

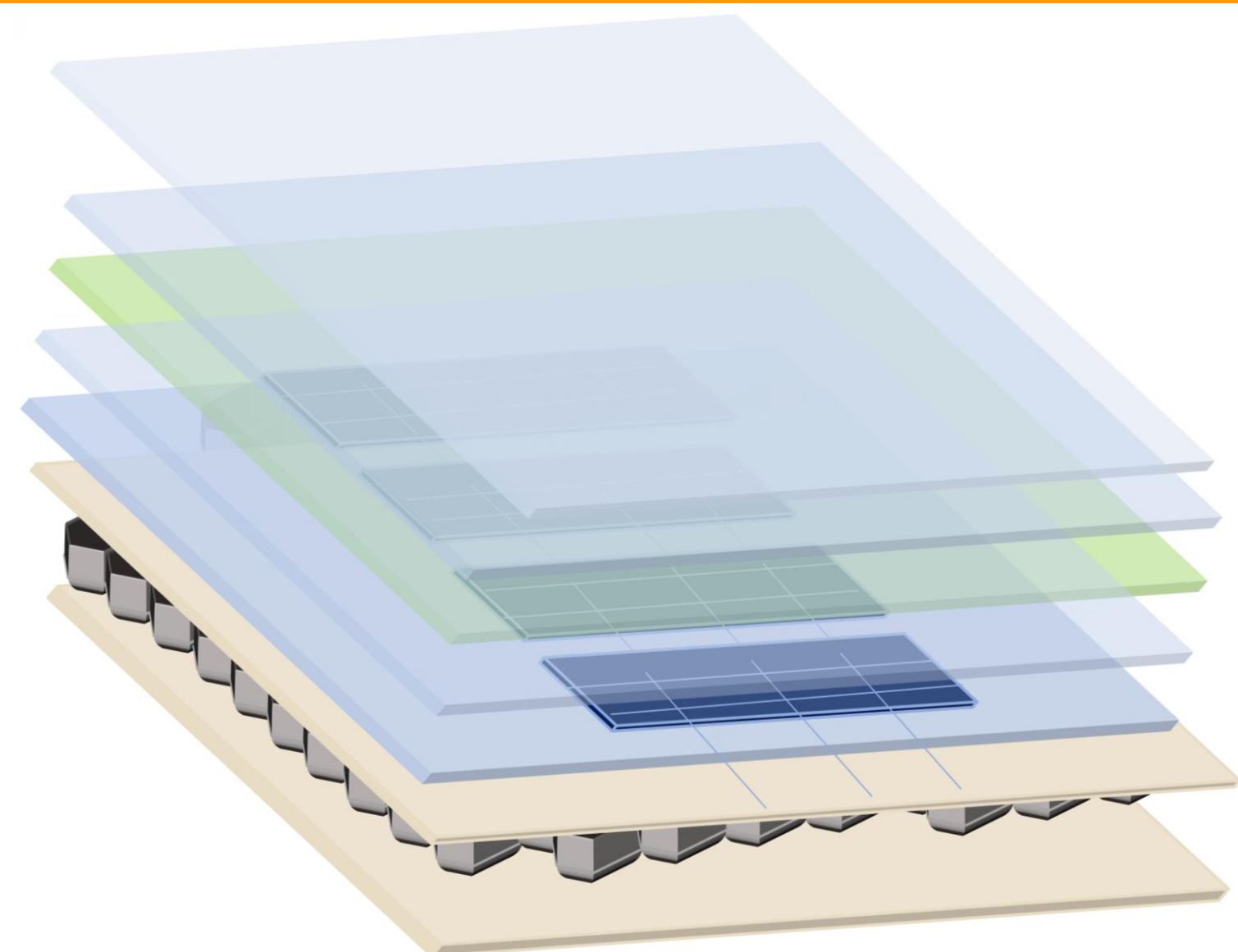


# Façade Application of Light-Weight Glass-Free Colored PV Modules: Reliability Testing of the Large-Format Modules and Monitoring of the Demonstration Site

