

## Horizon 2020 Research and Innovation Action – InDeWaG Project

### Demonstrational Pavilion in Sofia is now completed

The first building using entirely Water flow glazing (WFG) technology was completed in Sofia, Bulgaria. It is an innovative water flow glazing pavilion with three facades and internal partition walls made out of WFG elements. The construction started on 26 June, 2019 and ended a little more than three months later on 30 September, 2019.

**The entire building process was recorded and can be viewed in the VIDEO.**

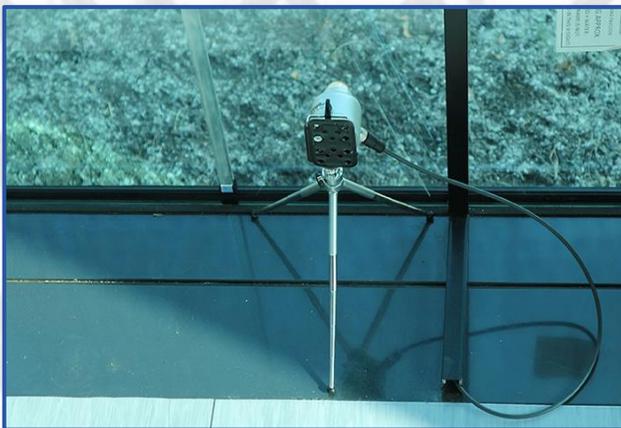
The WFG facades of the pavilion provide a floor-to-ceiling solution, attaining a fully transparent building envelope with up to 1300 x 3000 mm glazing units. They are easy to mount and maintain with frame-in-frame design, standardized components, developed to achieve Nearly zero-energy building (nZEB) performance.



A distinguished characteristic of the Water flow glazing is the active water chamber, in which the energy is transported within the glazing. Thus the façade provides radiant cooling or heating of the interior with minimized use of the Heating ventilation and air conditioning system, reaching outstanding performance and comfort levels. The WFG elements in the pavilion are connected to a heat pump, which regulates the temperature inside them and ensures that the inner space is properly conditioned.

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### Monitoring



The Water flow glazing elements of the pavilion bear monitoring equipment recording their performance and energy utilization. Weather station is mounted on the rooftop and constantly monitors the outside climate conditions. The data from the weather station provides information about the outside environment in which the WFG elements operate. Furthermore, a monitoring platform for the operation of the pumps and the outlet and inlet temperature as well as temperature and humidity inside the pavilion is operational and can be accessed online.

Remote access to the monitoring system is provided through the online platform. The analysis of the obtained data will be used to verify the simulation models and to determine the technical parameters of the WFG elements. Electricity covering the needs of the equipment inside the pavilion is supplied by a PV system with installed capacity of 4.48 kWp mounted on the rooftop.

### Official Opening of the Pavilion in Sofia

The official opening of the demonstrational pavilion took place in Sofia on the 10<sup>th</sup> of October, 2019 at Scientific Complex 2 of BAS. The event gathered about two hundred guests and visitors from the industry, scientific community, also engineers, architects, investors and media. The opening was followed by a short tour inside, where the project partners explained to the guests how the systems of the pavilion work, the achieved and expected results. The event obtained sufficient media coverage. A video material was prepared by Euronews devoted to the InDeWaG project. InDeWaG's demonstrational pavilion is now open for everyone for visits upon request.



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### DMAIA Demonstrator in Madrid

Another key project achievement was the completion of an additional Water flow glazing demonstrator in Madrid. This time the WFG technology was used to replace an existing partition wall. Real scale retrofitting of four windows was conducted in the Technical School of Aeronautics (E.T.S.I.A.E.) part of the Polytechnic University of Madrid. The DMAIA (Department of Applied Mathematics to the Aerospace Engineering) demonstrator is situated on the last floor of the main building and comprises two offices with four windows south-west oriented, belonging to an interior corridor.



The new WFG modules are integrated with an existing primary circuit which comprises an air-water heat pump. All the units are connected in parallel to one circulator composed of a pump and a plate heat exchanger dimensioned for the total glazed surface. The heating and cooling needs are assured by the WFG radiant walls. Control system with a thermostat based on the indoor temperature turns on and off the heat pump and the secondary flow rate.

The aim of the demonstrator is to validate the InDeWaG solution through a retrofitting intervention in the front facade of the two offices. The existing installation and the new solution coexist in the same space and are integrated with the same Electronic Control Unit for monitoring and control of the modules as well as for controlling indoor, corridor and outdoor temperature.

