

# A window to save resources and supply energy

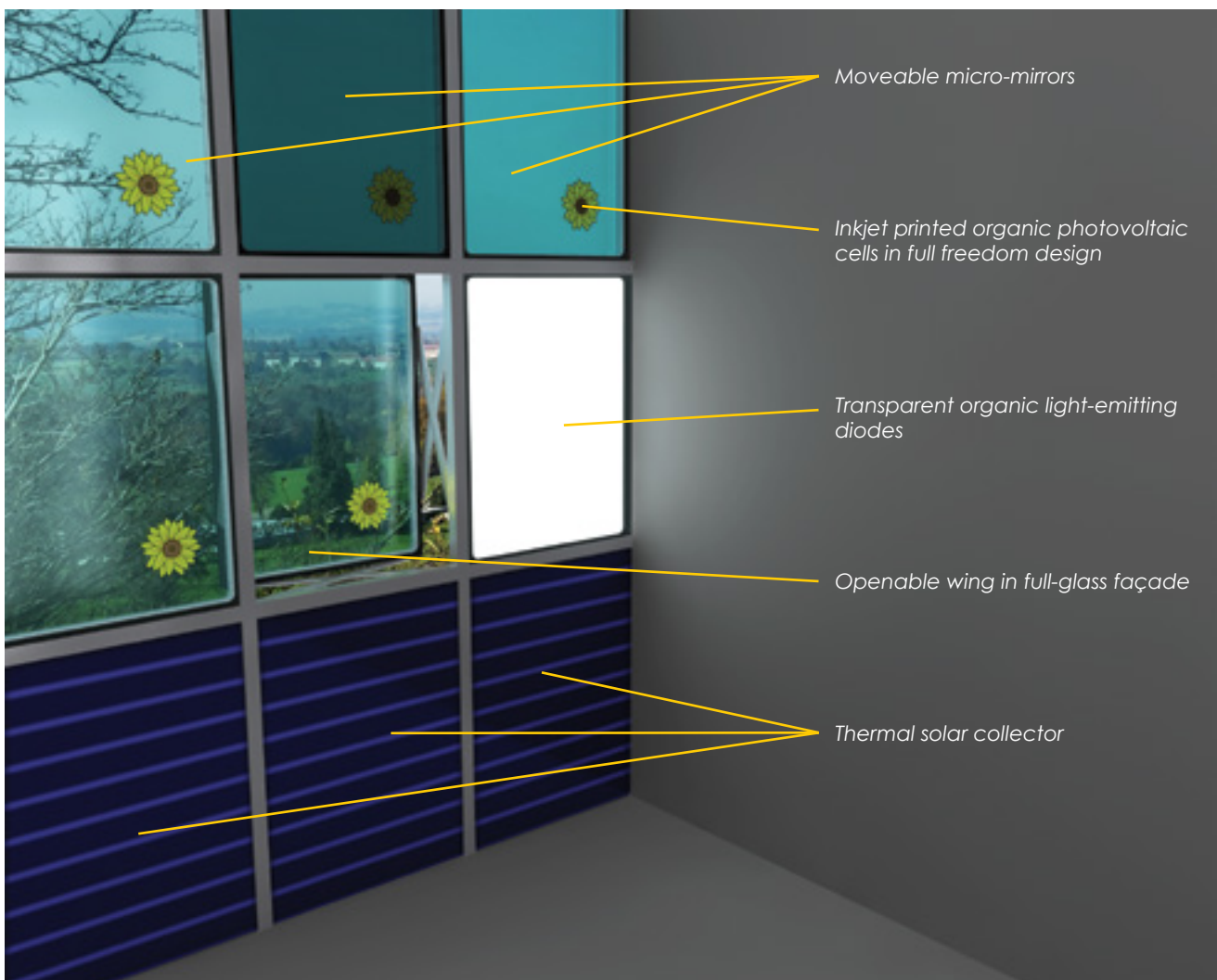
**B**uildings are responsible for around 40 per cent of Europe's energy consumption. Façades and windows play a decisive role in improving energy efficiency. In the future, windows will even supply energy and take on other intelligent functions that are crucial for the comfort of the building users: shading, light control, lighting, noise reduction. The 'window of the future', which will include all

of the above functions, will be developed as part of the EU-funded project 'MEM4WIN'. The Austrian industrial company LiSEC - global leader in glass processing machines and a pioneer in the production of insulating glass - is coordinating the international research project.