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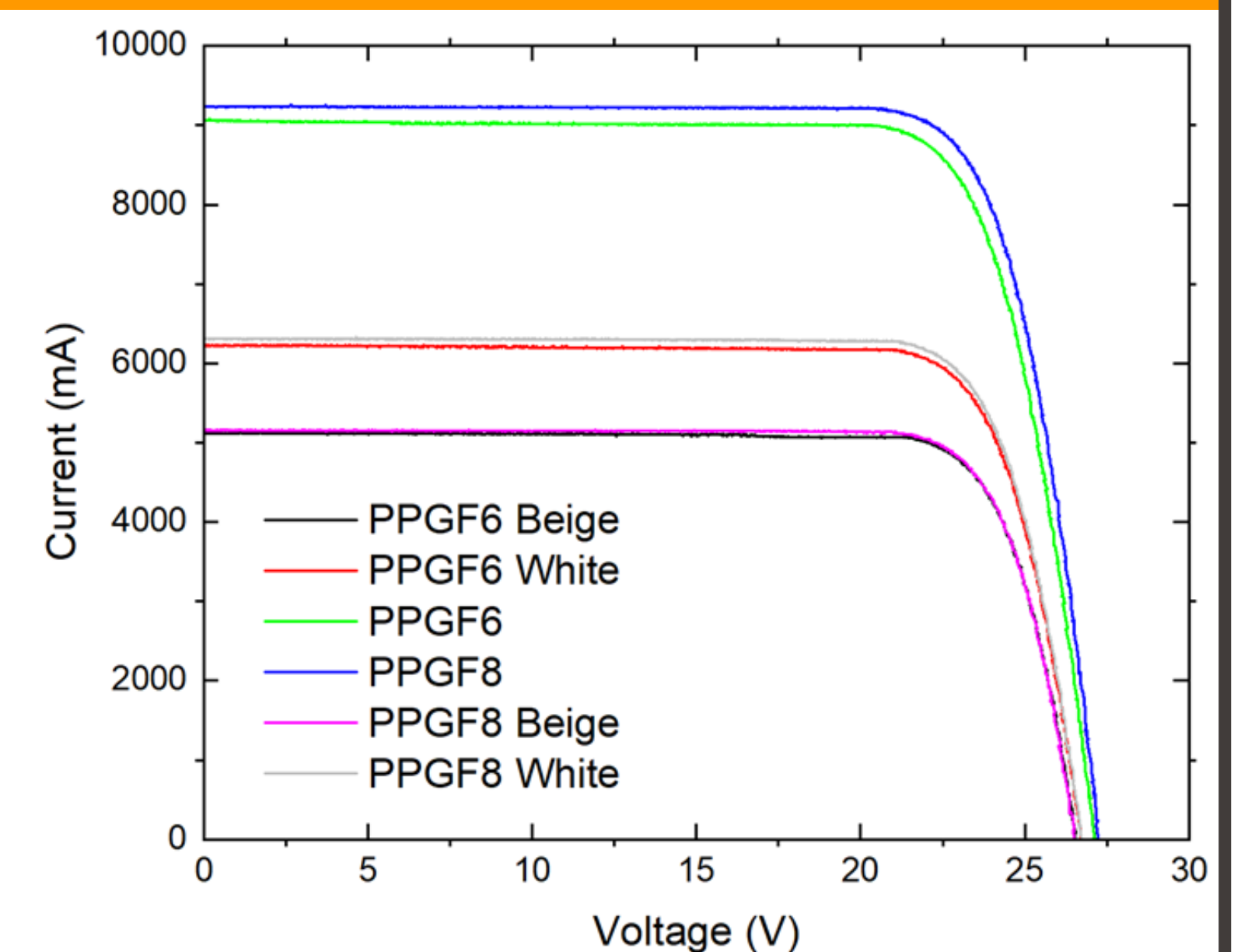
1: EPFL, IEM, PV-Lab, Maladière 71b, CH-2002 Neuchâtel; 2: CSEM, Rue Jaquet-Droz 1, CH-2002 Neuchâtel; 3: OFI, Vienna, Austria; 4: PCCL, Leoben, Austria;

