



Sustainable Facades for Indian Tropical Climate – Case for External Movable Shading Systems


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Indo-Swiss Building Energy Efficiency Project (BEEP) Activities



BEEP Outputs (2012-2015)





	<p>15 large buildings – Design Support</p>	<p>Capacity building of >1000 building design professionals – Training programmes & city-level seminars</p>	
	<p>MoUs with 5 Indian laboratories</p>	<p>5 innovative indigenous designs for external movable shading systems - National Design Competition</p>	
	<p>Technical support to PWD's of 2 states in developing design templates for EE public buildings</p>	<p>National Design guidelines for Energy-Efficient Housing Design</p>	

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Direct Solar Radiation on Glazed Surface – Use of Internal Blinds/Curtains

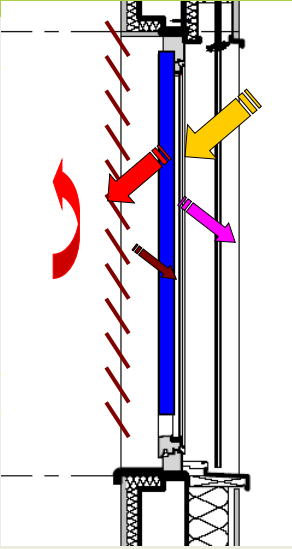






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Are Internal Blinds Effective in Controlling Solar Heat Gains ?



Interior blinds are not effective in controlling solar heat gains. A large part of the heat comes inside the space, which is to be then removed by air-conditioning.

Solar Heat Gain Coefficient > 40%.

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Two Cases to Illustrate the Impact of Direct Solar Radiation

- Commercial building, Noida
- Residential building, Indore

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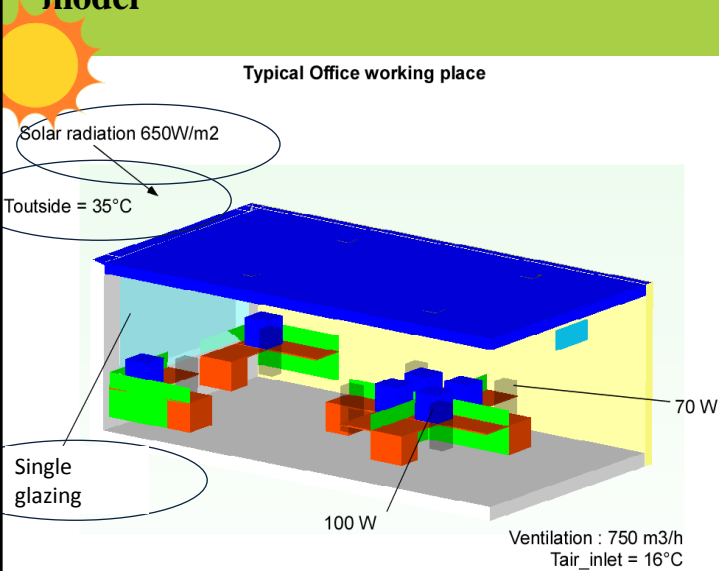
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Case I: Commercial building at Noida



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Computational Fluid Dynamics (CFD) model



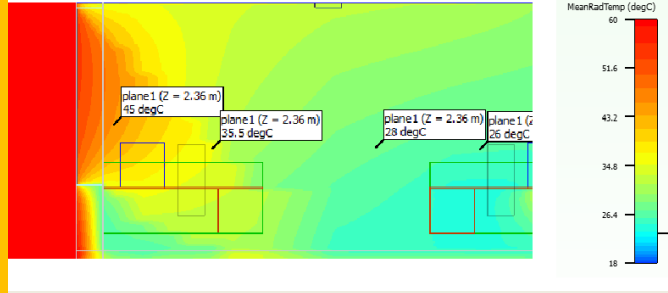
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CFD model – Radiant Temperature



