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Demonstration at industrial scale of the Flexible manufacturing of SMART multifunctional photovoltaic building elements

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INTRODUCTION

Building integrated photovoltaics (BIPV) is a promising area (the global BIPV market is expected to grow to €9.93 billion in 2016)¹, while it is still considered as a novelty, much rarer than traditional PV roof or site-mounted systems, dedicated only to exclusive construction. However, BIPV potential is much greater and many more solutions could be developed and BIPV could become a broadly accepted technology if the main barriers, hindering the market deployment are overcome.

¹ Building Integrated Photovoltaics Market 2011. Report from NanoMarkets



ABOUT SMART-FLeX

SMART-*FLeX* is a large - scale collaborative project within the European Union's Seventh Framework Programme. The project focusses on the manufacture of individually designed photovoltaic building elements on an industrial scale.

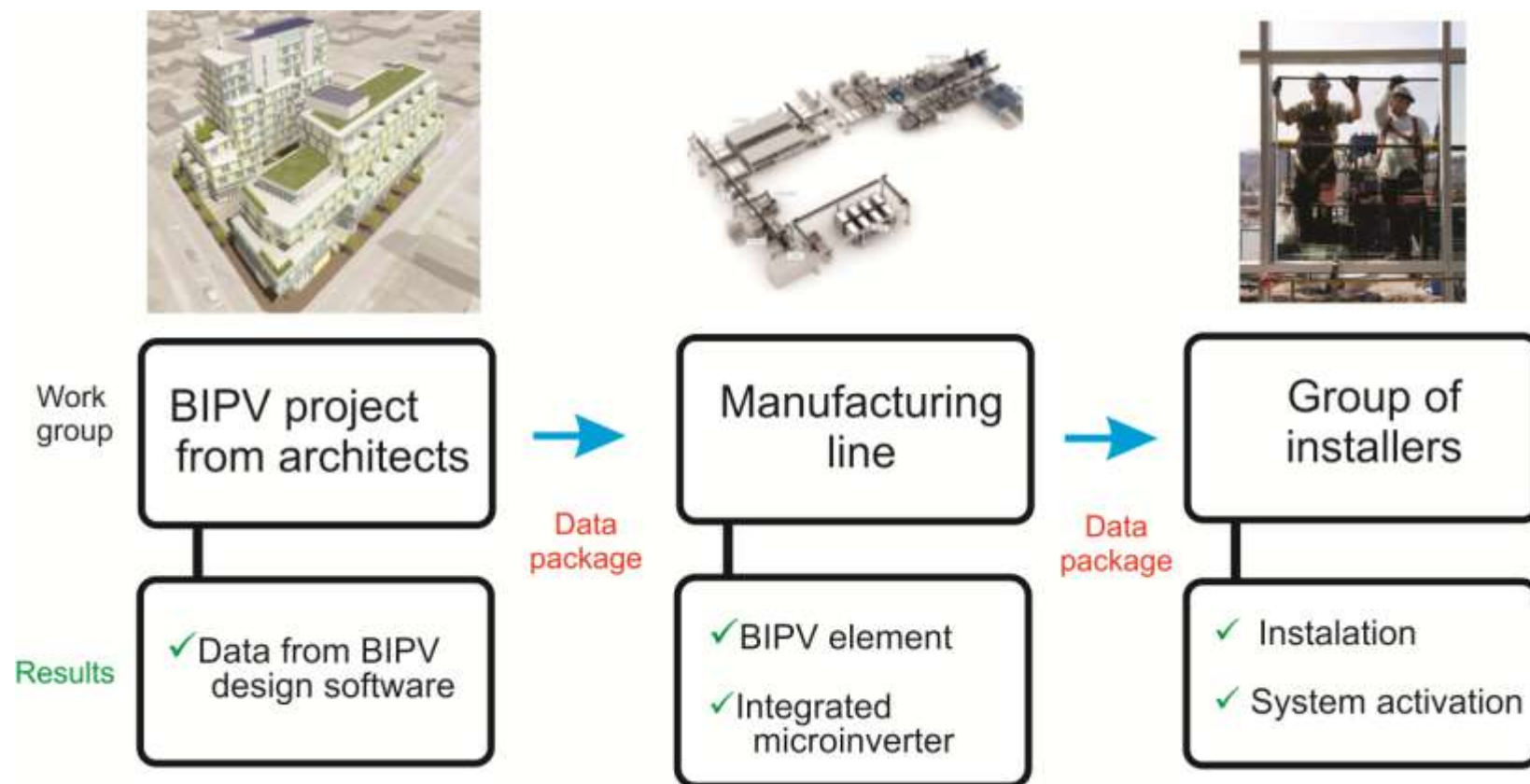
The overall objective of the project is to **demonstrate the multi-functional glass/glass PV building element as plug & play AC device for safe and easy installation into building electricity system.**