## Architecture to the novel lightweight coloured PV modules

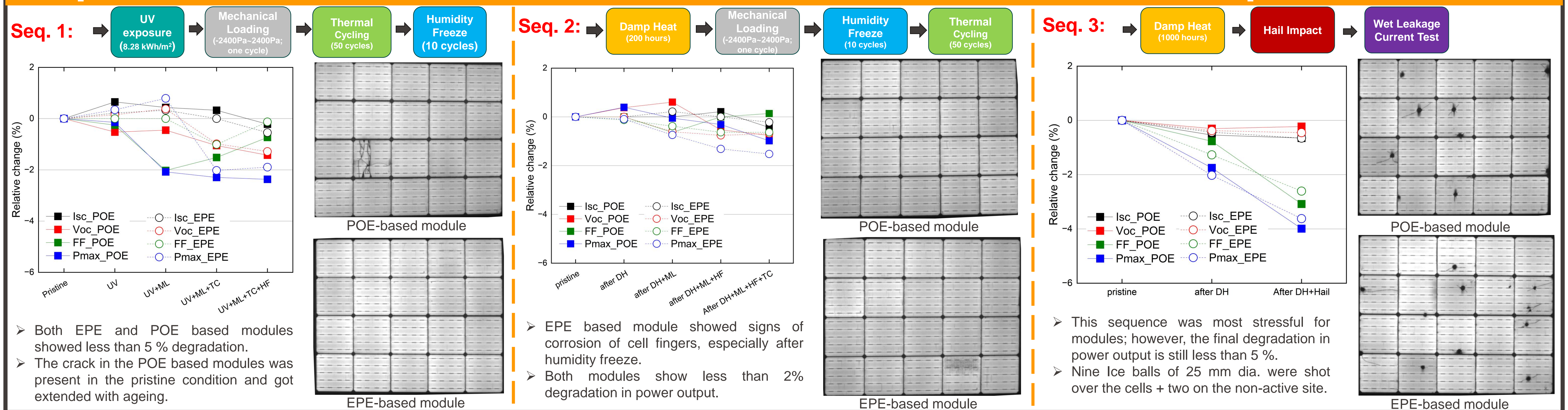


Polymeric front-sheet  
Encapsulant  
Coloured foil  
Encapsulant  
Solar cells  
Encapsulant  
Skin (GFRP)  
Polymeric HC  
Skin (GFRP)

