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Reference	Location	Panel size (m)	PBRs function	Orientation	Research content	Results
[38]	Hamburg	2.5×0.7×0.08 129 flat panel	Shading, Thermal usage, Biomass	Southwest Southeast	Experiment on <i>C. vulgaris</i>	<ul style="list-style-type: none"> <li>- Heat efficiency for hot water production is 38%</li> <li>- Converting light to biomass efficiency is 10%</li> <li>- Heat generation of 150 kWh/m<sup>2</sup> per year.</li> </ul>
[3]	Tel Aviv, Israel	15%, 30%, 45%, 60%, 75%, 90%	Shading	North, East, South, West	<ul style="list-style-type: none"> <li>- Determine experimentally the U-factor, SHGC, and VT of <i>C. vulgaris</i> and <i>Chlamydomonas</i> algae window with different concentrations.</li> <li>- Simulate energy consumption</li> </ul>	At maximum concentration, the energy savings of using an algae window can be up to 20 kWh/m <sup>2</sup> .year in the south, 8 kWh/m <sup>2</sup> .year in the east, 14 kWh/m <sup>2</sup> .year in the west, and 18 kWh/m <sup>2</sup> .year in the north compared to using single glass.
[16]	Bandung, Indonesia	0.7×0.6×0.05	Shading	-	<ul style="list-style-type: none"> <li>- Energy simulation for building.</li> <li>- Experiment for algae window for outdoor and indoor temperature difference, illuminance, and Oxygen release.</li> </ul>	<ul style="list-style-type: none"> <li>- When outside temperature increases, PBR can regulate indoor temperature.</li> <li>- Algae window can reduce 90% daylight, but its illuminance is still at an acceptable level.</li> <li>- Algae windows can reduce energy consumption.</li> <li>- Oxygen production can be 4.83 ml/hour/l microalgae culture (chlorella).</li> </ul>
[38]	Iran	0.30×0.30×0.45	Shading	-	Compare the performance of algae window glazing and typical Iranian Orosi window using simulation and experiment.	<ul style="list-style-type: none"> <li>- The light intensity in the door of an algae window glazing and an Orosi window are approximately equal.</li> <li>- Humidity increased from 25% to almost 70% with the algae window.</li> <li>- Nearly 500 ppm of CO<sub>2</sub> can be absorbed using an algae window.</li> </ul>
[39]	Paris	10000 ft <sup>2</sup>	Shading Biofuel production, Waste water treatment.	-	Experimentally developed microalgae	Reduce water usage by up to 80% and save up to 80% energy consumption
Current study	Phan Thiet province, Vietnam	1.5x1.3x0.2 10 windows	Shading Hot water production.	South North	<ul style="list-style-type: none"> <li>-Energy, daylight simulation based on <i>C. Vulgaris</i> 20%.</li> <li>-Hot water production based on solar efficiency of 38%</li> </ul>	<ul style="list-style-type: none"> <li>-Save up to 12% energy consumption for cooling compared to single glaze.</li> <li>-Produce 329.84 kWh/m<sup>2</sup>.year at South facing and 201.2 kWh/m<sup>2</sup>.year at North facing.</li> <li>-Reduce daylight level from outside.</li> </ul>





