

- Visegrad Fund
- •

Integration of PV modules in double-skin façade

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10.9.2018

Introduction

Directive 2013/31/EU

- nearly zero-energy building after 2020

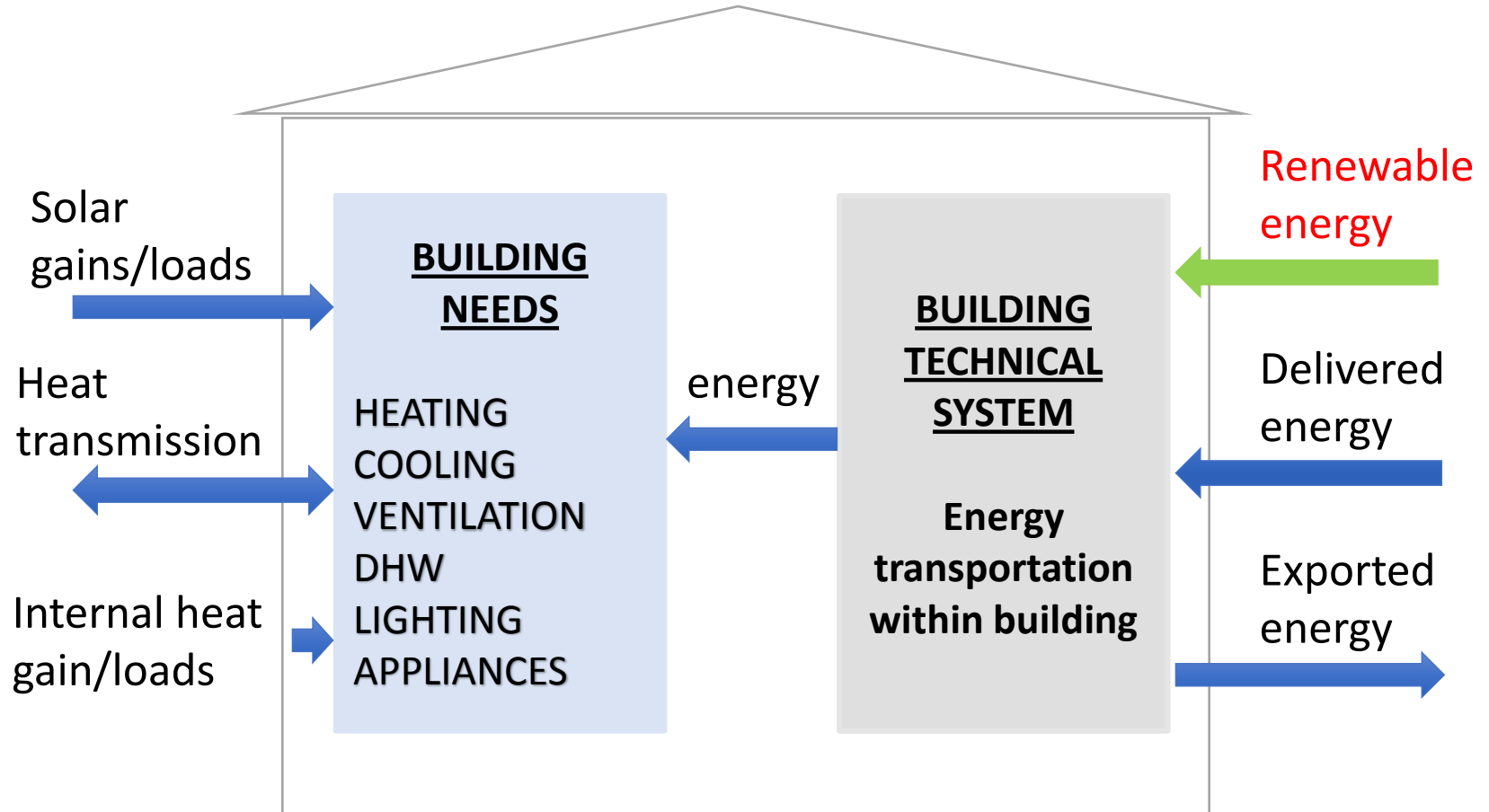
Directive 2009/28/EC

- 20% application of renewable sources (2020)