## AMBITIOUS GOALS

The sights have been set very high for the window of the future: An innovative four-pane

insulating glass means that heat transfer will be reduced by up to 50 per cent ( $0.3 \text{ W/m}^2\text{K}$ ) of the U values that were previously achieved. The weight of the window will be reduced by 50 per cent through the use of tempered thin glass, and the windows are designed to supply energy. Even though the glass units are significantly thinner than those in similar windows, the noise insulation is improved by around 20 per cent thanks to the four-pane structure.



### ECONOMIC EFFICIENCY

The main goals of the 'MEM4WIN' project are to achieve value for money and to make the windows feasible in an industrial environment. The manufacturing costs will be 20 per cent lower than for other windows with a similar range of functions.

### MULTI-FACETED RESEARCH TASKS

LiSEC is focusing on the following development areas within the research project:

- Tempered ultra-thin glass membranes (thickness of ~0.9 mm)
- Anti-reflective coating (plus 3 per cent transmission)
- Innovative frame assembly for a four-pane structure (Ug value: 0.3 W/m<sup>2</sup>K), which also allows for a frameless, openable wing in full-glass façades
- Sealing for the integration of PV and OLED, which takes care of diffusion proofing - for many decades into the future

The Austrian research company PROFACTOR, five universities and six additional industry partners are all closely connected to the project. These are just some of the tasks that they are focusing on:

- Movable micro-mirrors sized approximately 0.06 mm<sup>2</sup> are to be built into the insulating glass using nano-imprint lithography. Taking the level of daylight into account, these mirrors ensure that there are ideal lighting conditions or intelligent shading on the

inside of the building.

- Organic photovoltaic cells in full freedom design are to be directly applied to the glass surface using inkjet printing. Transparent, organic light-emitting diodes and thermal solar collectors are also to be integrated into the window. During hours of darkness, the light-emitting diodes take over the interior lighting while the photovoltaic cells and solar collectors supply energy.
- Graphene is to be used as transparent conductor for the photovoltaic system and the micro-mirrors. This transparent and conductive material will be employed for both the manufacturing of contactive layers and the printable ink for the conductor paths. This makes it possible to replace expensive raw materials such as silver and indium tin oxide that up until now have been essential in the manufacturing of transparent conductive layers. ●

The project, which began on 1 October 2012 and has a run time of 42 months (project close: March 2016), is funded by the European Commission within the Seventh Framework Programme (project number: NMP3-SL-2012-314578). The following partners are involved in the project, in alphabetical order:

- Aixtron SE and Aixtron Ltd.
- Belectric OPV GmbH
- Consiglio Nazionale delle Ricerche / IMIP
- Durst Phototechnik AG
- Energy Glas GmbH
- Johannes Kepler University Linz / ZONA
- Korea University / NMDL
- LiSEC Austria GmbH
- PROFACTOR GmbH
- Tiger Coatings GmbH and Co. KG
- The Chancellor, Masters and Scholars of the University of Cambridge / DENG / NMS
- University of Kassel / INA and CESR

### Current achievements:

- 18 June 2013: Working together with LINDE, LiSEC launched S-COAT®, the new AR coating technology for solar applications, at the Intersolar exhibition in Munich / Germany. LiSEC will further optimise the AR coating technology for use in energy-efficient windows as part of the MEM4WIN project.
- 16 September 2013: Energy Glas presented the new tempering furnace from LiSEC which has been specially designed for the production of thin glass at Wolfhagen / Germany. As the first manufacturer of IG units, Energy Glas launched NEUTRALUX triple-light, a triple isolated glass unit containing 2 mm tempered thin glass. Energy Glas will reduce the thickness to 0.9 mm during the MEM4WIN project.
- 1 October 2013: BELECTRIC OPV presented the next generation of PV products named SOLARTE at 28th EU PVSEC 2013 in Paris. In MEM4WIN BELECTRIC is OPV involved in system integration of OPV e.g. for smart windows.

More information: [www.mem4win.org](http://www.mem4win.org)