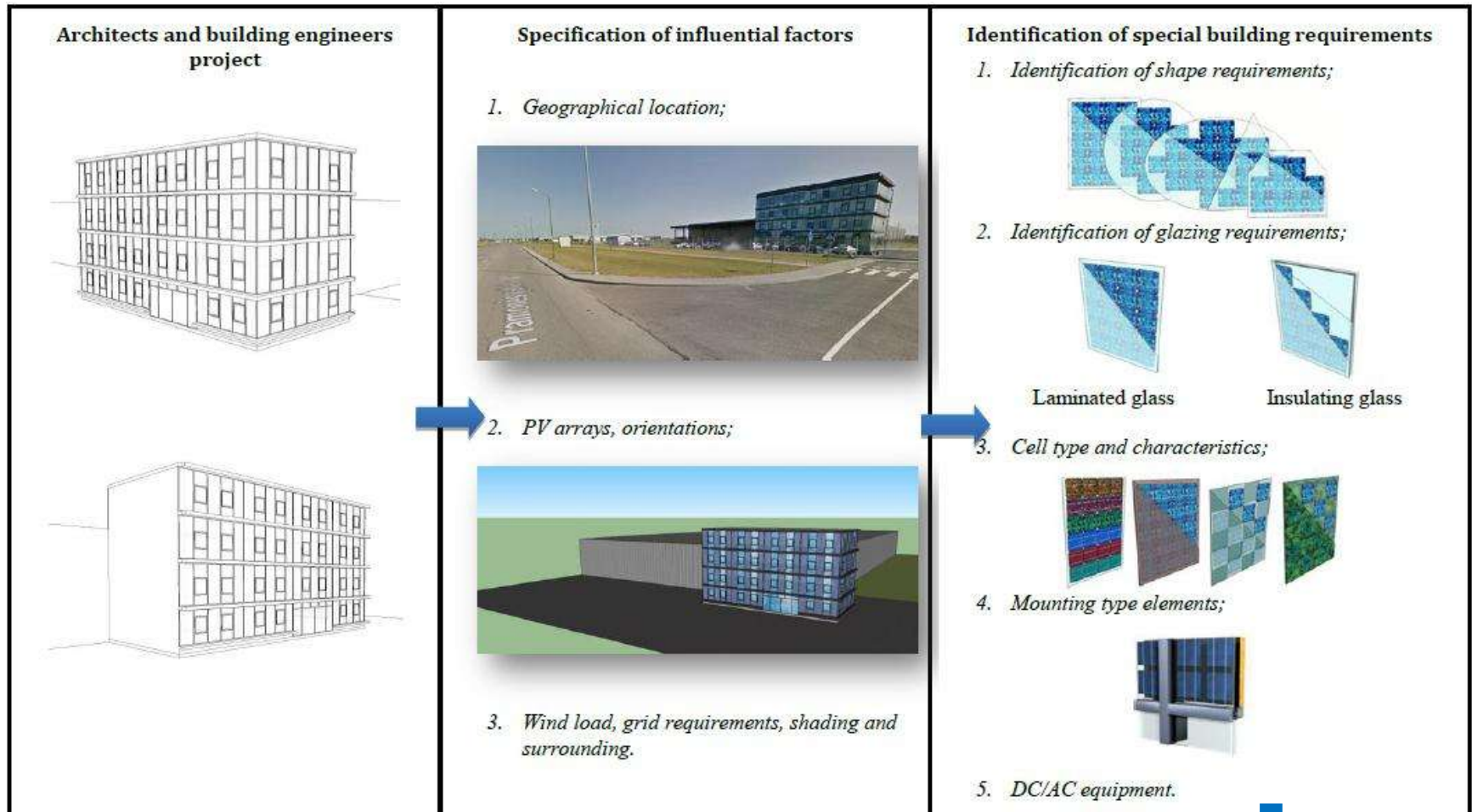
TECHNOLOGICAL OBJECTIVES

- **Novel approach to manufacturing:** to establish the frame for automated manufacturing of PV building elements according to architect's technical requirements by means of new software module for design of BIPV solutions communicating with CAD software platform as well as with PV manufacturing equipment;
- **Simplified installation:** to develop plug & play solution for PV building element by extending performance of state of the art junction box with the extra functions of DC/AC conversion, monitoring and maximizing the power production (MPPT) from each string of cells under different weather and shadowing conditions;
- **Product flexibility:** to increase flexibility of essential production steps to meet architectural requirements for different types of PV building elements demonstrating them on the existing module production line.

