

Electrical Energy Systems

Partial Shading in BIPVs

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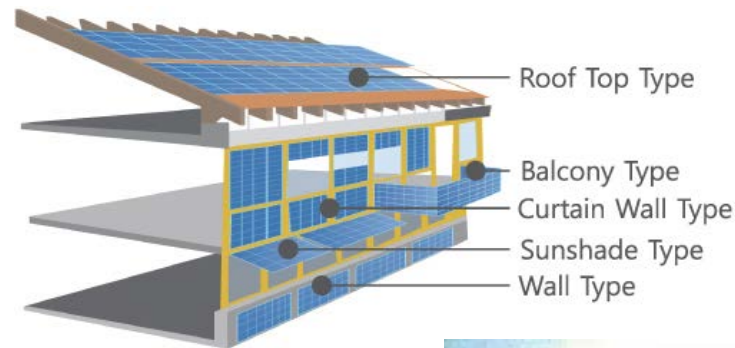


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Building Integrated Photovoltaics (BIPV)

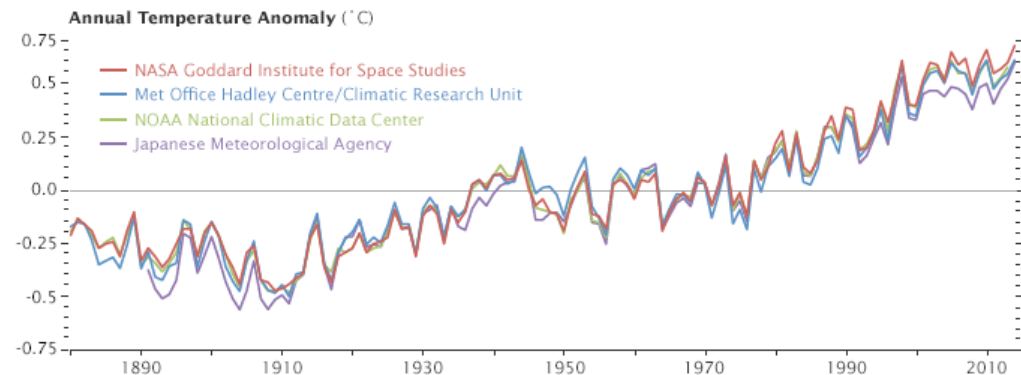
- Panels act as energy producers and exterior building materials
- More cost effective than regular PV installation
- Environmentally friendly



Why is this important??



- Fossil Fuel: Non-renewable vs. renewable
- Global temperature has risen 0.8°C (1.4°F) since 1880

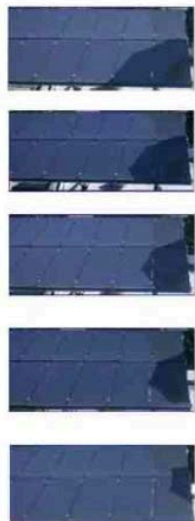
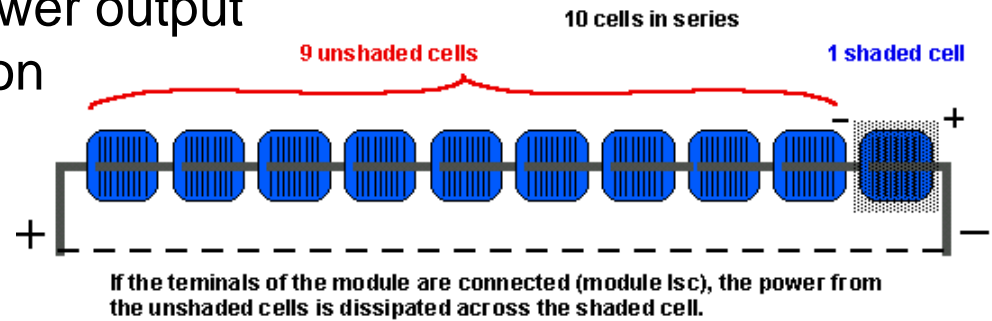


