Sunpartner Technologies and VINCI Construction present Horizon: the first autonomous, solar-powered smart glass window

European construction giant and international contractor VINCI Construction and French solar innovation specialist Sunpartner Technologies have announced a new 50/50 joint venture and launched a new connected smart glass window dubbed “Horizon.”

Featuring photovoltaic panels and multiple sunlight sensors, the new Horizon opacifying and communicating window can be adapted to any project, from new construction to renovations.

Project origin
This project grew out of a meeting in July 2015, in the Sunpartner Technology showroom in Aix-en-Provence, France, when Jérôme Stubler and Ludovic Deblois decided to pool their talents to investigate a number of promising joint projects.

Aix-based Sunpartner is the inventor of WYSIPS®, a technology that transforms any surface into a solar panel that can generate electricity using natural or artificial light without impacting appearance. Applications for this promising technology have already been developed in the consumer market (mobile phones, e-reader cases, smart watches), and it is also used for smart signage and the opacifying glass sector.

After months of studies, the two businesses signed a partnership agreement in April 2016 to develop and commercialize innovative photovoltaic solutions for the construction industry. Their objective was to bring to market comprehensive solutions to integrate Sunpartner technology in construction applications.

The Horizon energy-autonomous opacifying window is the first innovation in an emerging product line on its way to market.

Building-integrated photovoltaic (BIPV) glass: A growing market driven by new requirements and regulations
The BIPV glass market is poised to take off: By 2020, forecasts call for a $3.5 billion market abounding in technological and business opportunities (Source: N-Tech Research). According to experts, the building sector is responsible for 30% of world CO2 emissions, and 40% of France’s energy consumption (source ADEME, Joint Research Center).

Aware of the need to move closer to a goal of “zero-energy” buildings, government authorities in all countries are strengthening regulatory requirements and standards (BREEAM, LEED, HQE) that measure energy efficiency as well as the “greenness” of new construction and renovation projects.

In this context, the building envelope is more important than ever. Better building envelopes are being developed by introducing new functions to transform facades,
windows, sunrooms, and other canopies into active, smart building elements. Next-generation building systems will be expected to maximize occupant wellbeing year-round, support lower GHG consumption, save energy, and lower building operating expenses.

**Horizon windows: A building block of the Smart City**

Today’s cities face many challenges, from demographic explosion, urban densification, and waning real estate supply to global warming and pollution. But there’s good news: by combining and harnessing the potential of various digital technologies, renewable energy, and innovations in building systems and public infrastructure, major cities are embracing new development models based on the Smart City concept.

This is no less than a new understanding of what cities are and do: a more integrated, participatory approach built on sharing local resources (energy, local services, and more). With local energy production, the day may be coming when smart buildings actually produce more energy than they consume. And the new Horizon connected solar window is a building block of this new, sustainable, liveable city.

**Horizon windows: A brand-new, autonomous, connected smart window by VINCI Construction and Sunpartner Technologies**
Horizon is a unique 3-in-1 solution that combines a window, a sunshade, and a blind. Because it is connected, it can be operated remotely using a smartphone, remote control, or building management system. Horizon’s opacifying ability and real-time control system can cut a building’s energy consumption by up to 30% by diminishing the effects of overheating and efficiently using air conditioning.

It also provides increased comfort (i.e., protecting occupants from glare and reducing overheating in interior spaces) and simpler use and control.

**An opacifying window**
Concretely, the Horizon opacifying window consists of two photovoltaic panes mounted in an apron. The apron includes Sunpartner technology—either WYSIPS® Design Glass or Camelon—which captures light and converts it to electricity. The energy produced feeds the shading system integrated in the upper frame. Three shading areas have been defined to meet users’ varied needs.
A connected window

In both renovation and new construction, one factor that can stand in the way of smart glass deployment is the need to wire windows (for electrical supply and control).

With Horizon, VINCI Construction and Sunpartner have developed an autonomous smart window connected to the Building Management System (BMS) through an electronic box mounted on or built into the window.

- Communication and controls are wireless, using Bluetooth or LoRa protocols.
- Operations can be handled using a mobile app or integrated BMS.
- Integrated sensor management enables the building control system to control the glass:
  - Outside irradiation
  - Interior luminosity
  - Interior temperature
  - Battery level
  - Opacification levels of each window zone
  - Open window detection (if applicable)
  - Break-in detection
- Operating system that supports applications.