FROM IDEA TO INSTALLATION



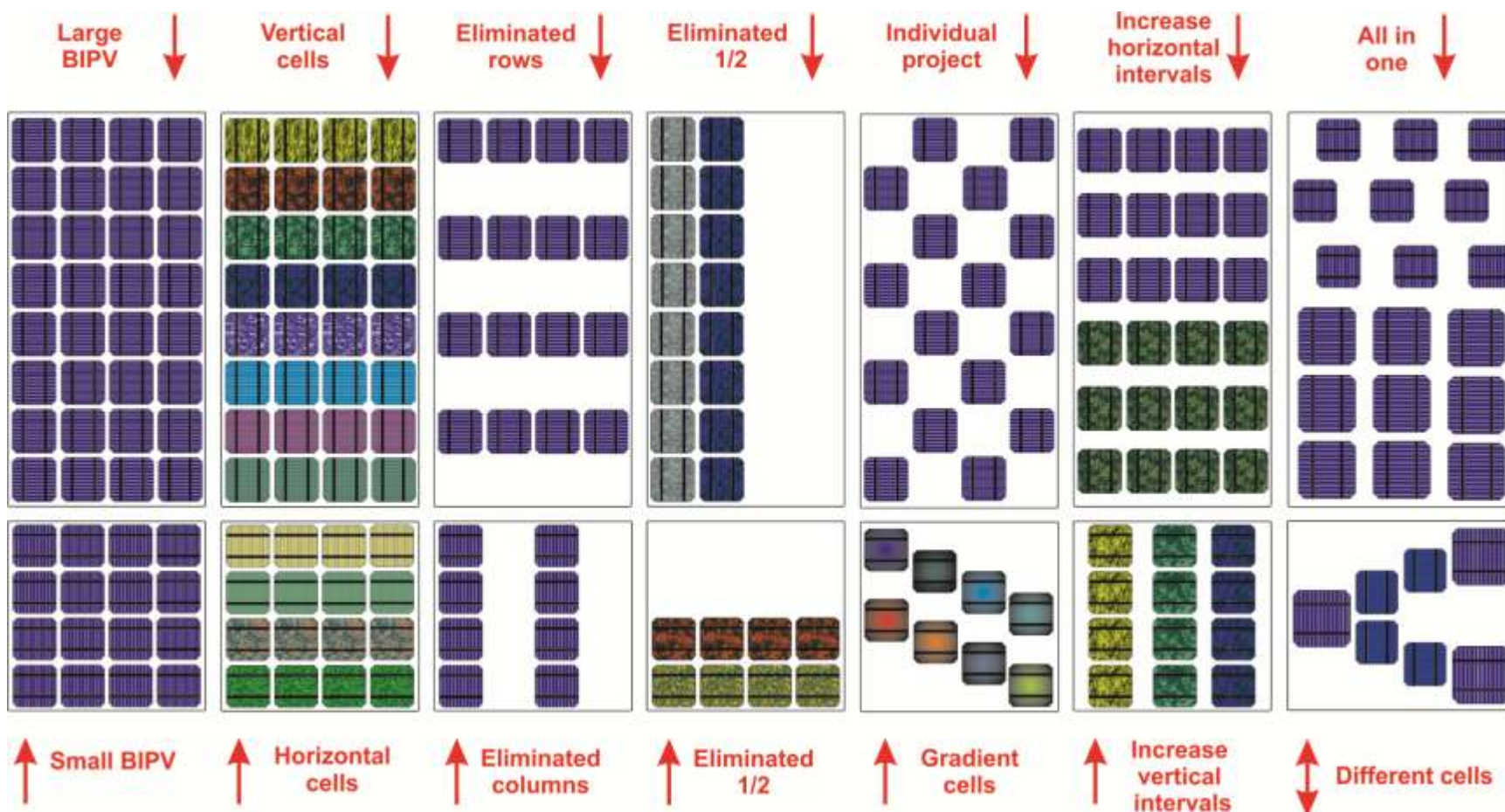
SOFTWARE TOOL FOR MODELING



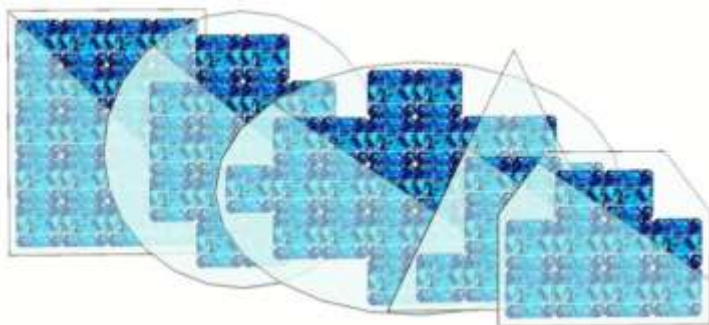
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FLEXIBILITY OF THE PRODUCT

Tailor-made building elements of: minimum size: **176x334** mm and maximum size: **1700x3500** mm

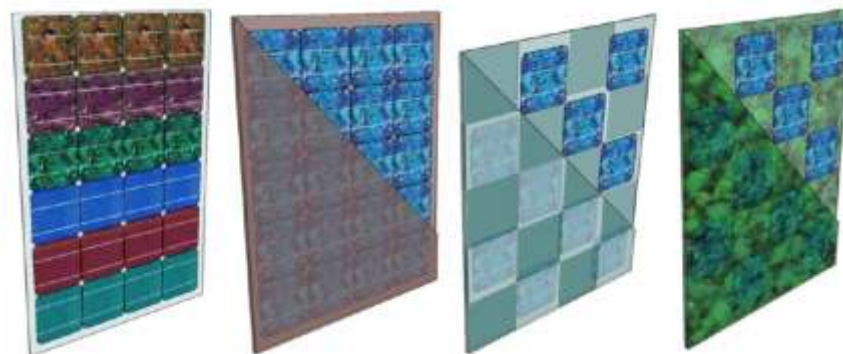
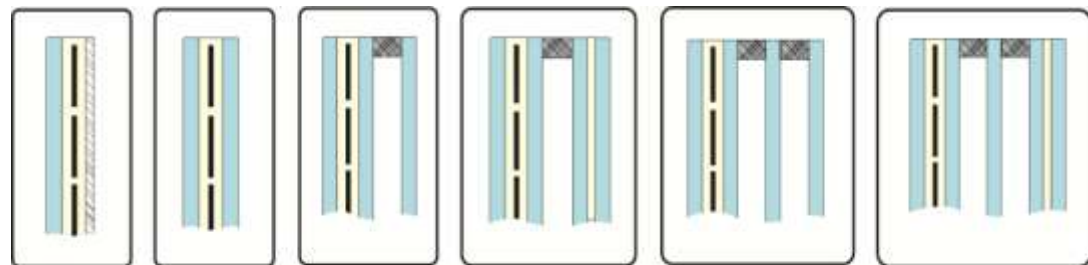