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### EVENTS

#### EU Industry Days 2019

February 5 -6, 2019



University of Bayreuth (UBT) took part in the exhibition on the EU Industry Days 2019 presenting the InDeWaG project. The Event was held on 5th and 6th of February 2019 in Brussels (The Egg Congress & Meeting Centre). It was established in the spirit of dialogue and cooperation with the industry stakeholders. The organized exhibition was showcasing how the EU supports industrial modernisation through various activities. The selected thematic areas were: industry and sustainability, industry and globalisation, innovation and digitalization.

#### European Conference of Renewable Energy Systems

June 10 -12, 2019

InDeWaG was proud to be part of this year's European Conference of Renewable Energy Systems (ECRES) that took place on 10-12 June 2019 at Puerta de Toledo Campus Universidad Carlos III de Madrid, Spain. The purpose of the ECRES is to bring together researchers, engineers and natural scientists from all over the world, interested in the advances of all branches of renewable energy systems. In cooperation with researchers from the City University of Hong Kong, partners from InDeWaG prepared a special session: "Achieving nearly Zero Energy Buildings with Water Flow Glazing facades."



During the session in six presentations, based on scientific articles, scientists from InDeWaG highlighted selected aspects from the recent research of fluid flow glazings:

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*Software tool for the design of water flow glazing envelopes, J. A. Hernandez (UPM), B. Moreno (UPM)*

*Commissioning process of water flow glazing facades, D. Garcia (UPM), B. Moreno (UPM), J. A. Hernandez (UPM)*

*Thickness dimensioning of water flow glazing facades, J. Escoto (UPM), B. Moreno (UPM), J. A. Hernandez (UPM)*

*Automation Platform as an Advanced Energy Management System, M. A. Rapado (UPM), B. Moreno (UPM), J. A. Hernandez (UPM)*

*Industrialization of Water Flow Glazing facades by means of modular units, B. Moreno (UPM), J. A. Hernandez (UPM)*

*Building Energy Modelling by means of BIM software. A case study with Water Flow Glazing, F. Del Ama Gonzalo, J. Ferrandiz, B. Moreno (SVC)*

### 'Science is Wonderful!' Exhibition

September 25 -26, 2019

The Science is Wonderful! exhibition was held in the framework of the European Research and Innovation Days 2019 on September 25<sup>th</sup> and 26<sup>th</sup> in Brussels. Besides the general public, the specific target audience of this event were students between six and fourteen years of age.

InDeWaG participated with a large-size fully operational water flow glazing window where the visitors could experience the function of the water flow glazing concept in cooling mode. Furthermore, a simple software model of a single room was prepared, where the visitors could toy around with glazing configurations and temperatures and study the effect of water flow glazing. On the practical example of a class room on a hot summer day, different ideas for reducing the room temperature have been acted out and the effect of water flow glazing has been demonstrated. The exhibition was also attended by grown-up

visitors, providing possibilities for various fruitful discussions about the potential of water flow glazings. The participation in this event has been a privilege for the InDeWaG project and is considered a huge success.



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### 14th Conference on Advanced Building Skins

October 28 -29, 2019

InDeWaG was presented at the Advanced Building Skins Conference 2019 in Bern, Switzerland. Architects, engineers, and representatives of the building industry met to discuss the latest trends and new developments in sustainable building design. In a special session “**Fluid-flow Façade Technology for Advanced Performance**” experts from the InDeWaG consortium had presentations on the topics:



- ◆ **Spectral and thermal problems of Water Flow Glazing** - Spectral parameters of water flow glazing; Glazing as a sun collector and sun protector; Unidimensional thermal profiles (*Juan Antonio Hernandez, UPM*);

- ◆ **Modular façade system for Water Flow Glazing façades** - System design, construction and production, compliance with EN standards (*Veneta Novakova, ETEM*);

- ◆ **Achieving nZEB by means of water-flow glazing systems** - Overheating in glazed buildings; Validation of water flow glazing; nZEB project for a single-family house in Spain (*Belen Moreno, UPM*).

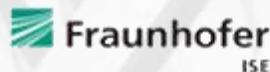
It was valuable to share the experience with colleagues from China. There was shown great interest in WFG technology and the audience shared its enthusiasm to visit the real scale Water flow glazing pavilion in Sofia.

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### PARTNERS



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### PROJECT INFORMATION

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