An energy-autonomous window

The photovoltaic glass set in the window apron provides all energy needed to power window opacification. As a local source of renewable energy, Horizon makes the perfect component of the buildings of tomorrow, which will be smart and energy-autonomous.

Delivering benefits today:

- For users, improved energy consumption means lower energy costs: up to 30% off a building’s air conditioning/heating/ventilation costs.
- Electricity-generating façades that don’t require wiring or other complicated electrical work.
- Easier installation: When you install a Horizon window, you are actually installing a window, sunshade, and blind in one.
- Easy upkeep and maintenance: There’s no mechanism, since the thin layers of active materials are located between two panes of glass.
- Long-lasting installation: the typical service life of a blind is estimated at 10 years, whereas an opacifying window should last around 20 years.
A range of designs to fit every project
WYSIPS® double-pane glass is available in many designs.

WYSIPS® Design Glass

WYSIPS® Camelon

WYSIPS® Design Glass is semi-transparent, rigid photovoltaic compound producing up to 110 watts-peak/m² to achieve transparency ratings of 10% to 70%, as needed.

The glass offers a highly customizable appearance (PV band, straight line, or mesh or lace pattern).

WYSIPS® Camelon is a coloured and/or decorated product for exterior cladding that can achieve performance of up to 115 Wp/m².

Around ten designs are available.

Horizon: A more affordable window

- Capital expenditure: Equivalent to standard windows (with sunshade and blinds)
- Operating expenditure: Lower than standard windows (by around 20%) due to lower maintenance costs

Commercialization

We plan to begin taking orders for the first Horizon products in Q1 2017.
Sunpartner Technologies: The smart surface specialists

Sunpartner Technologies was founded in 2008 by Ludovic Deblois and is headquartered in Rousset, near Aix-en-Provence, France. The company quickly made a name for itself in the consumer electronics market (mobile phones, connected objects, accessories, and wearables) as a supplier of innovative solar technology. Through WYSiPS® (What You See Is Photovoltaic Surface), a technology that captures solar energy and generates electricity to make everyday objects partially or fully energy-autonomous, Sunpartner is putting its know-how to work to create smart, beautiful surfaces for use all over the world.

With its finger on the pulse a fast-changing market, Sunpartner realized that the field of building-integrated photovoltaics (BIPV) was poised to take off in the near future. The company began mass-production, and pivoted to a business model based on three distinct high-potential markets: the general public (consumer), transportation, and the construction industry.

**Branching out: From provider of technical solutions to industrial manufacturer**

To make this transition, Sunpartner acquired a stake and several employees of Nexcis, an EDF subsidiary, which came with a more spacious facility for a human-scale production facility. The new plant, slated to begin production in 2017, will have the capacity to produce 30,000 m²/year of transparent photovoltaic components, which can be doubled to reach a total of 200,000/m² year. The first few hundred square meters will be produced in late 2016.

Sunpartner also boasts seasoned management and technical teams spanning disciplines from electronics to solar photovoltaics to optics, semiconductors, industrial processes, and more.

The company also works with leading building sector partners including Toppan, Idosens, and VINCI Construction, to do its part for the coming sea change in the construction industry and the fight against climate change.

**Agility and innovation driving the disruptive technologies of tomorrow**

Driven by its philosophy—“Coupling our forward-thinking, entrepreneurial spirit with the power of renewable energies to build the smart, human, connected cities of tomorrow”—the Sunpartner team has developed a smart glass capable of delivering better sustainable building management while lowering building energy footprints.

With €2.4 million in sales in 2015, Sunpartner plans to continue to grow through joint ventures in manufacturing around the globe, forging partnerships with industrial leaders who will bring them access to local markets to favor development.

Today Sunpartner boasts some 65 partners, has a substantial patent portfolio, and has raised €45 million since its creation. The company has won awards and distinctions in such spheres as innovation, business, and economics. These include: Nobel Sustainability® Supported Clean Tech Company (2013) and Technology Pioneer (2014; World Economic Forum). The company was ranked in the Global Cleantech Top 100 (2014).