

Photovoltaics in urban area: energy for smart cities

Background: Long history and experience in PV



SUPSI PVlab: only ISO 17025 accredited test laboratory in Switzerland

Challenges to overcome barriers for the use of PV in buildings and urban areas

- ❑ To Create new building components for a truly integration of PV in the building (projects with start-up companies)
 - ❑ New regulatory request, standards and testing procedures
- ❑ To explore new technologies for PV modules for aesthetic effects
- ❑ To develop new tools and to introduce technological features
- ❑ To convince the architects and investors of the aesthetic
 - ❑ Tools and best practice and dissemination
- ❑ Bring BiPV to the urban scale

Demonstration of BIPV module for the opaque part of the envelop in a European Project



Outdoor testing for new BiPV elements

- Energy yield measurements a STC
- Rooftop integrated elements with rain testing
- PV-Modules with integrated building insulation
- Test stand for BiPV façades



Mechanical tests on new products

- Mechanical load test under STC
- and beyond
- Testing of complete mounting structures (roof and façade) to detect problems with fixing and limits of the structure
- Hail test up to 60mm



European Project – Construct PV

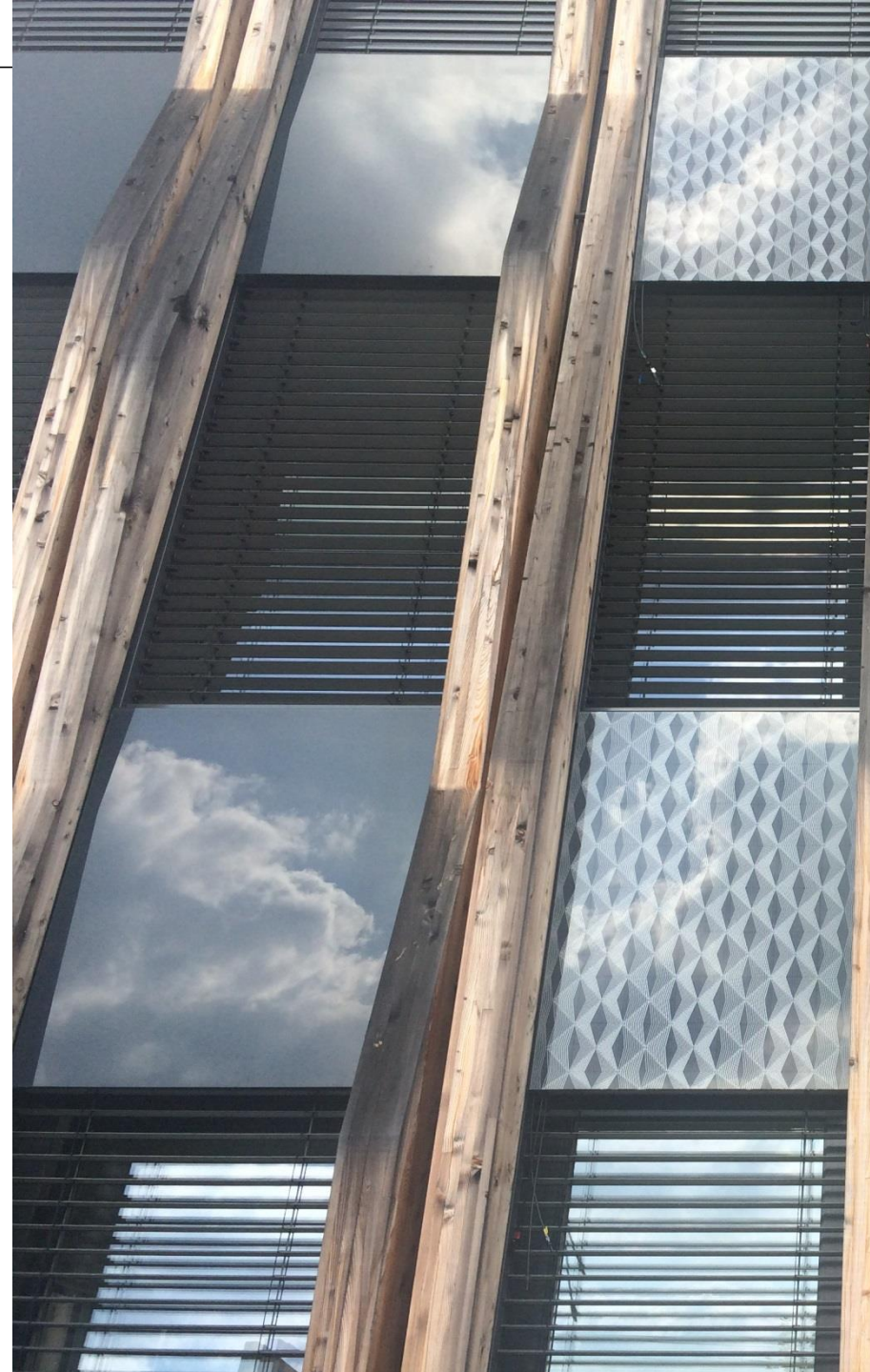
Development and demonstration of standardized building components