Issue with shading

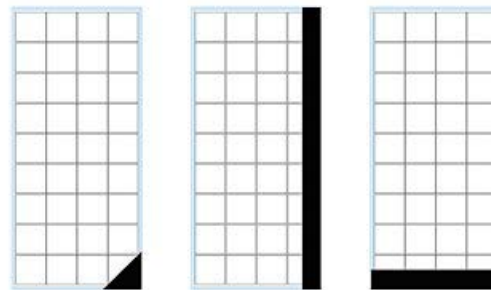


Issue with shading

- Shading in one cell affects the entire string
- Significant reduction in power output
- “Hot spots” and degradation



% of Array Shaded	Power Loss Due to Shade
13%	44%
11%	47%
9%	54%
6.5%	44%
3%	25%



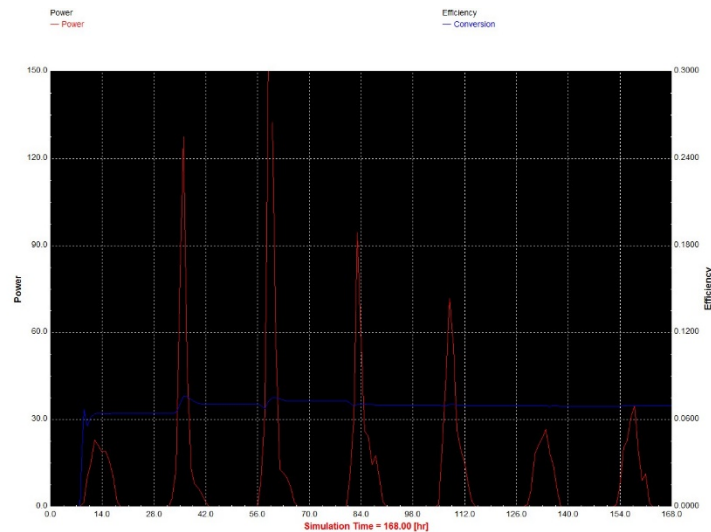
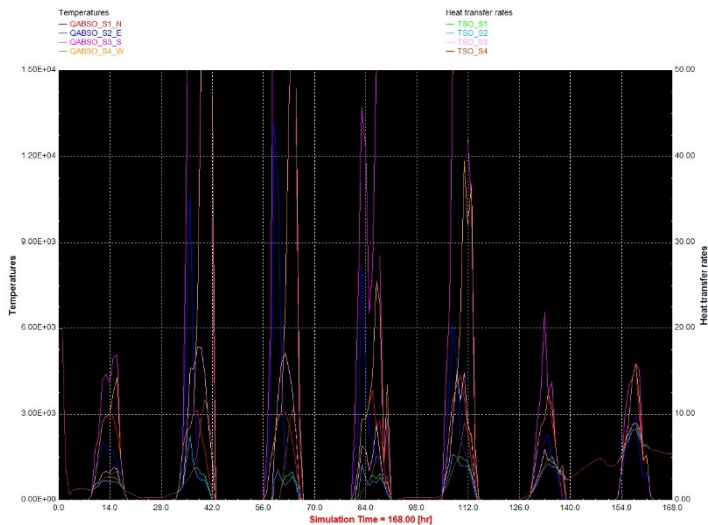
Cracked glass due to overheating