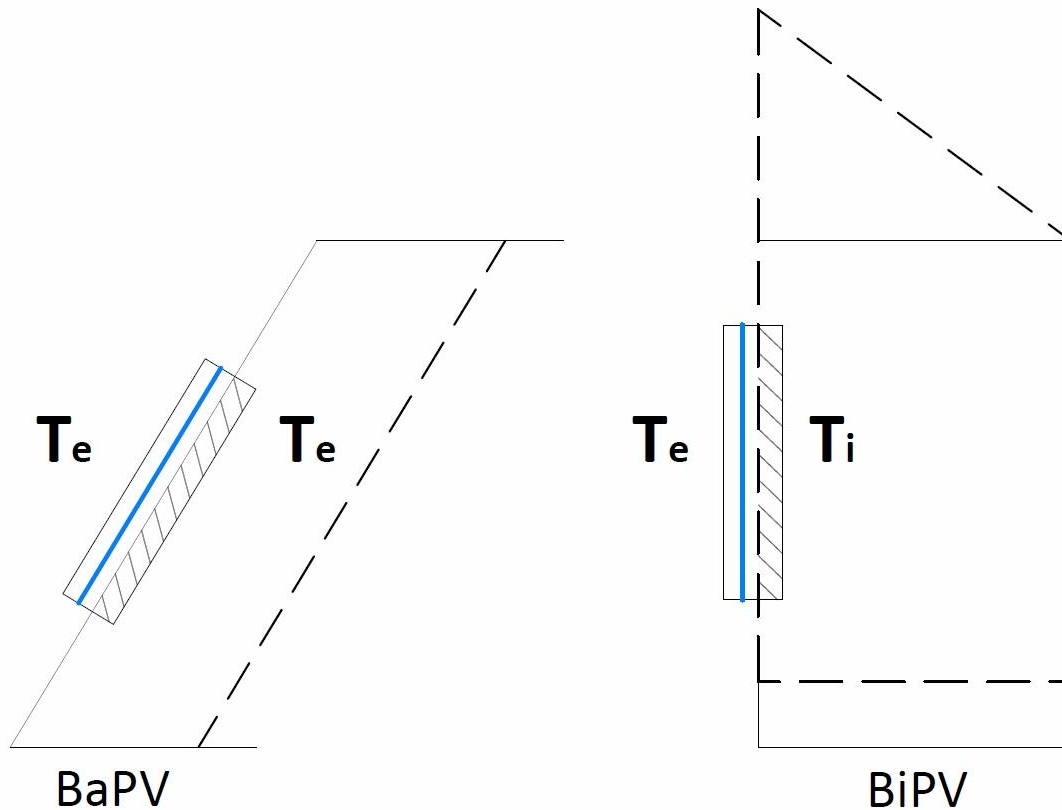
Building envelope with the integration and adaptation of renewables and smart material