- *Collaborative project* (large consortium, different stakeholders)
- *Demonstration project (TRL 7)*

Duration: 2011 (Proposal + Kick-off)
February 2013 – February 2017
Estimated project budget: 12Mio. €.

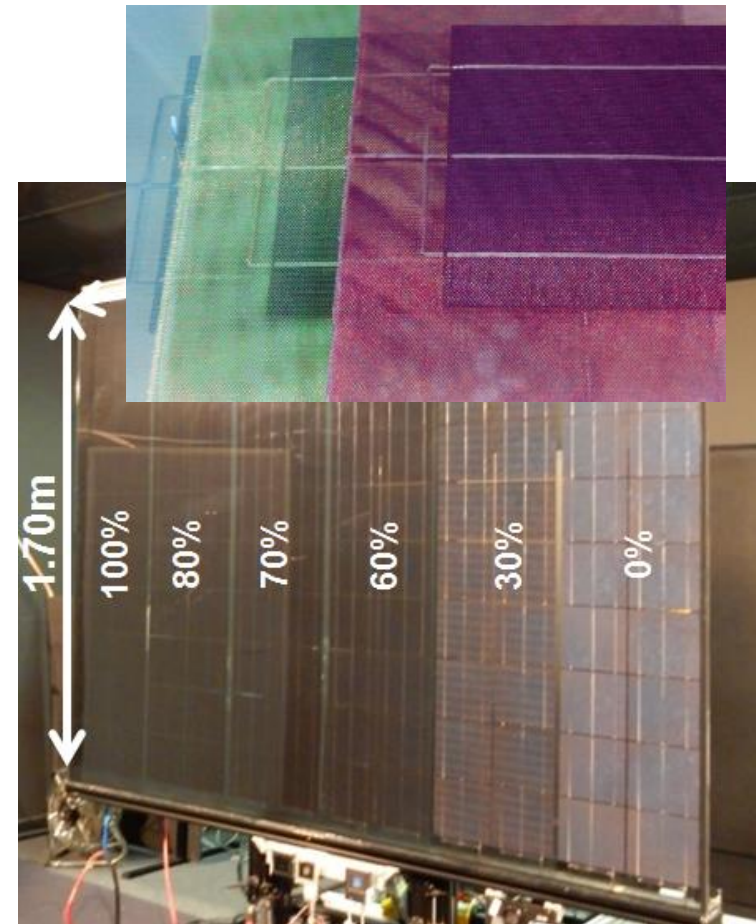


Integration in the rooftop and façade



European project SmartFlex

- SMART-FLeX provides custom made solution for façade integration (digital printed flexible components)
- Investigations (outdoor/indoor):
 - Aesthetics vs energy
 - Color and Printing degree
 - Color mismatching

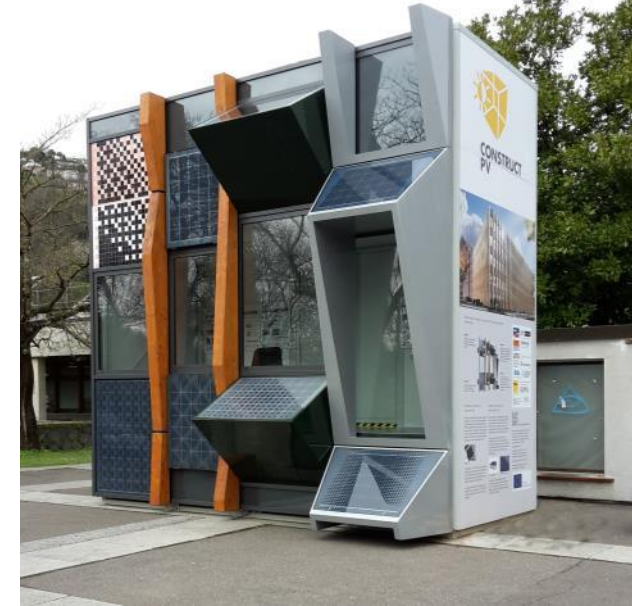


SmartFlex: SMART Façade (PV plus aesthetics)





