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# Angle resolved performance measurements on PV glass and modules

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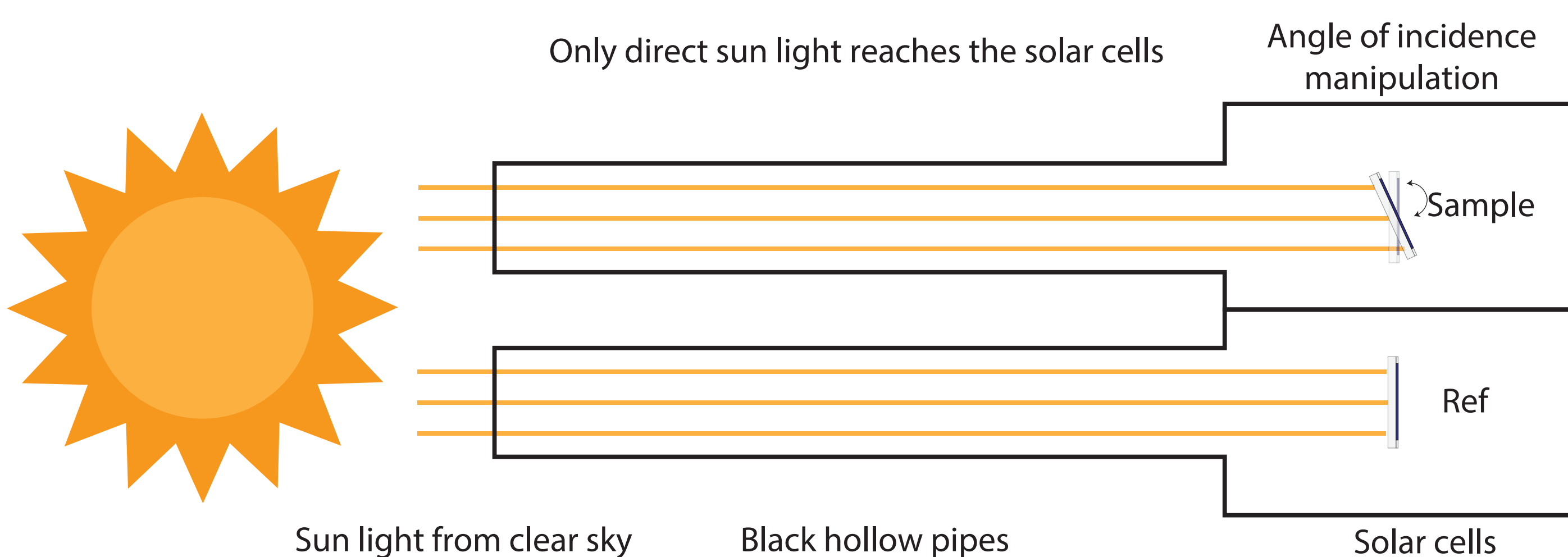