FLEXIBILITY OF THE PRODUCT



Shapes of BIPV module

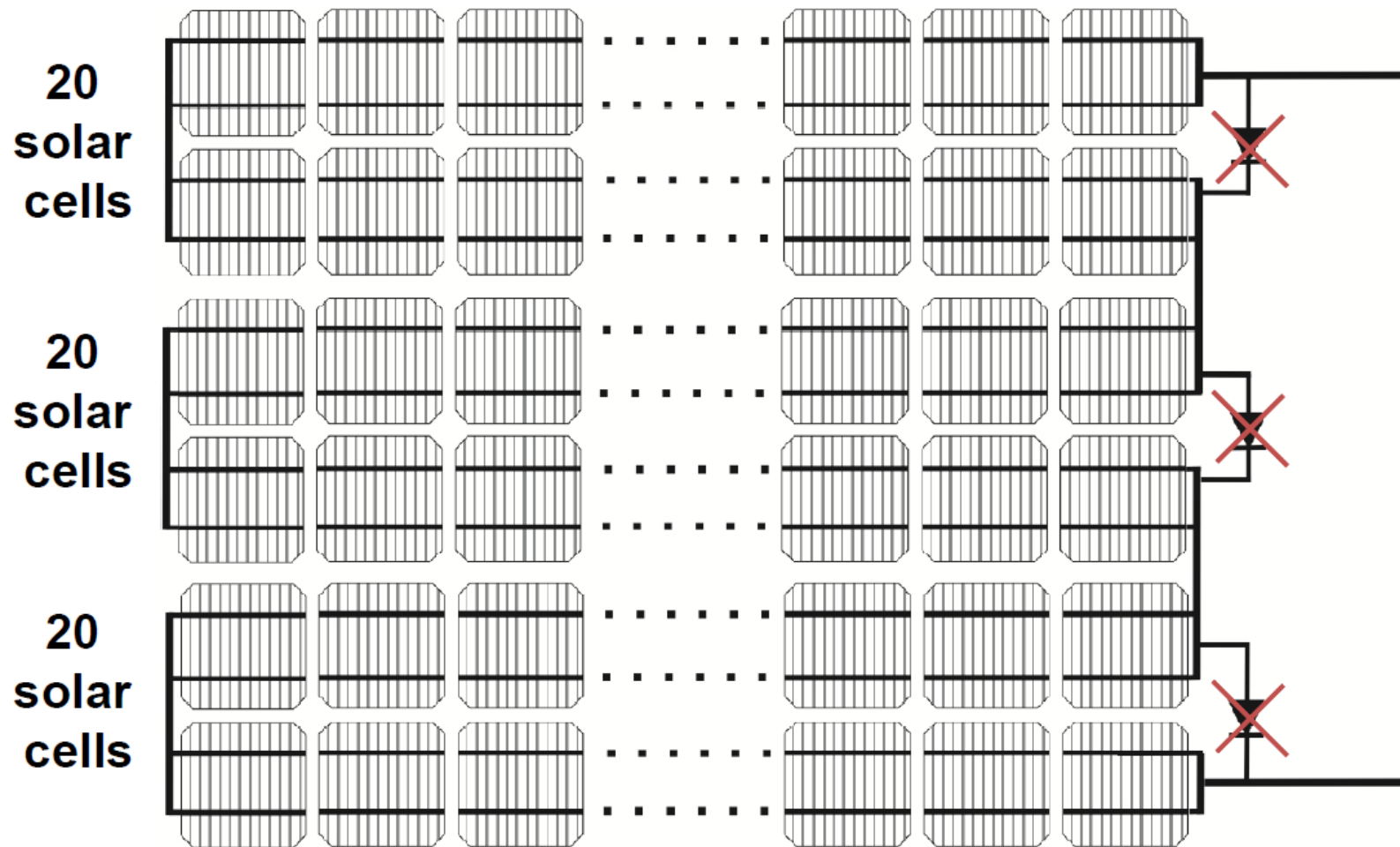