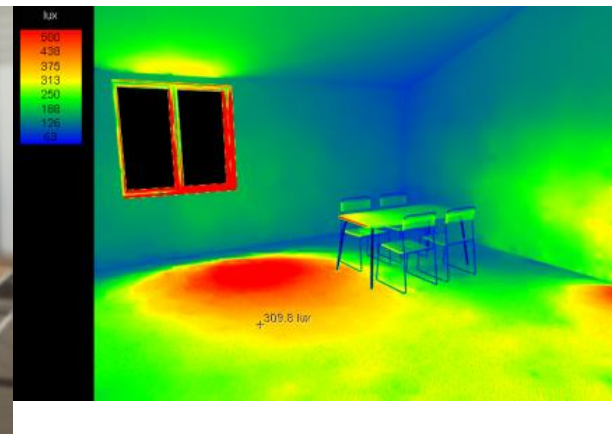
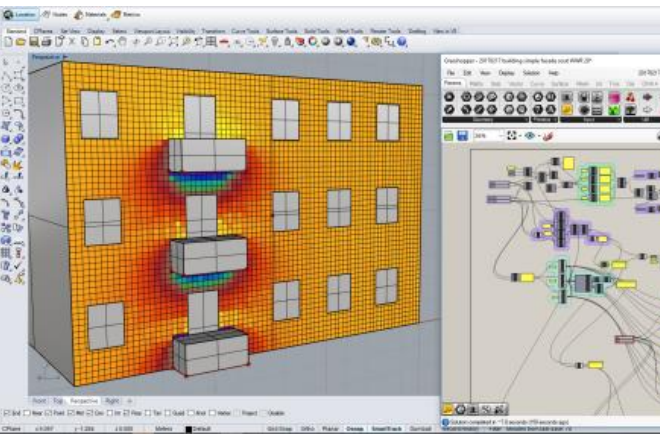
Mock-up with different solutions for the façade



Digital Tools and simulation

- Digital representation and simulation:
- Computational design
- Energy and lighting Simulation
- Optimization tools for planning and installation