Energy performance of building



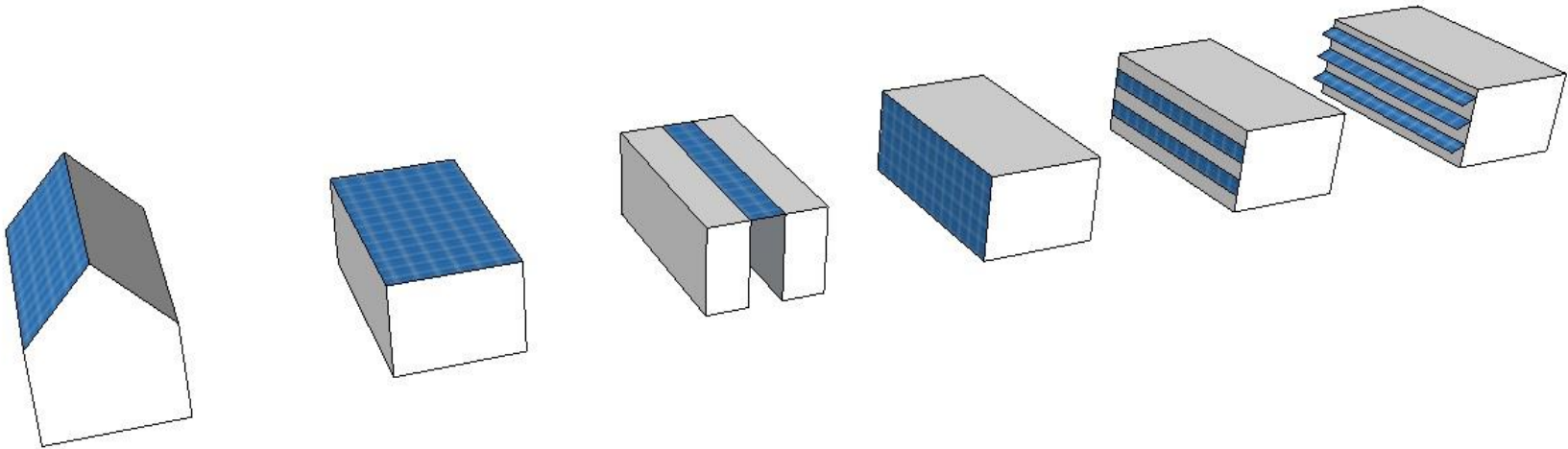
BiPV systems

- attached PV → integrated PV

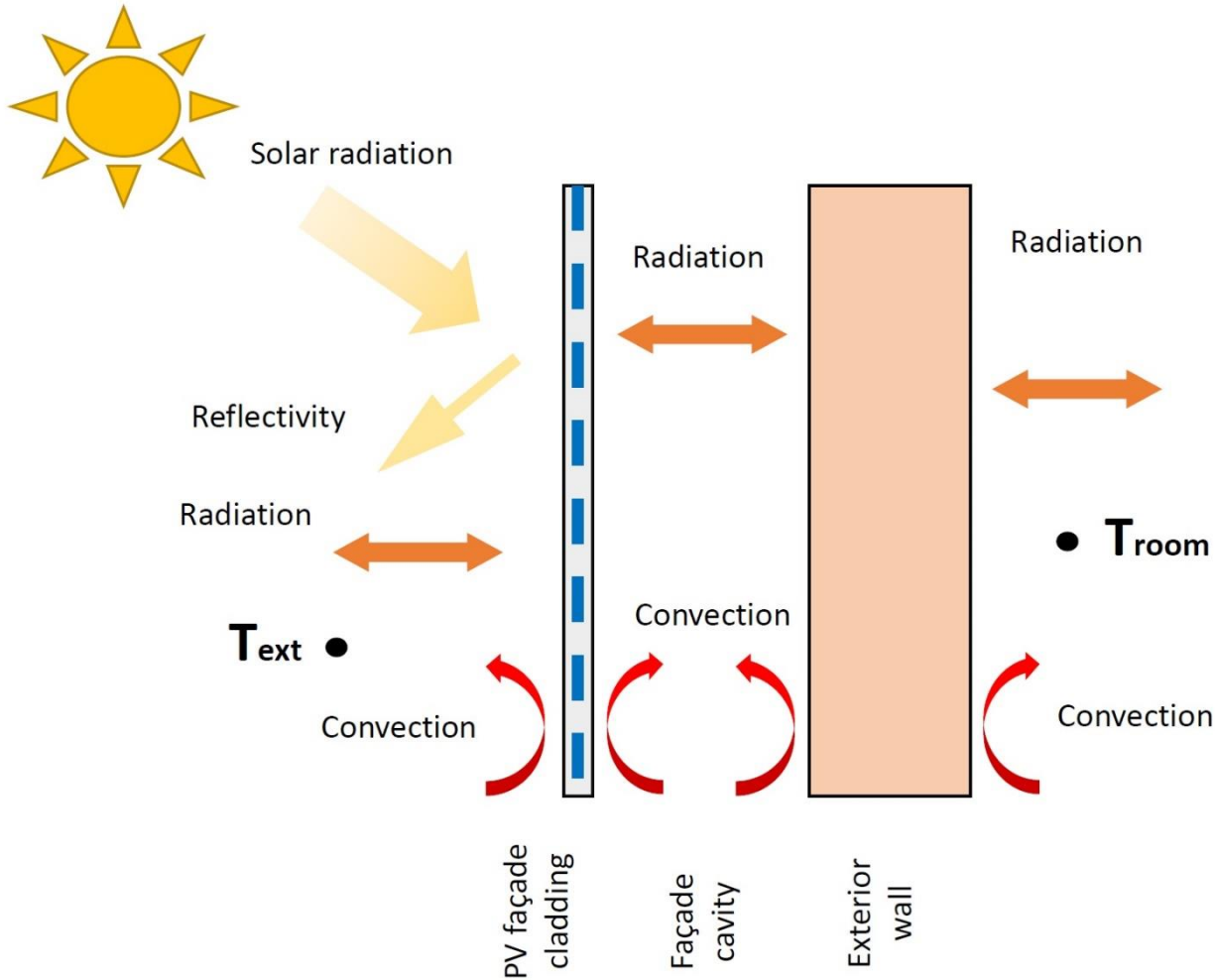


BiPV systems

possibilities of integration PV modules within different parts of building envelope

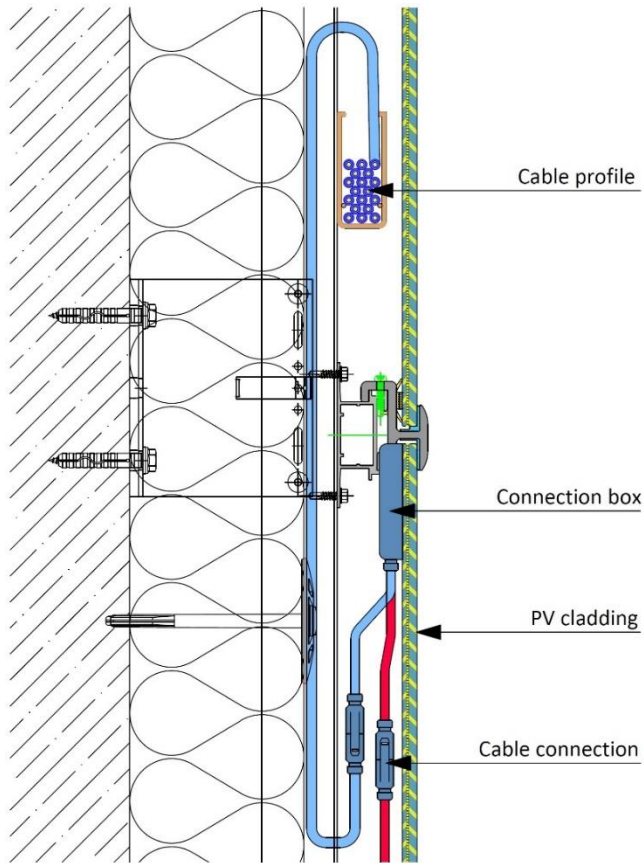


Double-skin BiPV façade



Current trends in practice

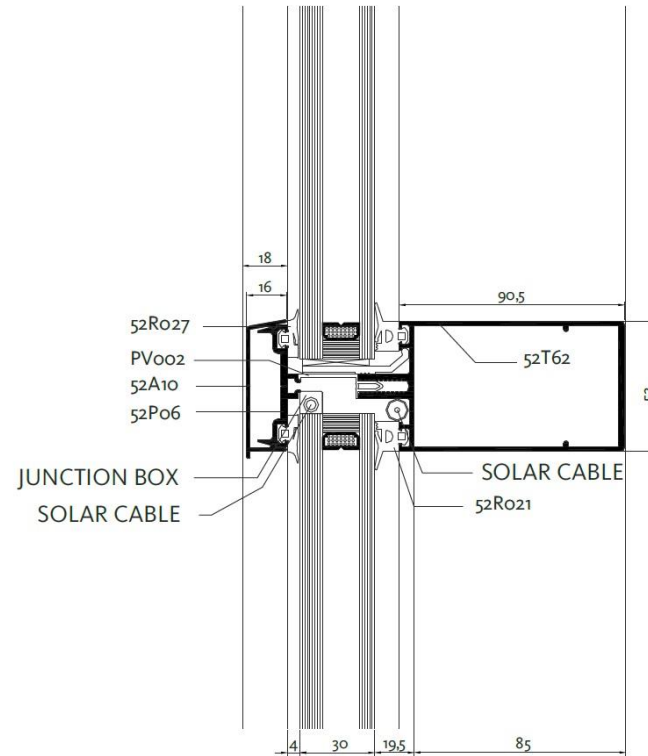
Solid opaque exterior wall



LITHO Photovoltaic, Vorgehängte hinterlüftete Photovoltaic-Fassade, Anschlussdetails,