Radiant temperature

The temperature of the glazed surface exposed to direct solar radiation > 50°C



Case II: Residential Building Project



Analysis at Flat Level to Ensure Comparable Thermal Comfort in all Flats

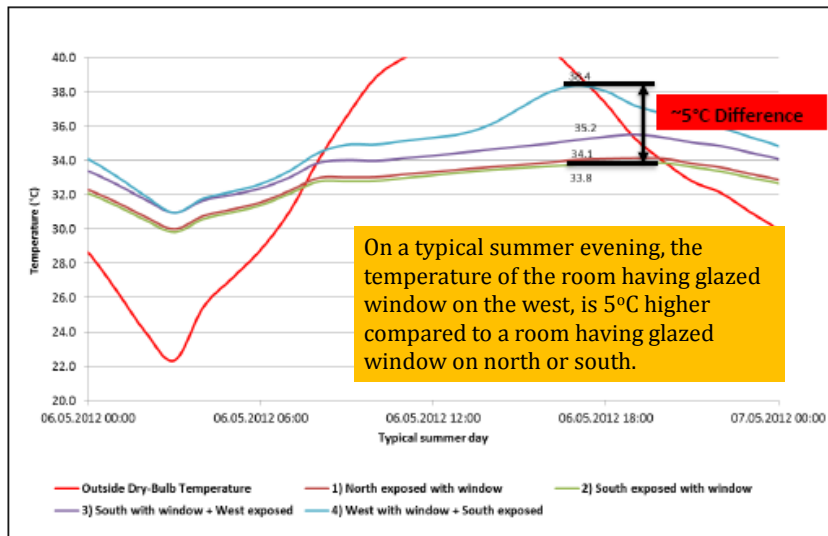


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Figure 12: 4 bedrooms taken for further analysis

