



## Partnering with higher education at Solar Decathlon China

The Solar Decathlon is an intense collegiate competition, held by the U.S. Department of Energy, requiring student teams to design and build efficient and innovative structures powered by renewable energy. Solar Decathlons take place across the globe – in the U.S., Europe, Africa, Middle East, and Latin America/Caribbean – with the first Chinese edition held in 2013. The second-ever Solar Decathlon China took place in mid 2018, in sun-drenched Dezhou (home to China's Solar Valley), featuring more than 20 teams from 43 universities from around the world. Unicel Architectural was part of Canada's TeamMTL delegation, spearheaded by McGill and Concordia universities and sponsored by Hydro-Québec.





*“A traditional photovoltaic panel converts about 20 percent of the sun’s power to electricity – the rest being lost primarily through heat. With a BIPVT system, you can reclaim some of that heat with an air channel behind the PV to heat the house, thereby recuperating up to 70 percent of the sun’s energy. Leveraging Unicel’s advanced curtain wall and skylight technology, the TeamMTL house features a BIPVT front roof and a BIPV back roof that deliver high levels of thermal performance.”*

- Samuel Doyon Bissonnette, Director of Engineering, Unicel Architectural

## The Challenge

The competition itself – in which teams were judged based on individual criteria such as energy performance, engineering, innovation, market potential and architecture – was just the beginning. Teams also had to construct the entire building within narrow three-week window, while working through extreme heat that forced crews to stop work every day between noon and 4 p.m. If all this wasn’t enough, the team’s tools were delayed for the first four days of the competition thanks to a customs issue – a challenge that could have led to the team’s undoing had fellow participants not graciously loaned them equipment until their gear arrived.

## The Solution

To meet the three-week competition timeline TeamMTL initially assembled its two-storey, net zero energy-capable Deep Performance Dwelling in Montreal. It was then taken completely apart and packed up, to be re-assembled in China. The design – inspired by a combination of Montreal’s classic row houses and traditional Chinese siheyuan residences – consumes 80 per cent less energy than a traditional dwelling, while producing enough solar energy to power it for a year thanks to building integrated photovoltaic (BIPV) and building integrated photovoltaic with thermal (BIPVT) front and back roofs. Far more advanced than traditional solar panels that simply sit on top of a surface, building-integrated photovoltaics are built right into roofs, windows, walls, facades and shading devices – part of the makeup of the house itself.

Unicel helped TeamMTL design and install the BIPV/BIPVT roof systems by adapting its very polyvalent skylight system to incorporate photovoltaic panels instead of glass. Unicel also incorporated an air and heat recovery system while preserving the weather resistance of the skylight system.



*"The international Solar Decathlon event can be considered a precursor toward a more sustainable planet. Being recognized for market appeal, architecture, engineering and innovation demonstrates both Quebec and Canadian leadership in all things green and energy efficient."*

- Samuel Doyon Bissonnette

## The Results

TeamMTL's Deep Performance Dwelling wowed the crowd in Dezhou. While it didn't finish in the overall top three among the nearly two dozen teams competing – teams from Chinese universities took the top two spots – it took first place in both market appeal and architecture and third place in engineering and innovation. The deep, narrow house is divided into two units through a courtyard in the middle, providing flexibility to its future occupants. It can also store solar energy and sell it back to the power grid as electricity, when appropriate.

### Participants

**Architecture lead:** McGill University

**Engineering lead:** Concordia University

**BIPV/BIPVT roof:** Unicel Architectural

**Solar panels:** Canadian Solar

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