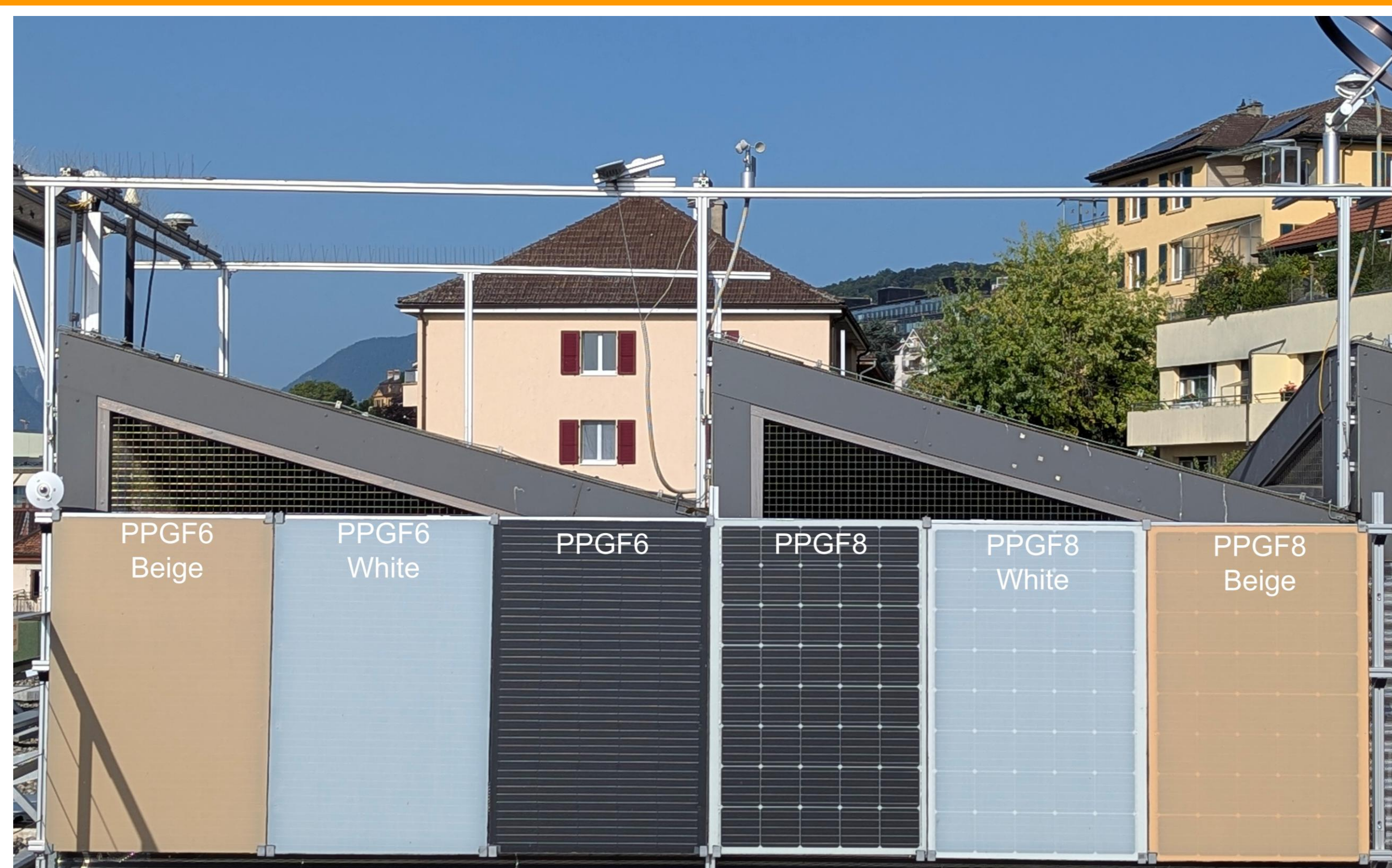
- Glass-free lightweight design,
- PET-based frontsheet,
- Less environmental impact due to polyolefin based backplane,
- Improved aesthetics due to colored modules,
- Frame-less design,
- Total weight less than 6 kg/m<sup>2</sup>