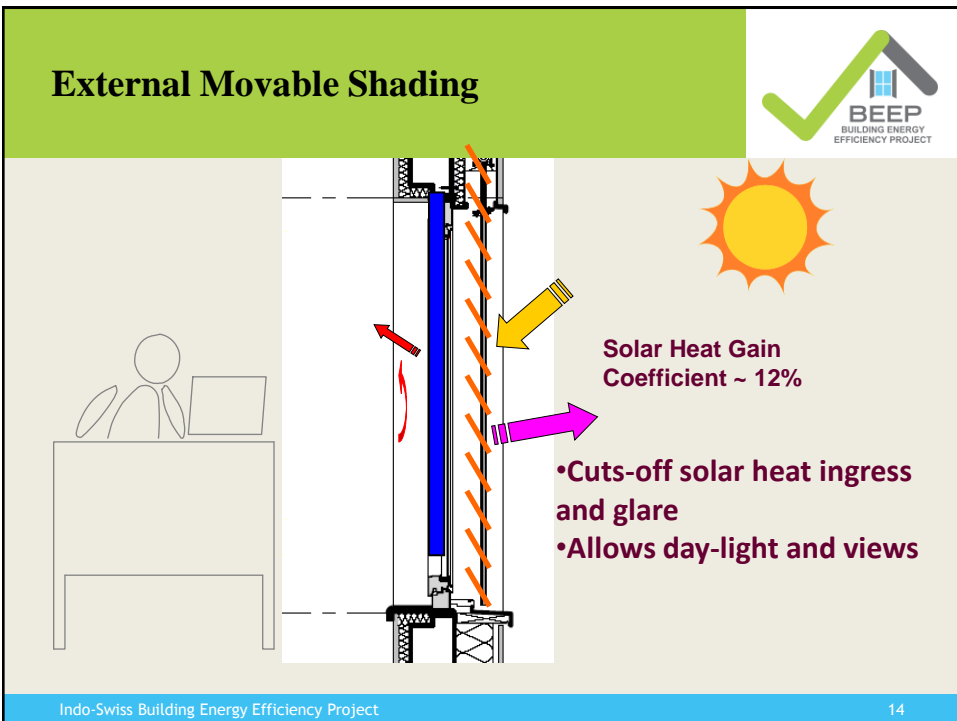
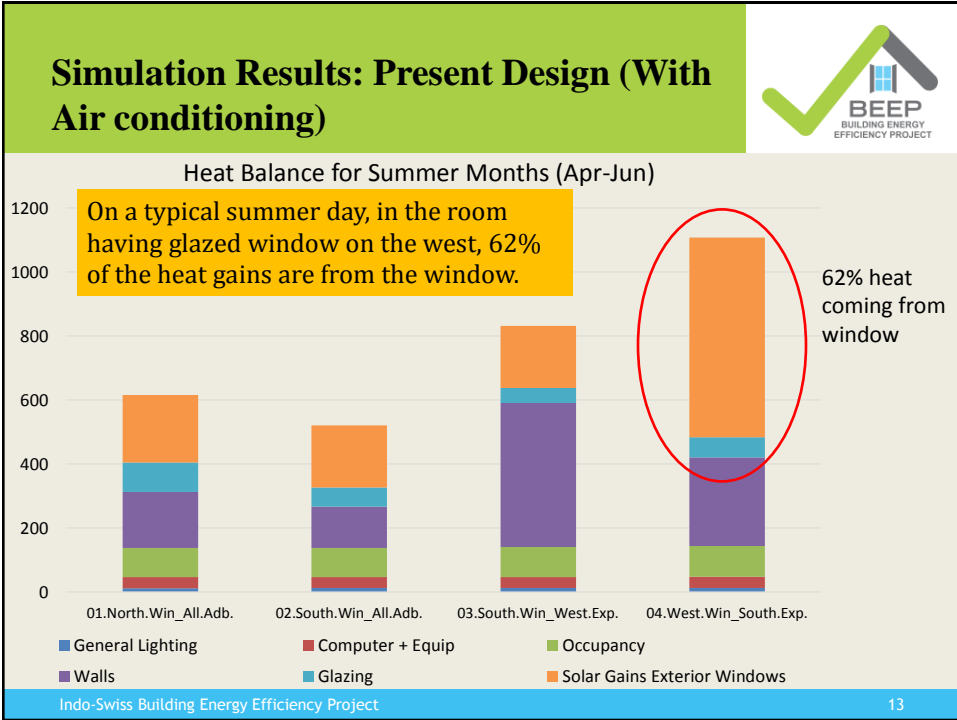
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Description of Base Case



On a typical summer evening, the temperature of the room having glazed window on the west, is 5°C higher compared to a room having glazed window on north or south.

Figure 13: Inside temperatures on a typical summer day on an intermediate floor



External Window Shutters Examples



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External Movable Shading (India)



Source: FACE, Ahmedabad



Source: FACE, Ahmedabad



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External Movable Shading (Europe)



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Sliding shutter



Hinged and top rolling shutters

Example of external movable shading (Europe)



Example of external movable shading (Horizontal Lamella Blinds)

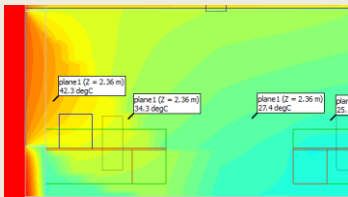


Source: Swiss Problinds

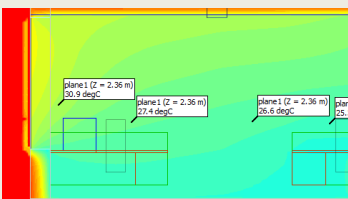
Case I: CFD Model : Radiant temperature after the application of External Movable Shading



