

# Multidisciplinary Evaluation of Power Converter Options for Building Integrated Photovoltaics

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Poster IPV\_V13

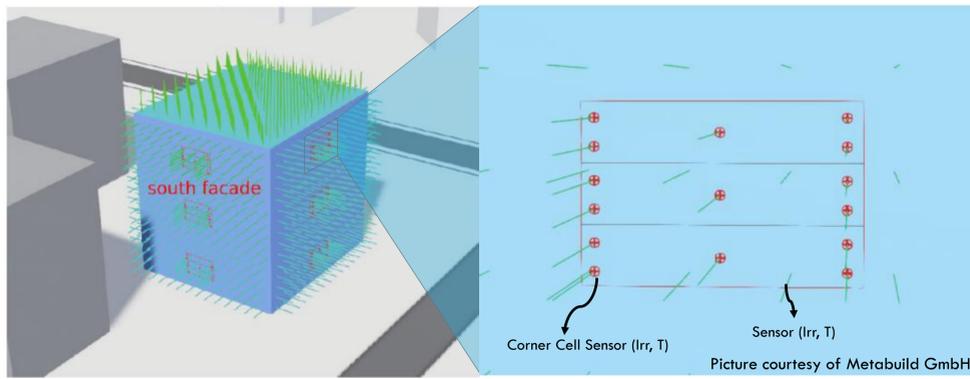
## Our 3-step methodology:

- Building irradiance and power modelling,
- Corner-cell shading approach
- Systematic evaluation of power converter options
- ➔ estimating the actual PV yield under irregular shading,
- ➔ assisting the design workflow of BIPV solutions

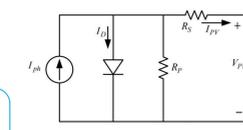
## Key Takeaways

- 1) Automatic power conversion design and simulation
- 2) Adaptable for arbitrary geometries and panel types
- 3) Standardized electrical design
- 4) The tool facilitates BIPV design and is compatible with commercial tools
- 5) This work presents a novel method for interlinking geometry, shading and electrical design
- 6) Direct assessment of trade-offs under reasonable conditions

(1) Building Irradiance and cell power

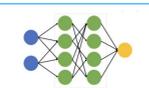


Corner-cell single diode model



Irradiance Time series per corner cell

Data-driven yield estimation per panel  $f(Irr, T, PV \text{ model})$

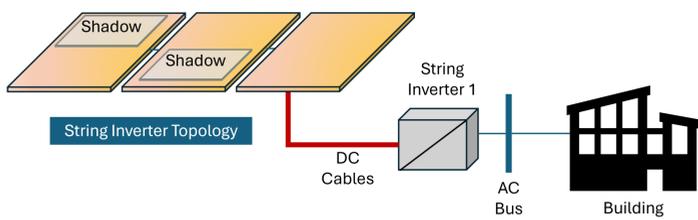
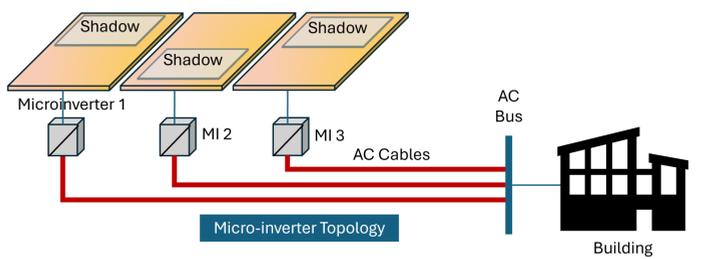


**Panel Metadata:**  
- Colouring  
- #Cells  
- #Cell-blocks  
- Cell size (m<sup>2</sup>)

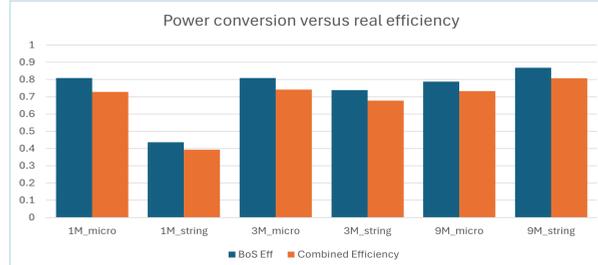
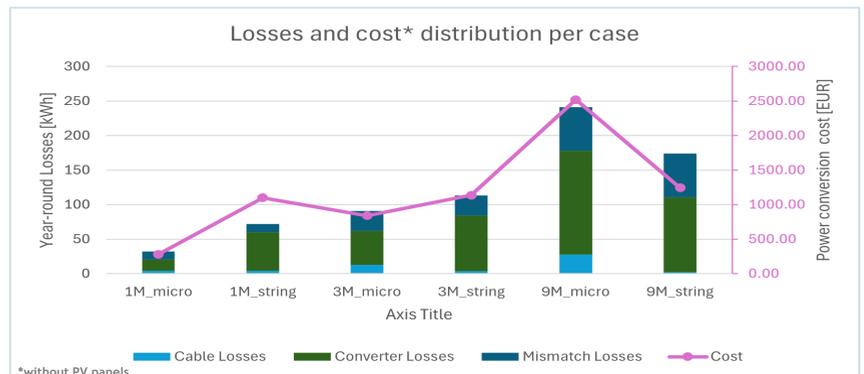
Panel power output time series (W/m<sup>2</sup>) estimation per panel  $f(Irr, T, PV \text{ model})$

## 1 BIPV design, multiple possible topologies

(2) Power Converter Options

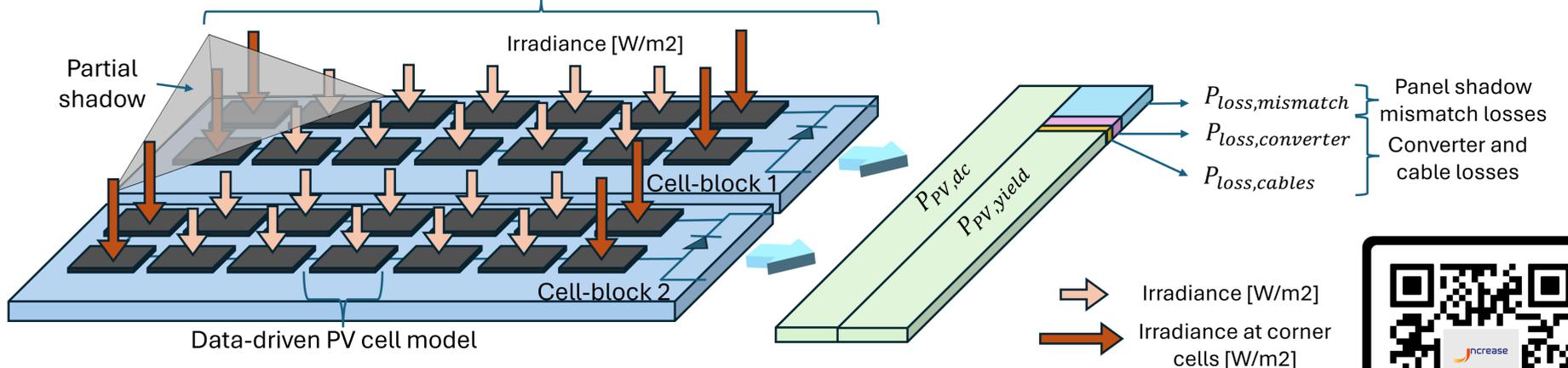


Irradiance modelling



**Results examples with 1, 3, and 9 panels using micro and string Inverters.**

(3) BIPV Modelling



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