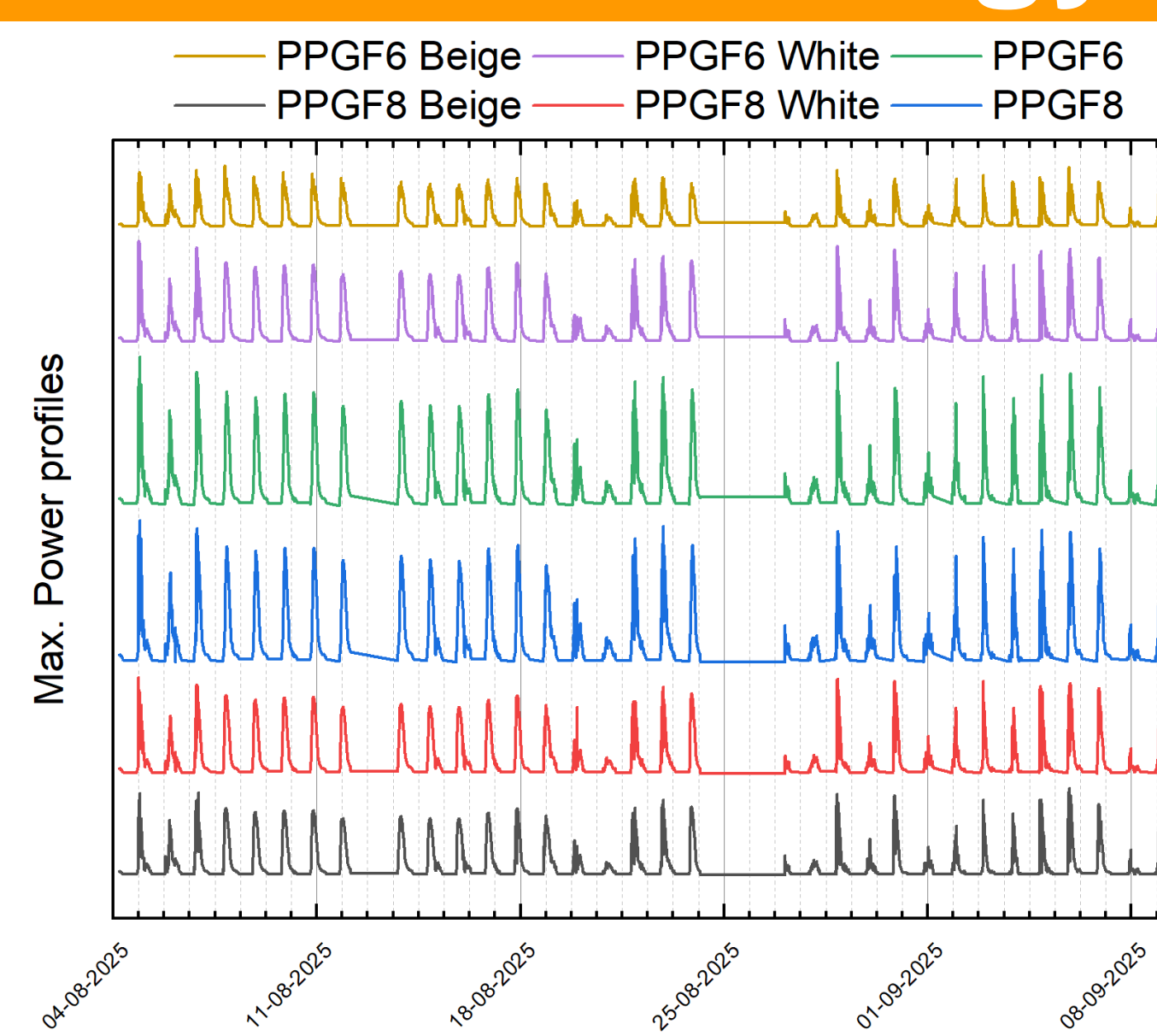
## Sequential Accelerated Environmental Tests: POE vs EPE encapsulants