Possibilities of architectural glass



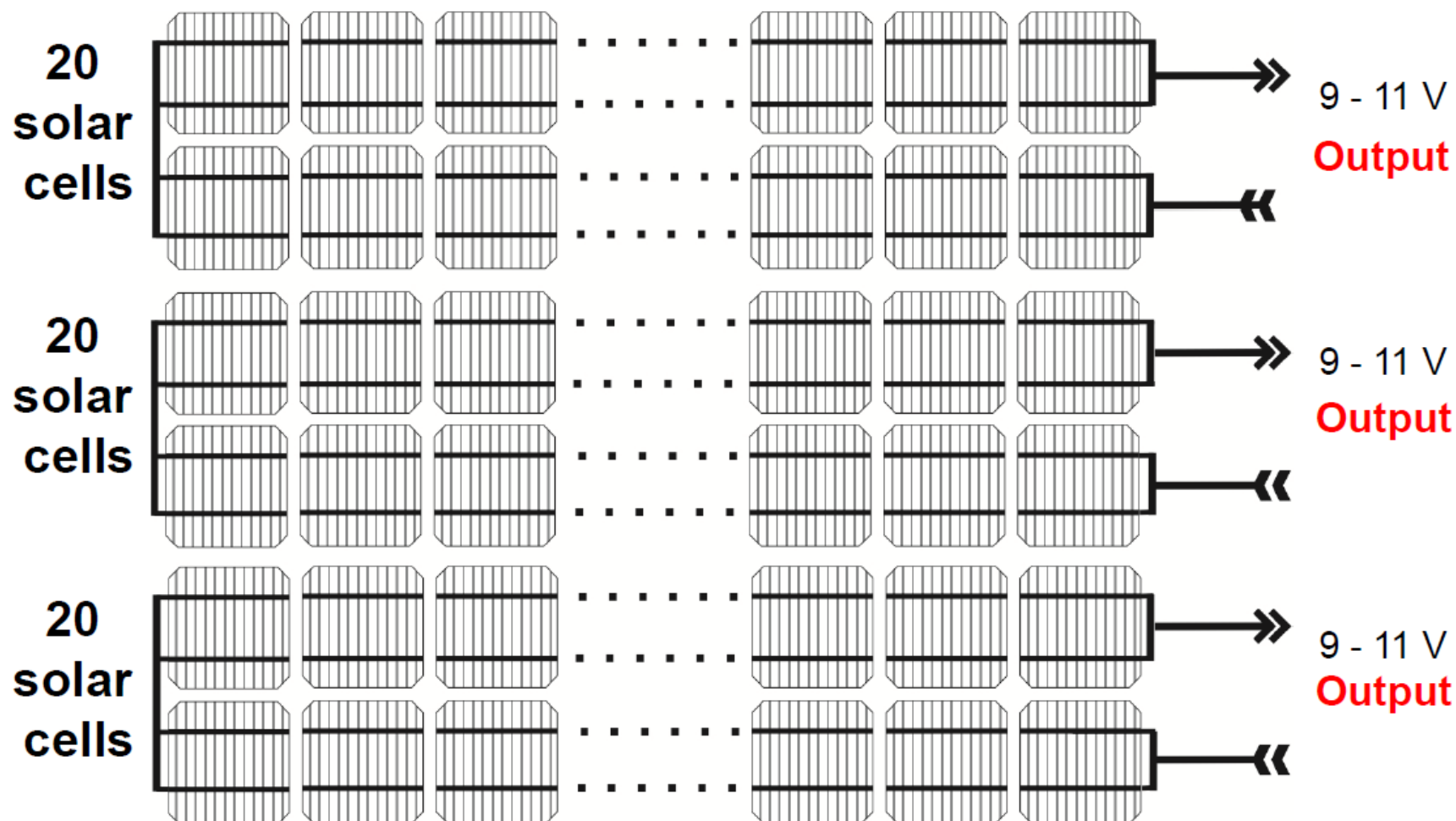
■ Glass ■ PVB UV+ ■ Cell's ■ Tedlar ■ Spacer