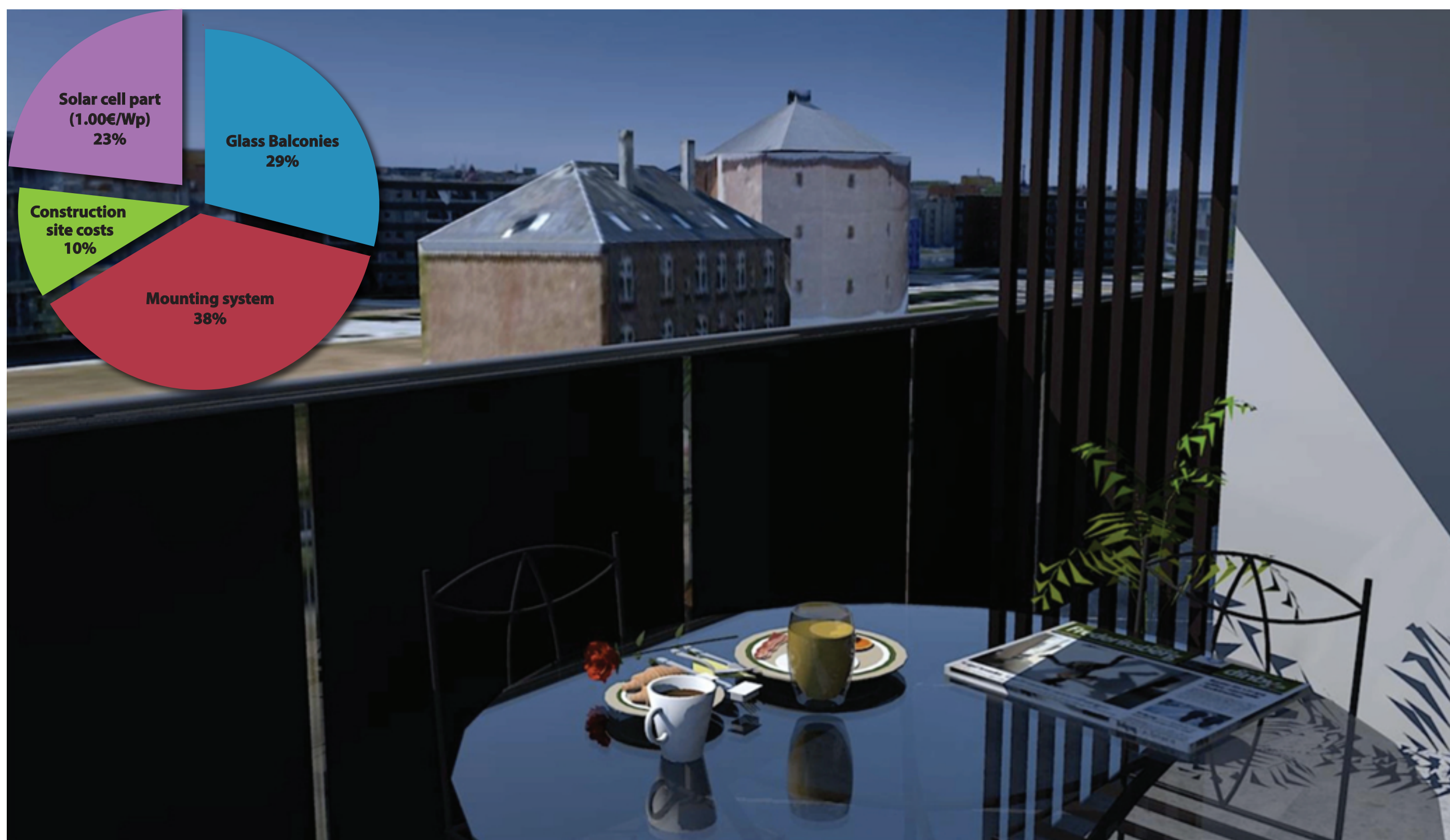
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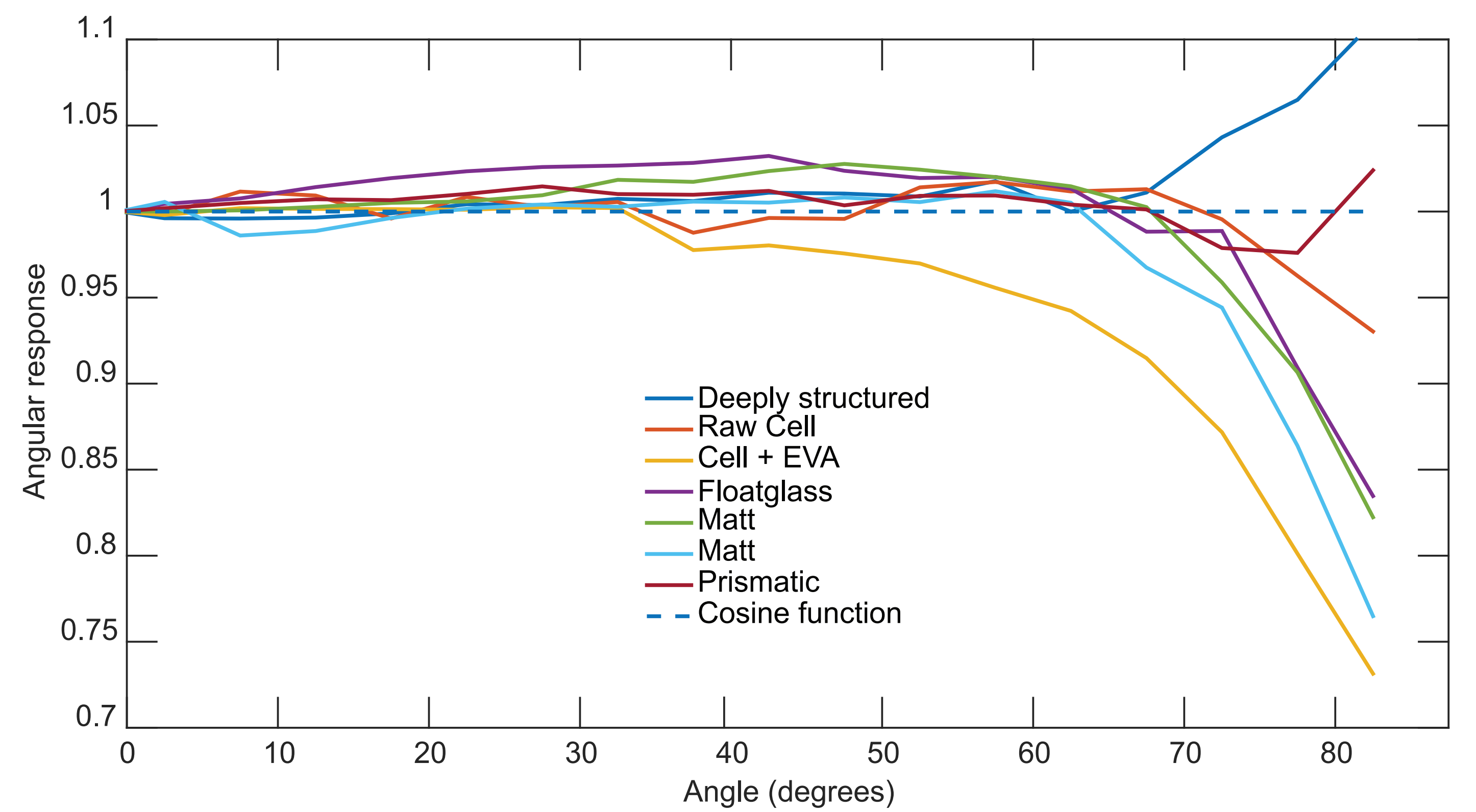
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## Motivation