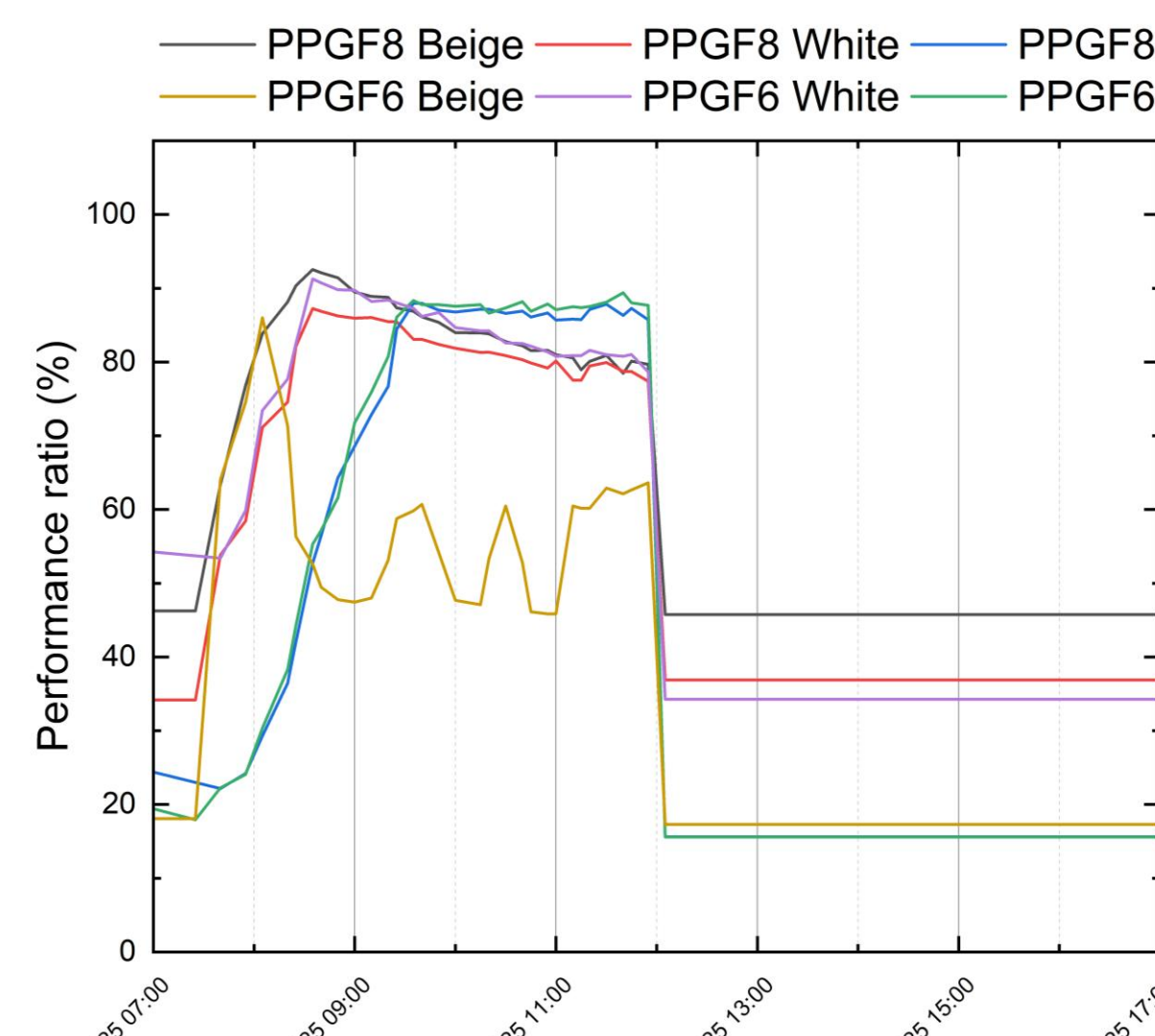
## Façade integration: outdoor performance and energy yield modelling