Variety of insulating glass

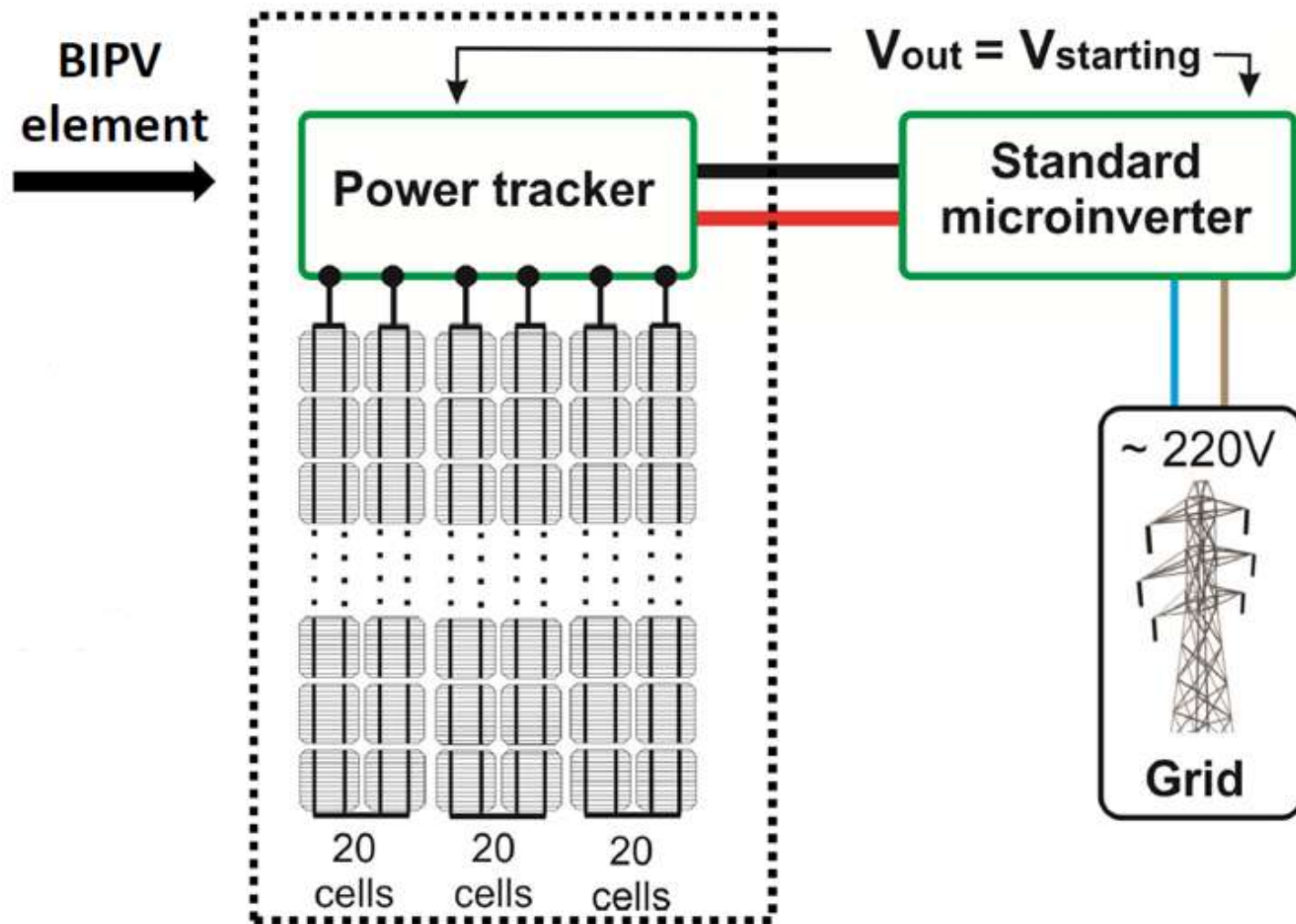
NOVELTY OF THE PROJECT



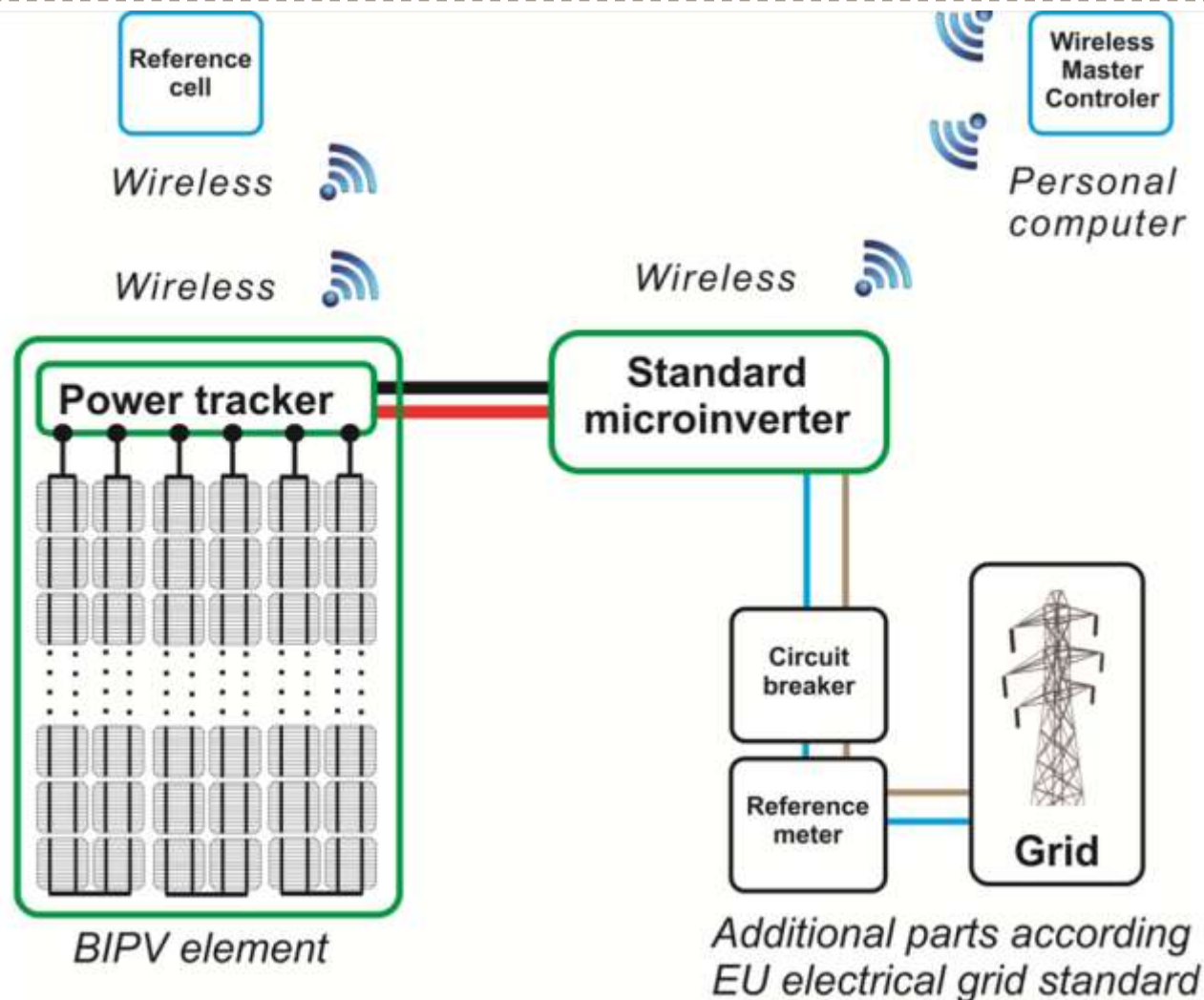
NOVELTY OF THE PROJECT



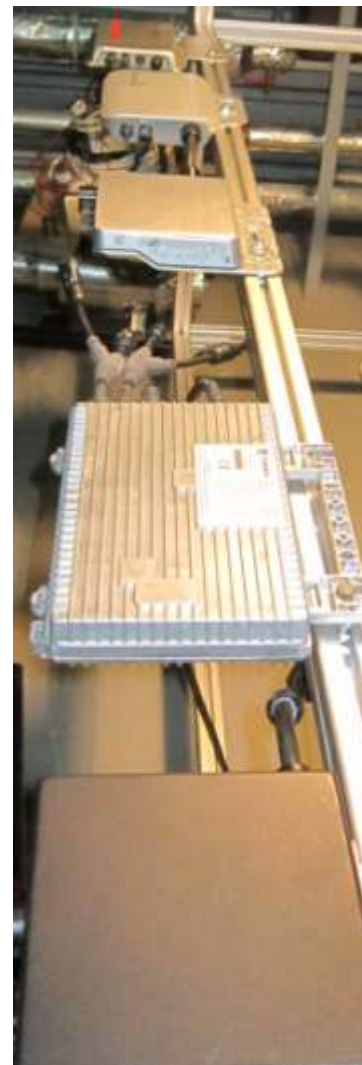
CONCEPT



CONCEPT OF FULL SYSTEM



MICROINVERTERS UNDER TEST



DEMONSTRATION AND TESTING SITE



Testing area – 200 m²

Location – Klaipeda, Lithuania

Total power – up to 30 kWp

Type of cells – mono/multi Si

Connection to grid – end of 2015

DEMONSTRATION AND TESTING SITE



DEMONSTRATION AND TESTING SITE



CONSORTIUM

ProTech



The Applied Research Institute for Prospective Technologies (ProTech) specialises in providing research and technological development services to industry agents. Their main areas of competence that are relevant to the SmartFlex project are photovoltaic technologies, in particular solar cells and modules manufacturing technologies, material science, electronics, microelectronics, measurements and testing.

Mondragon Assembly