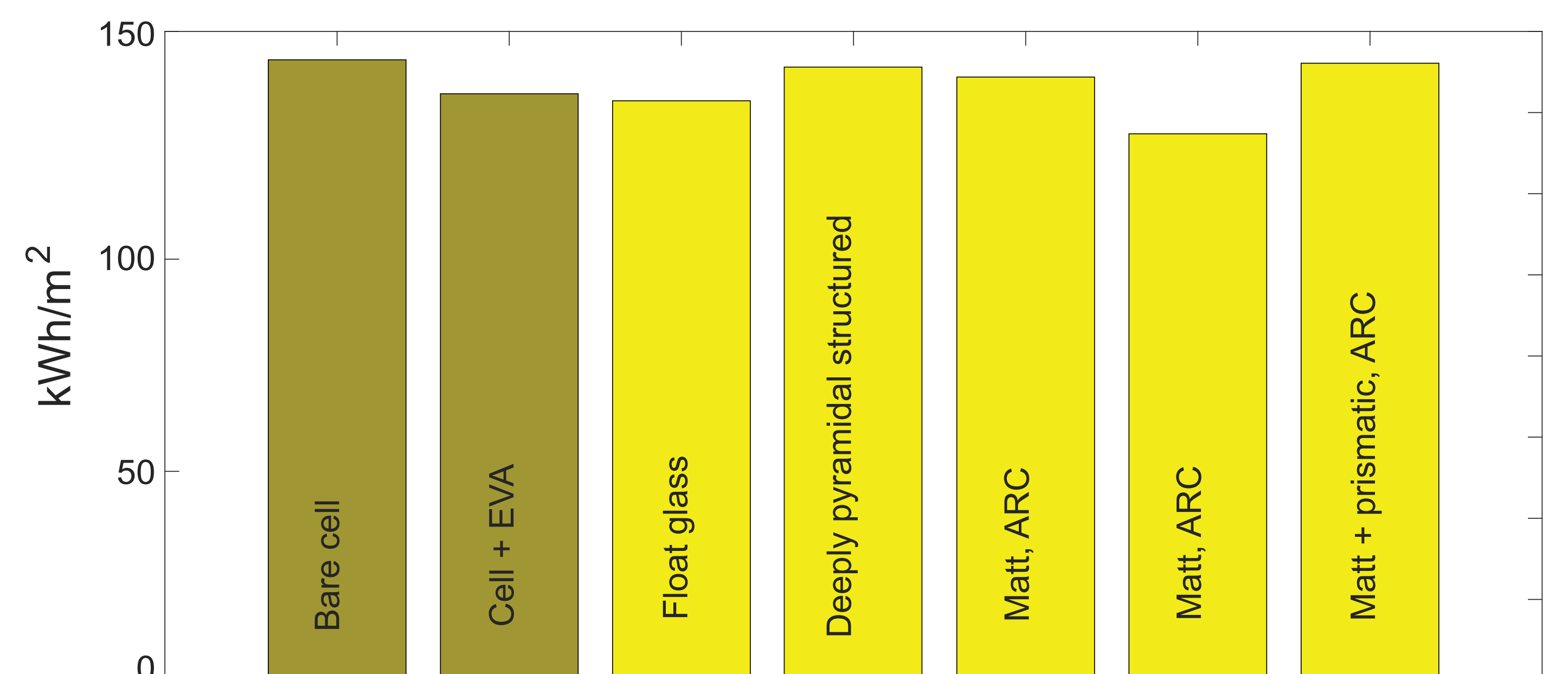
PV balcony fences are an example of PV application where odd angles of incidence are pronounced. The angular performance of the PV cover glass has a crucial impact on the energy output. We have characterized the angular response on a range of glasses with different AR properties.



**Depiction of setup for outdoor measurements as viewed from above.** Two pipes leads direct sun light into boxes containing the test sample and a reference sample respectively. The test sample rotates as the angular performance is measured.



**Short circuit current measurements.** Angular response is obtained by normalizing with respect to normal incidence and reference to the cosine function.



**Estimation of annual effective irradiance south faced balcony in Roskilde, Denmark.** The results are derived from a simple model based on irradiance data obtained from PVgis folded with the angular response curves.



## Conclusion

Proper assessment of solar glass for PV balcony fences requires knowledge of the angular properties of the optical layers. Here solar glass have been investigated. A difference of 13 % between annual yield of the best and worst performing solar glass is found.

## Outlook

Outdoor measurements introduce additional errors. Future work will include improvement of the experimental setup, while still keeping the actual sun as light source.