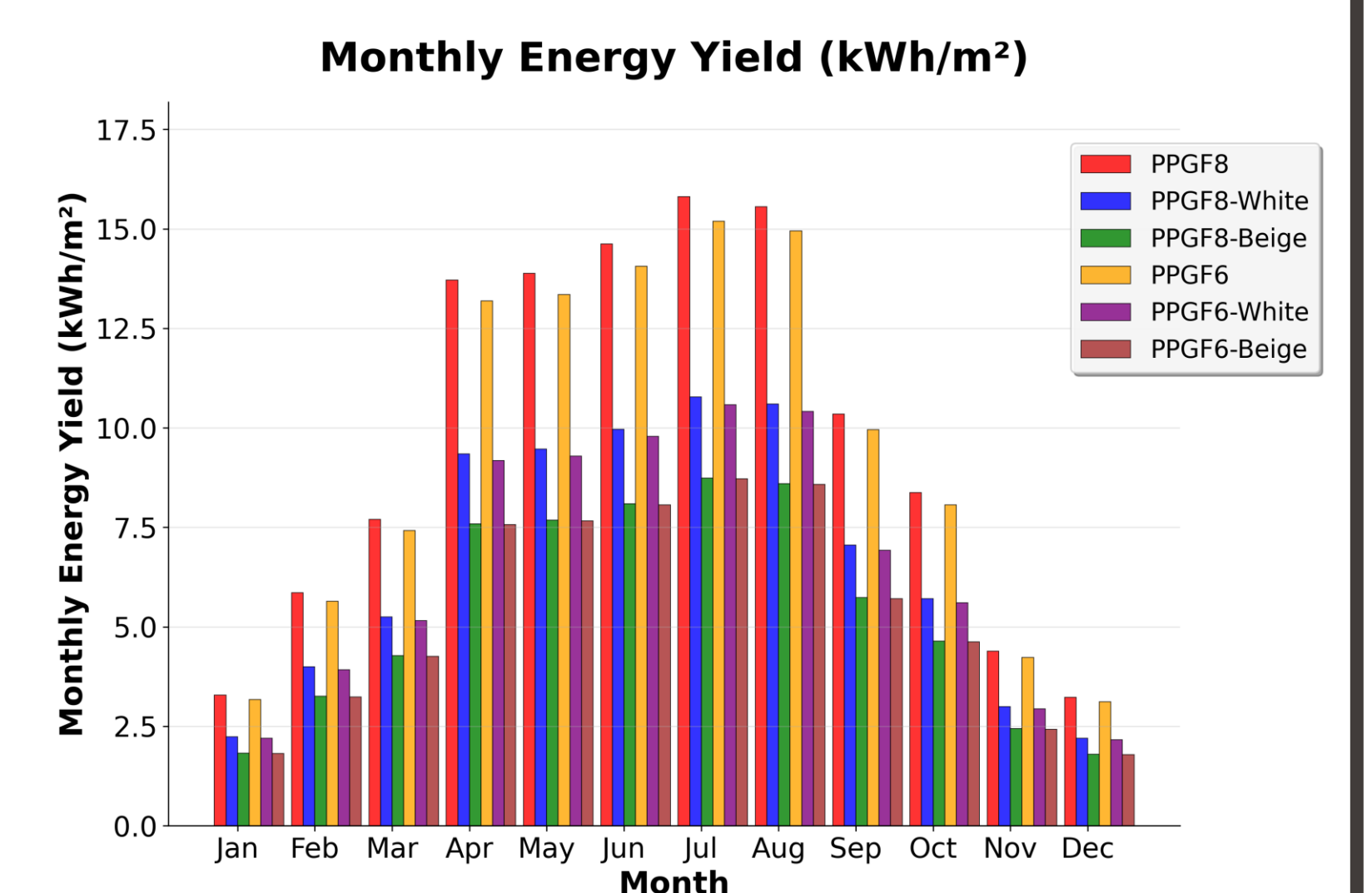
Module	Isc (mA)	Voc (V)	Max. Power (W)	Efficiency (%)
PPGF8	9122	27.1	195.74	19.57
PPGF8-White	6305	26.7	136.18	13.6
PPGF8-Beige	5220	26.5	112.8	11.19
PPGF6	9065	27.1	193.61	19.36
PPGF6-White	6215	26.7	134.08	13.4
PPGF6-Beige	5112	26.5	110.94	11.09