Issue with shading

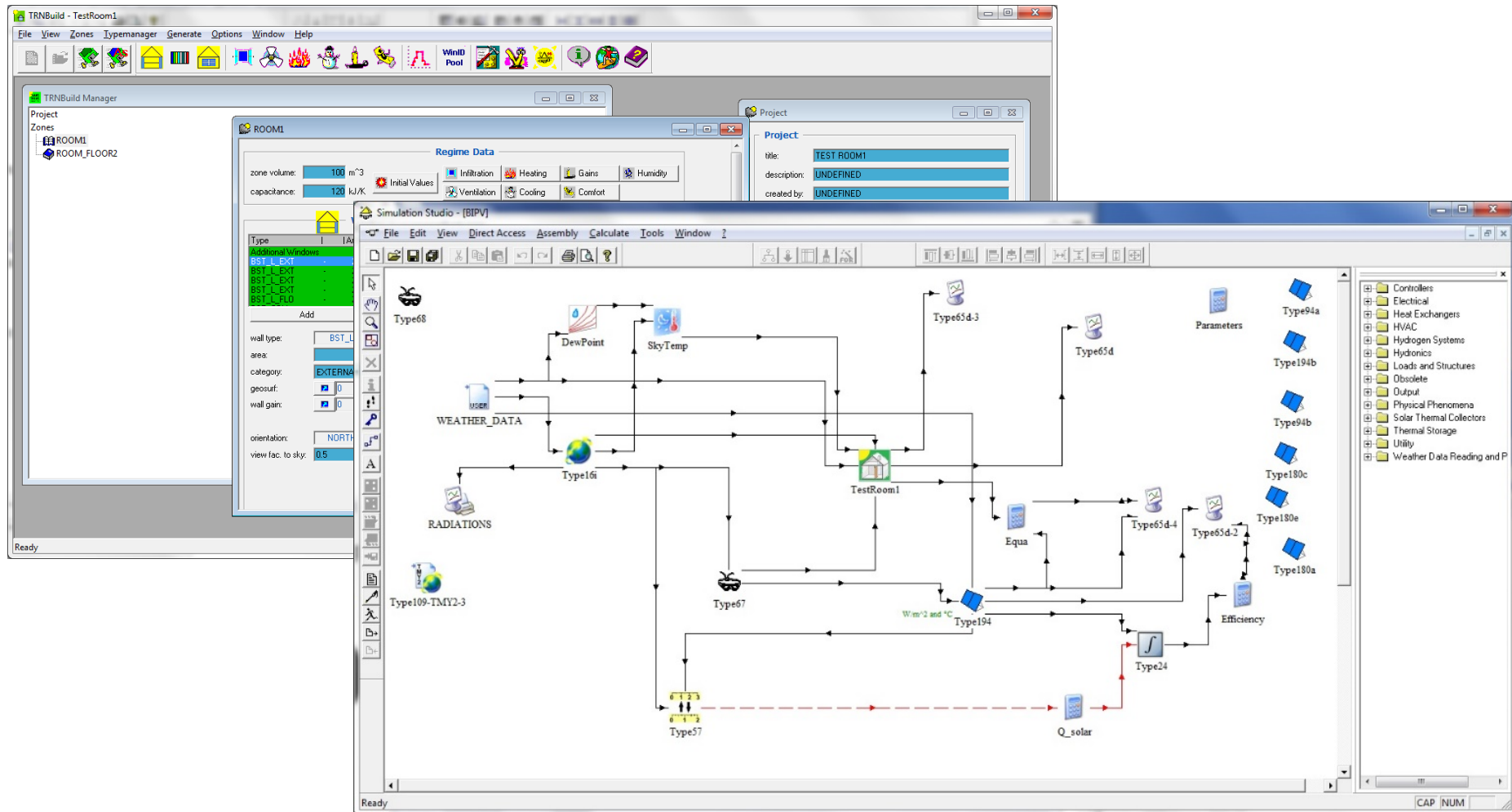


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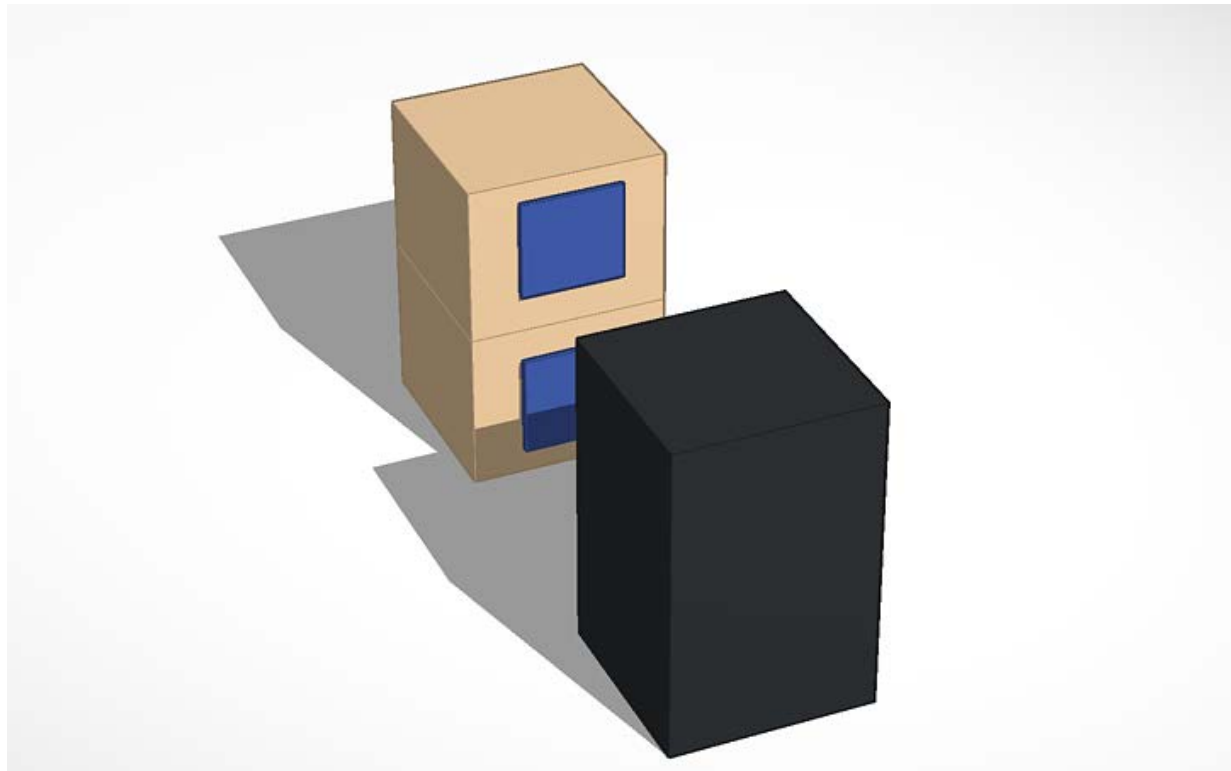
Simulation software program that shows photovoltaic performance in specific shaded conditions