Current trends in practice

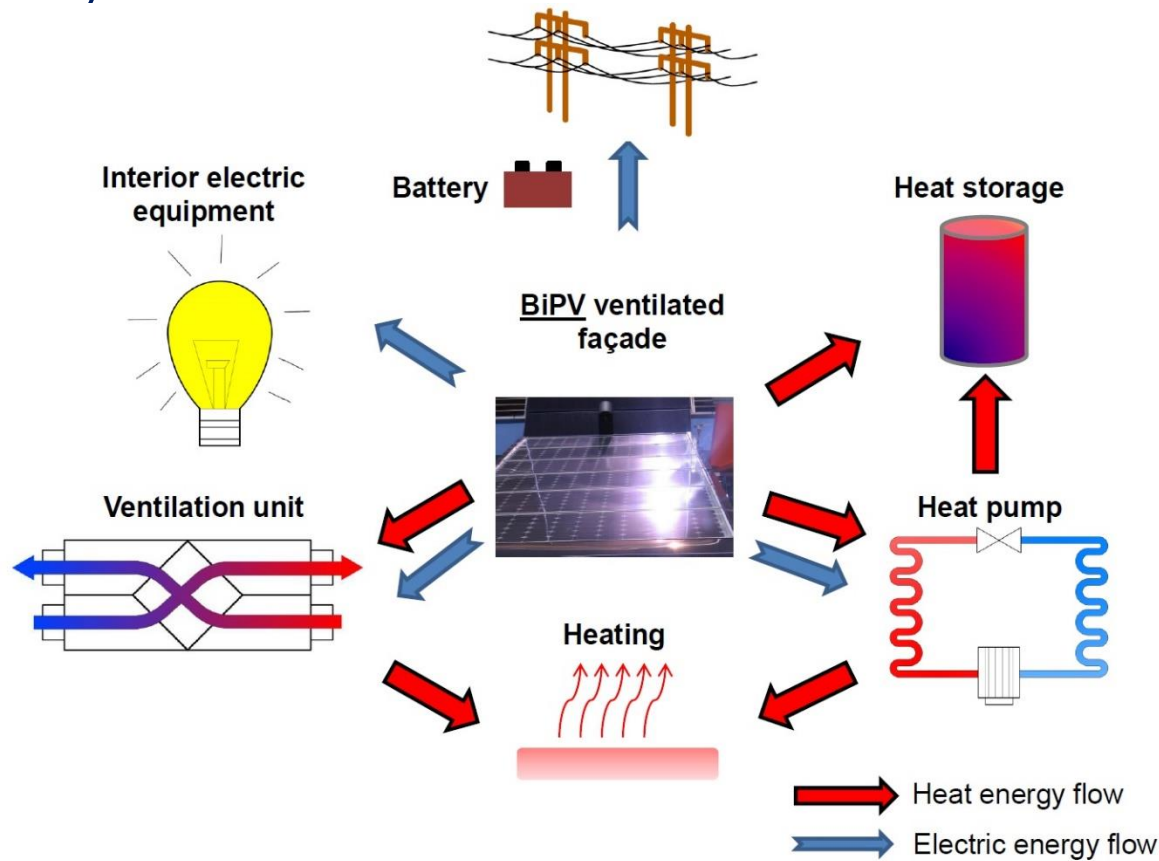
Lightweigh semitransparent exterior wall