Mondragon Assembly designs and manufactures tailor-made systems and equipment in the area of process automation for the automotive, photovoltaic, medical and cosmetic sectors, including a wide range of technologies to be implemented.

Creative Amadeo



Creative Amadeo is the owner and developer of CygniCon technology, the basis of all products related to CAD, home design and specialised software versions. The product range targets professional planners and architects in the building industry as well as end users designing their own homes.

Sunbeam Communications



Specialising in renewable energy and energy efficiency, Sunbeam offers technically-oriented communication services tailored to the dynamic renewable energy market in Europe. Sunbeam also boasts in-depth market knowledge and excellent contacts with industry associations and the media.

Via Solis



Manufacturer of photovoltaic modules Via Solis boasts cutting-edge PV manufacturing facilities with a flexible production line for innovative glass/glass type c-Si modules with an annual capacity of 60 megawatt (MW), mainly targeted to BIPV and modern architectural applications.

Glassbel



The mission of Glassbel is to develop and propose glass solutions that will provide a long-term return on investment due to the high performance properties of the product as well as create expressive architectural style on a building.

ISAAC – Swiss BIPV Competence Centre

University of Applied Sciences and Arts of Southern Switzerland



The Swiss BIPV Competence Centre tests and characterises photovoltaic modules, focussing on the development and adaption of test methods for BIPV and flexible modules.

Photovoltaik-Institut Berlin (PIB)



The Photovoltaik-Institut Berlin (PIB) tests the reliability, safety, performance and yield of PV modules for certification by IEC and UL and beyond. PI Berlin provides consultancy, field testing and technical assessment for the BIPV installation including yield analysis and execution planning.



MORE INFO



<http://www.smartflex-solarfacades.eu/home.html>

THANK YOU