My Work

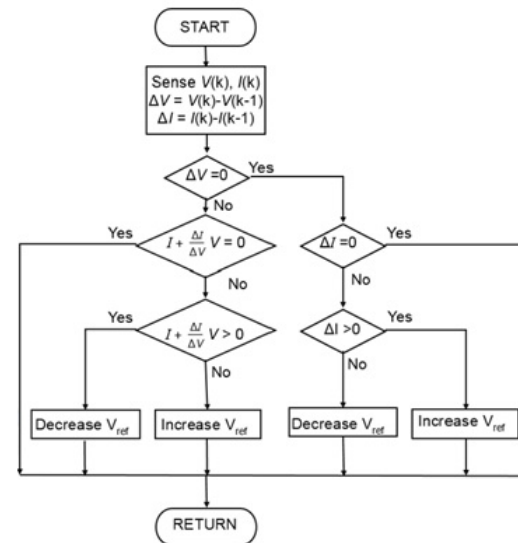
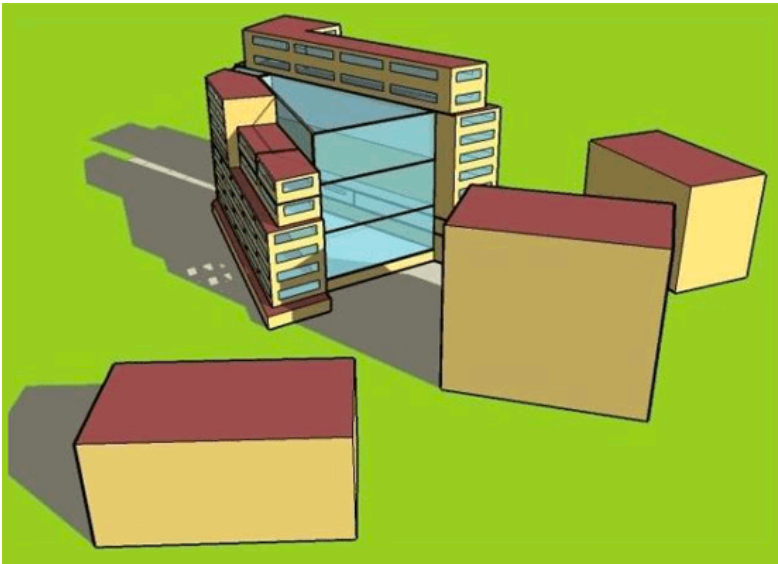


My Work



Current/Possible Solutions

- Prior analysis of shading conditions before installation using programs
- Optimized maximum power point trackers (MPPT)
- Attaching bypass diodes to cell level



Thank You

Acknowledgements

Prof. Johan Driesen,
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