualization for customers (BIPV) and city authorities, with real time interaction
- 2) Collaborative planning and interaction between electrical companies and roof installers

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PV digitalization Conclusions

- The fast scaling of solar rooftop installations lags behind in technology compared to centralized segment, which often result in a lack of optimum/correct designs and O&M.
- Design optimization can recommend the right sizing of solar (and battery) in order to optimize energy and financial results.
- Digital twin monitoring indicates the real health status of the solar plant, and assist to diagnostic the installation. It also enable to determine loss parameters and cloud coverage factor for localized installation planning.
- The development of computer vision tools open possibilities for novel interactive sales and engineering processes.

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PV digitalization

Thank you!



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