www.ertex-solar.at/en/

Concepts in research

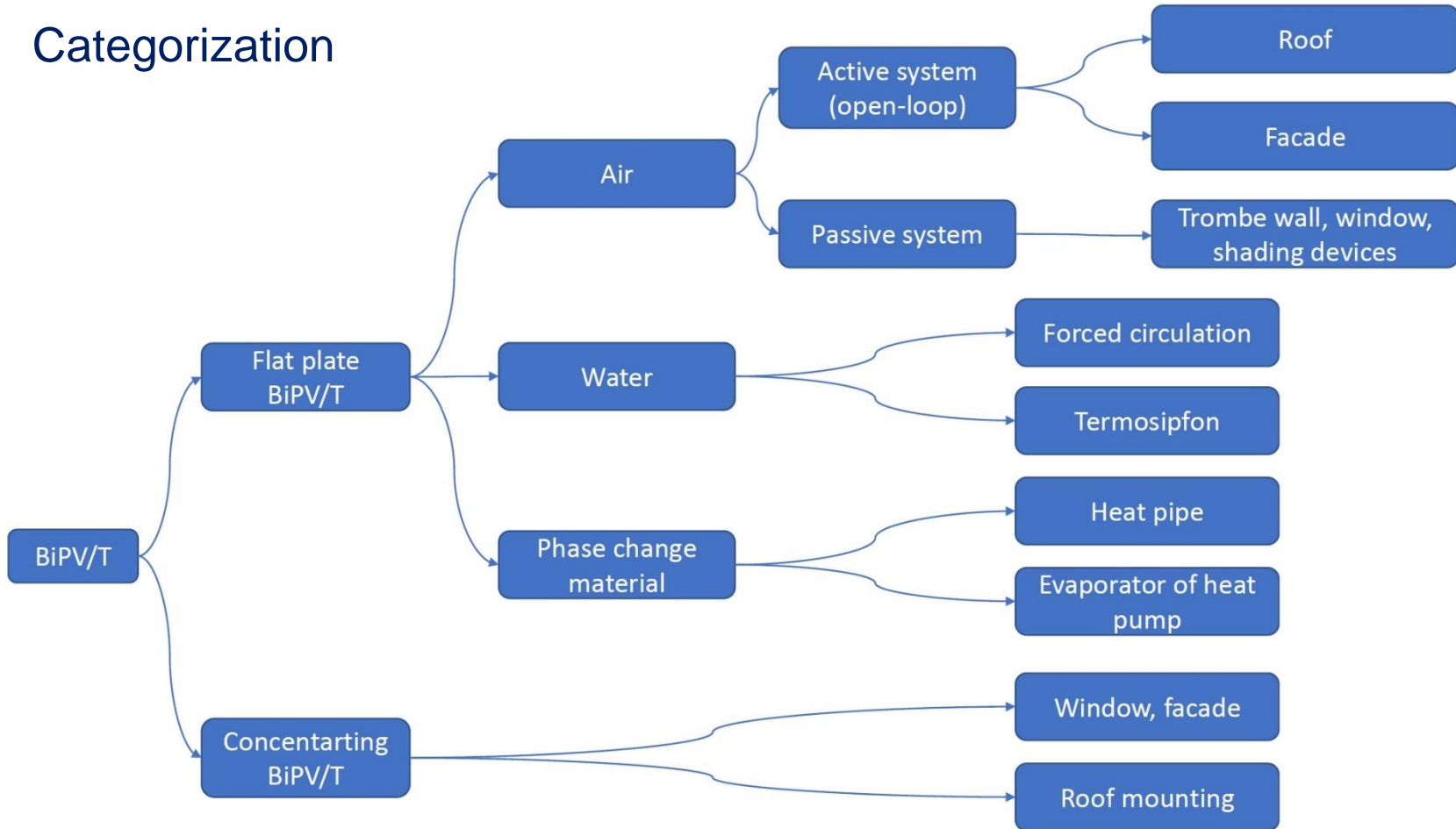
Building integrated photovoltaic – thermal system BiPV/T, connection with HVAC system



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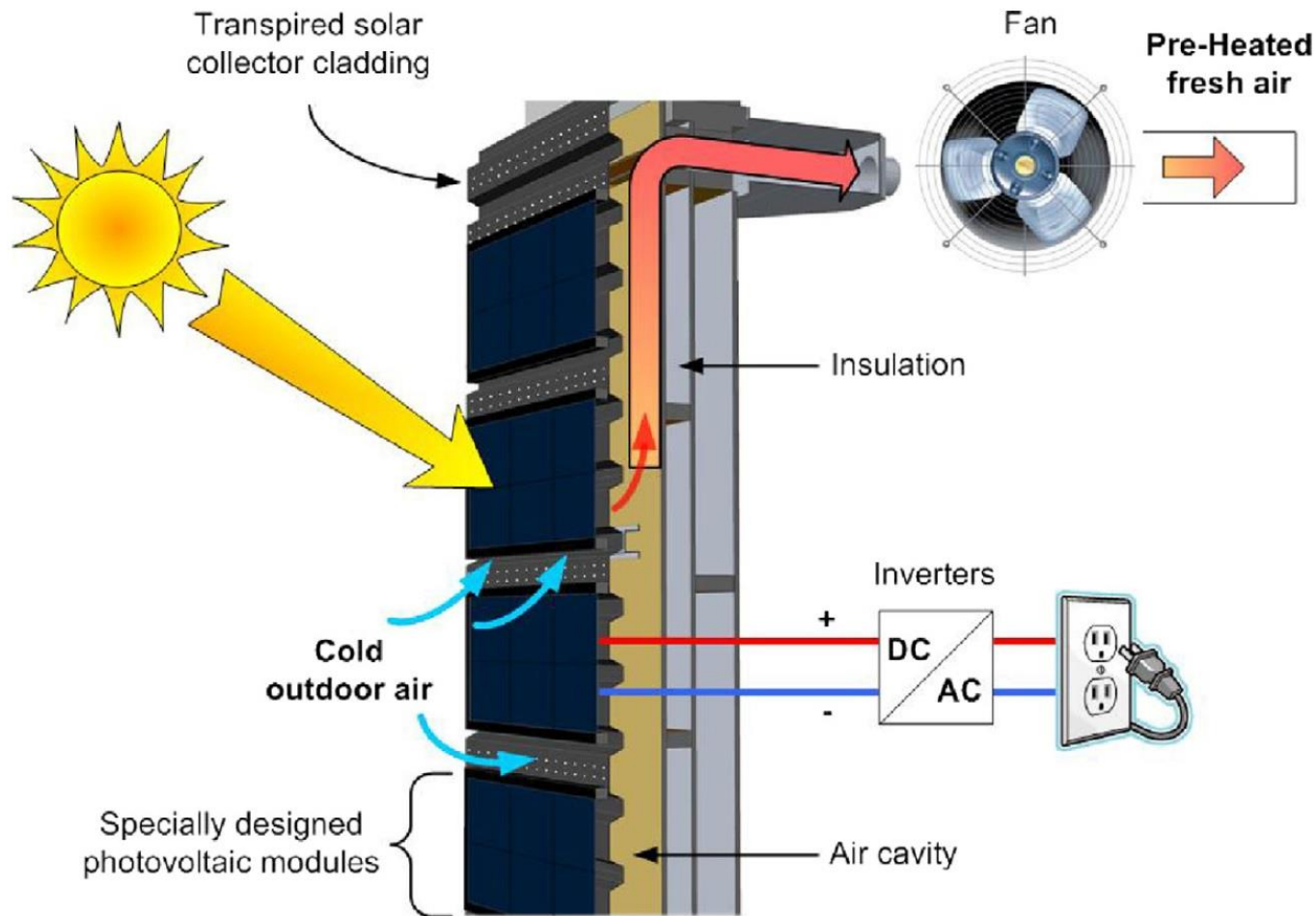
Concepts in research