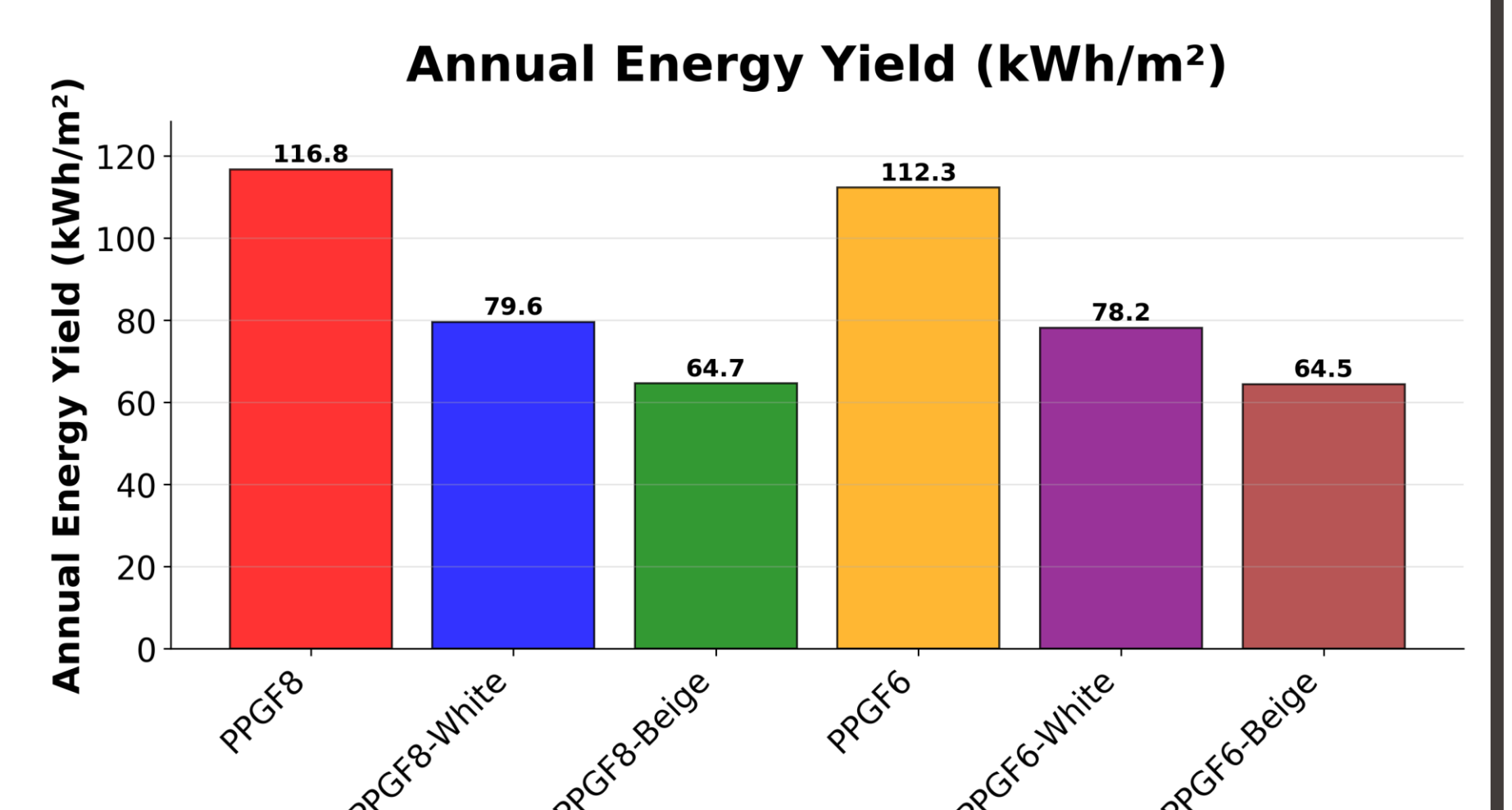
Performance in the outdoor conditions



Performance ratio for the modules (400-1000 W/m<sup>2</sup>)



Modelled monthly energy yield



Modelled annual energy yield

## Conclusions and next steps

- The lightweight modules presented here passed the requirements of IEC 61215:2016 → scan QR:
- Accelerated sequential ageing of 3 different kind involving various stressors showed less than 5 % degradation in relative power output.
- Frameless, glass-free coloured modules were installed in the form of façade and operated outdoor for about nine months. Modeling showed that East-facing façade in Neuchatel, Switzerland can produce 672 kWh/kWp over a year



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