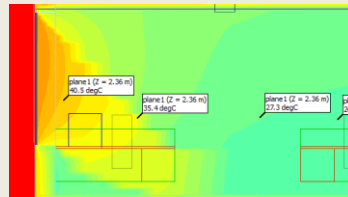
Single glass



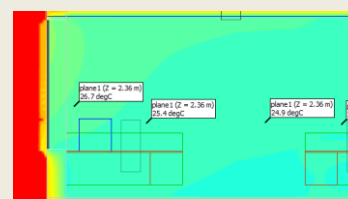
Single glass and solar protection



Double low-E glass



Double low-E glass and solar protection



Case II: Application in the Residential Building

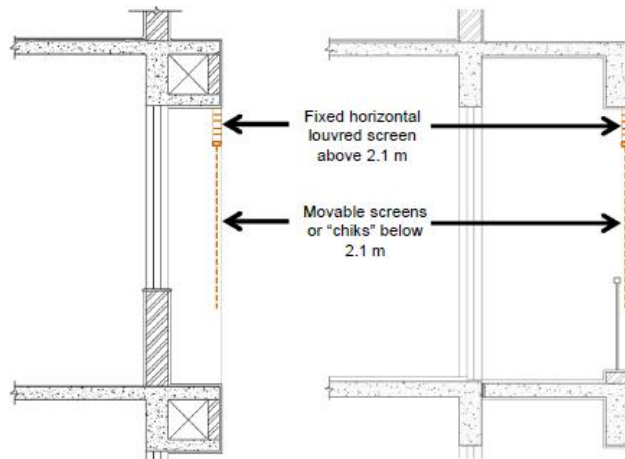
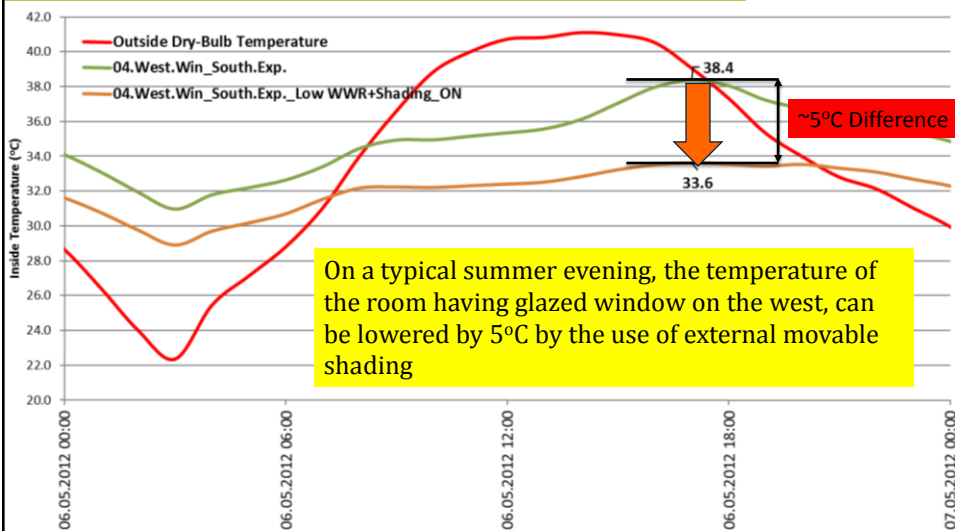


Figure 20: Section showing proposed shading

Case II: Impact of Shading on Inside Temperature



National Design Competition on External Movable Shading – Jury



31 entries
5 Winners
Rs 2 million prize money

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External Movable Shading Prototypes - Testing at CEPT University, Ahmedabad



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Conclusions



- External movable shading systems should be an important component of the sustainable façade to reduce solar heat gains in tropical climates. In addition, these systems help in controlling glare, increased day light utilization and natural ventilation.
- A national effort is needed, which should be focused at:
 - Developing a variety of cost-effective external movable shading systems
 - Demonstration, validation and labelling of performance
 - Promotion of local manufacturing
 - Market development
- BEEP plans to organize a national exhibition on external movable shading systems in September, 2016



THANK YOU !

**For availing technical assistance for design charrettes,
downloading technical materials and information on
training programmes, please visit**

www.beepindia.org

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