Categorization



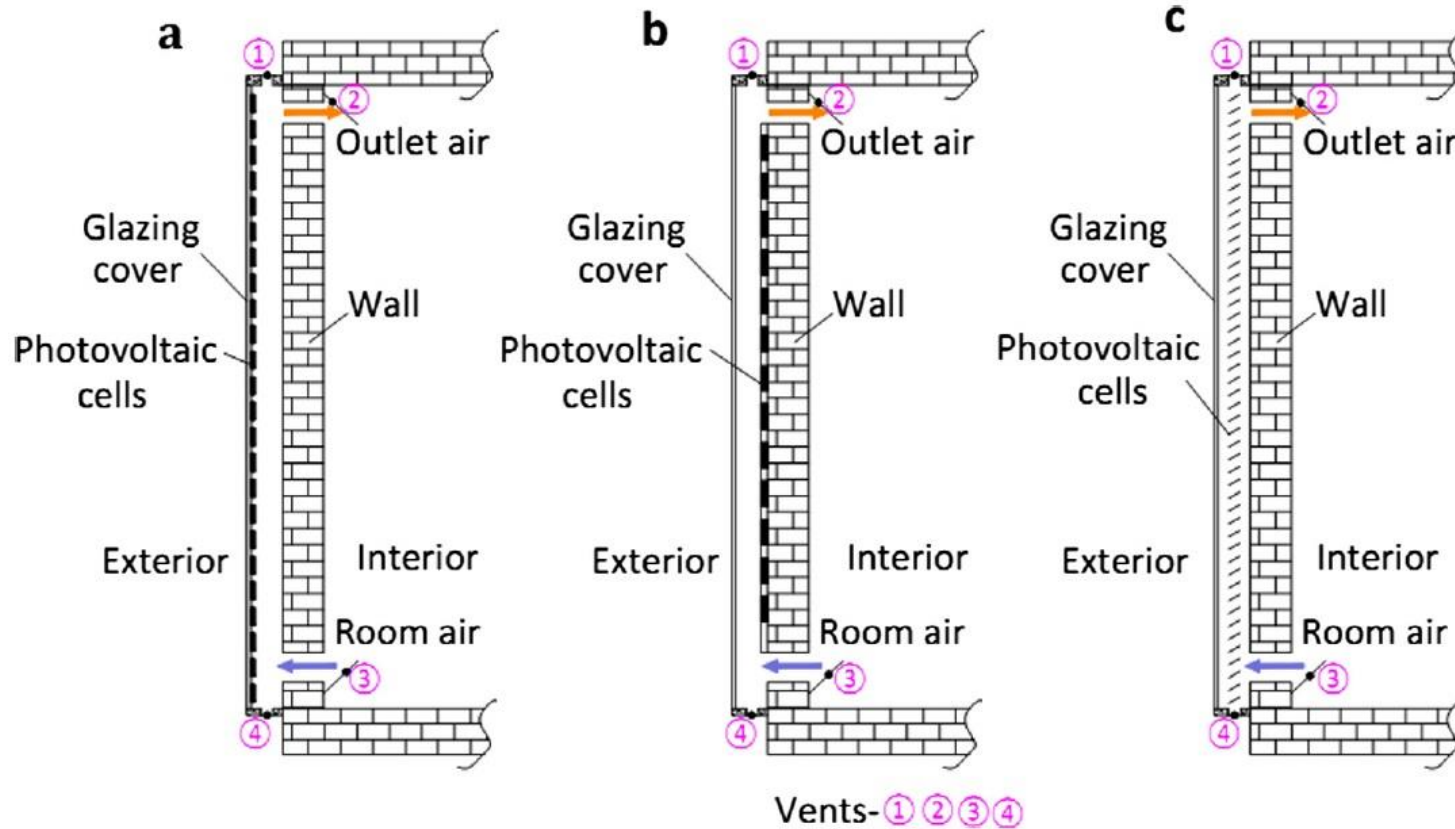
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Concepts in research



ATHIENITIS, A., K., BAMBARA, J., O'NEIL, B., FAILE, J.: A prototype photovoltaic/thermal system integrated with transpired collector. *Solar Energy*, January 2011, Vol. 85, pp. 139-153. ISSN: 0038-092X. • supported by

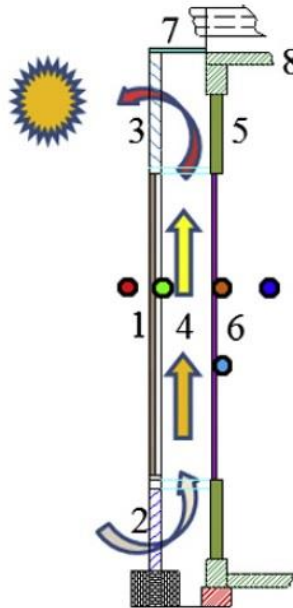
Concepts in research



HU, Z., He, W., JI, J., HU, D., LV, S., CHEN, H., SHEN, Z.: Comparative study on the annual performance of three types of building integrated photovoltaic (BIPV) Trombe wall system. *Applied Energy*, May 2017, Vol. 194, pp. 81-93. ISSN: 0306-2619

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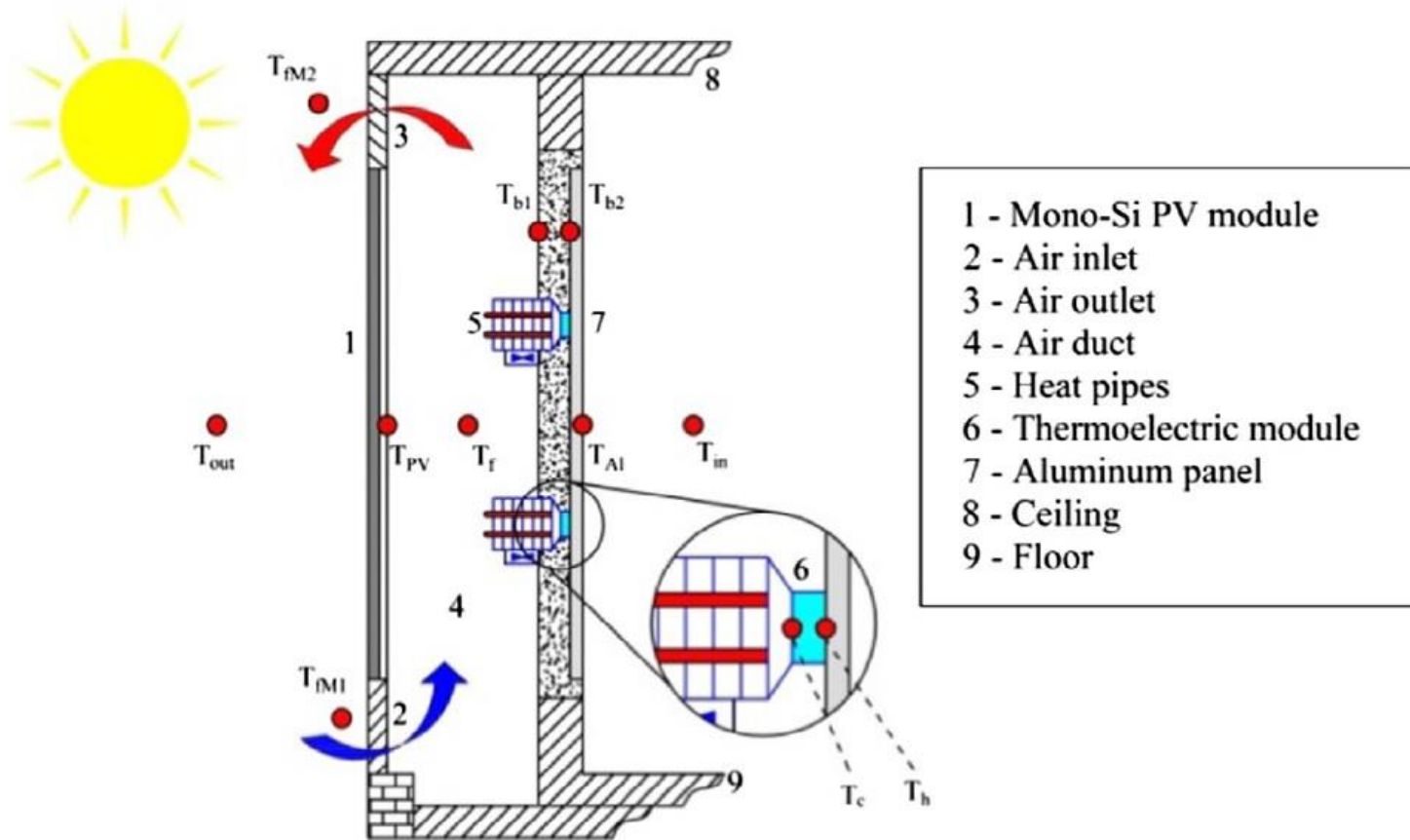


- 1- see-through a-Si PV module
- 2- air inlet louver
- 3- air outlet louver
- 4- air-flow duct
- 5- sandwich insulation board
- 6- inward opening window
- 7- connect and support bar
- 8- ceiling

● Ambient T ● PV module T ● Inner surface T ● Indoor T ● Heat flux

PENG, J., LU, L., YANG, H.: An experimental study of the thermal performance of a novel photovoltaic double-skin facade in Hong Kong. *Solar Energy*, November 2013, Vol. 97, pp. 293-304. ISSN: 0038-092X.

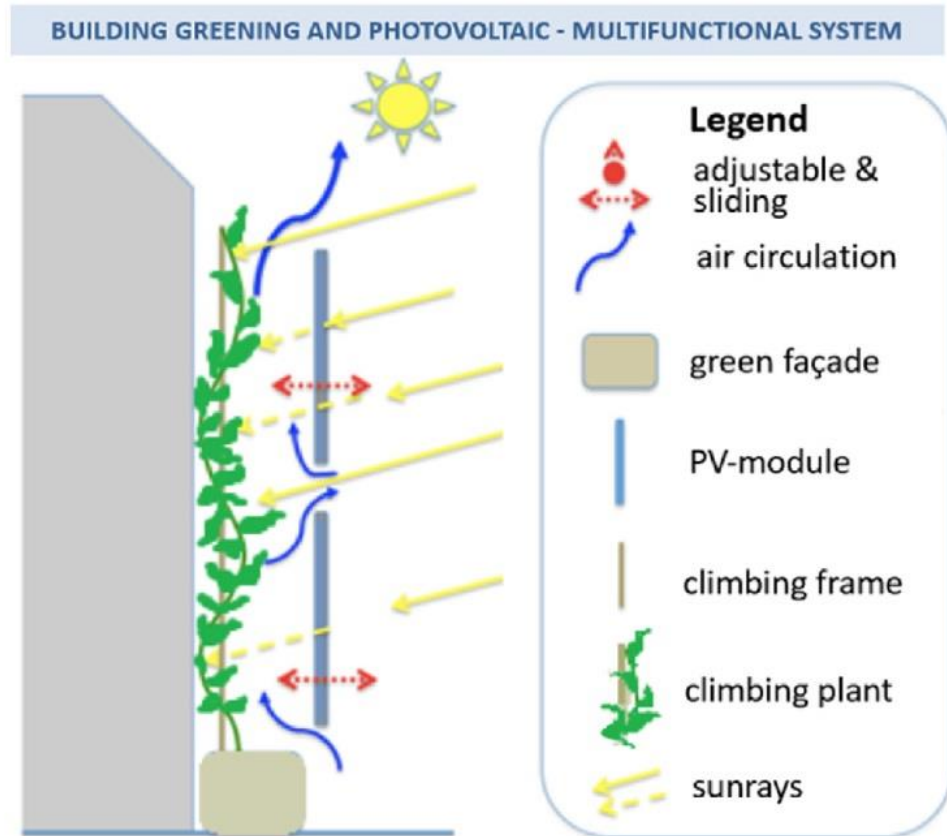
Concepts in research



LUO, Y., ZHANG, L., LIU, Z., WANG, Y., MENG, F., WU, J.: Thermal performance evaluation of an active building integrated photovoltaic thermoelectric wall system. *Applied Energy*, September 2016, Vol. 177, pp. 25-39. ISSN: 0306-2619.

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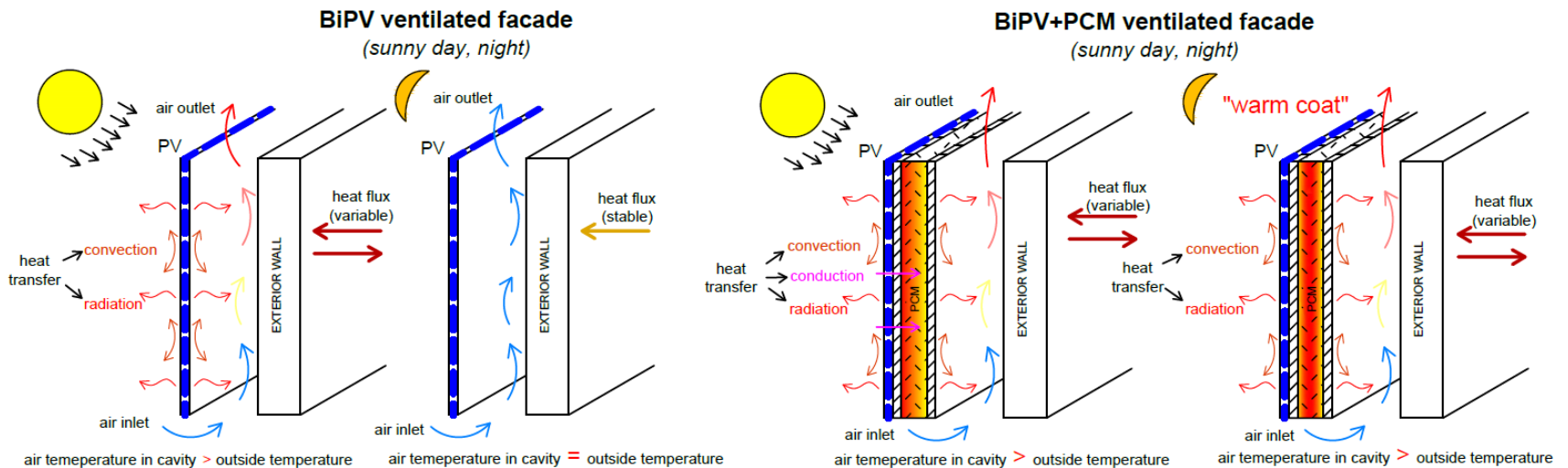
Concepts in research



MOREN, M., S., P., KORJENIC, A.: Green buffer space influences on the temperature of photovoltaic modules Multifunctional system: Building greening and photovoltaic. *Energy and Buildings*, July 2017, Vol. 146, pp. 364-382. ISSN: 0378-7788.

Novel concept of BiPV/PCM façade

Currently in development at Faculty of Civil Engineering STU in Bratislava



THANK YOU FOR YOUR ATTENTION

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