- Visualization (VR and Rendering)
- Validation and user perception

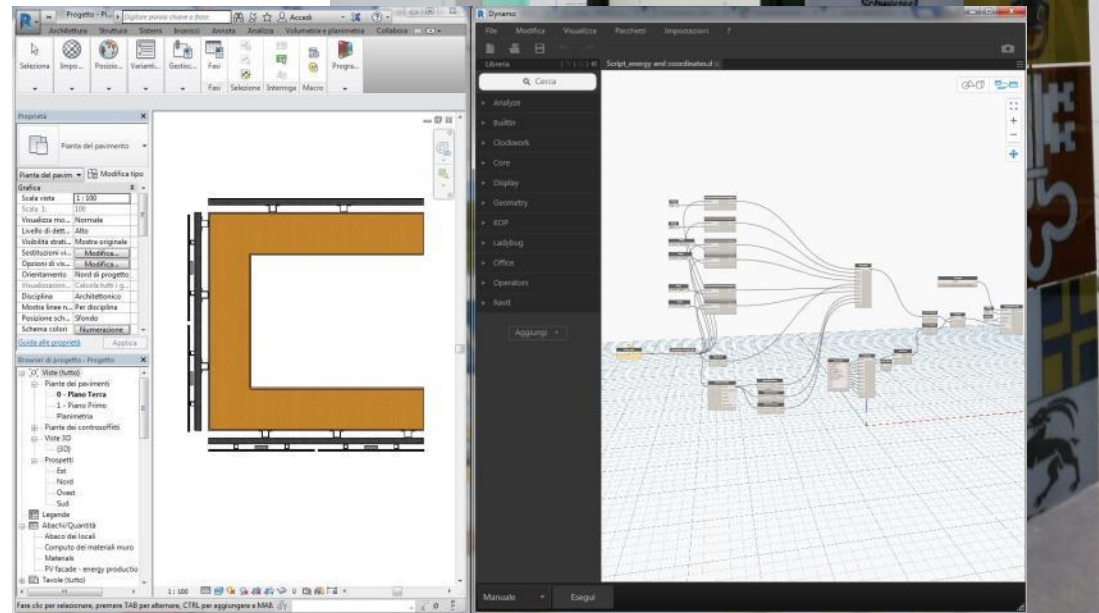
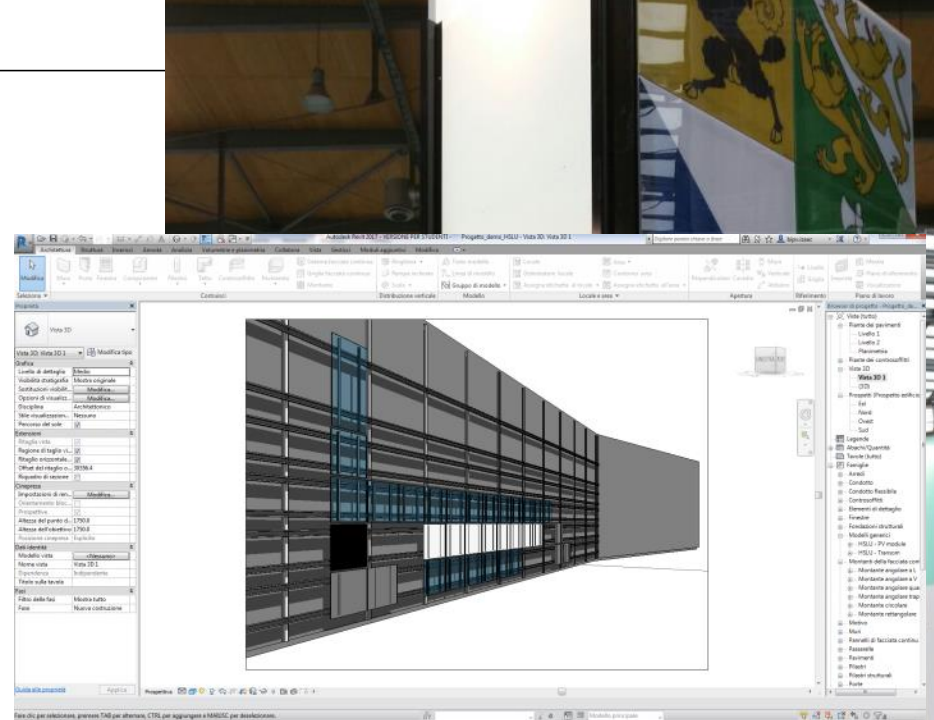


BIM and BIPV

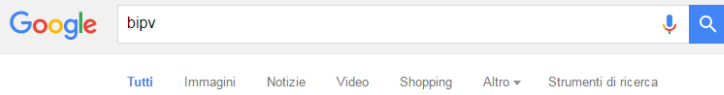
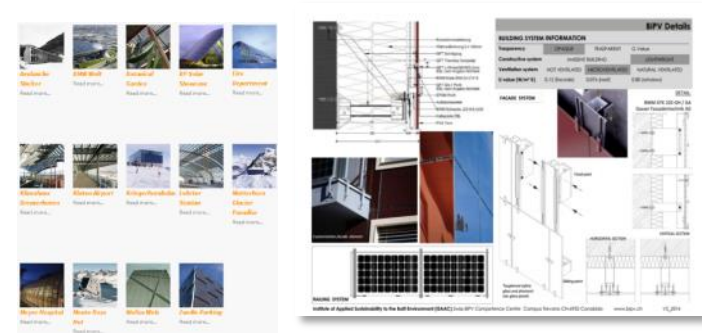
Digitalization, Information Modeling and Information Management (IM) of a BIPV façade for:

- design
- quantity take off
- early energy analysis
- LCA

BIM libraries
BIM-based tools



BIPV...our communication and dissemination platform for the Swiss Federal office of Energy



Circa 472.000 risultati (0,40 secondi)

BIPV
www.bipv.ch/index.php/it/ ▼
Il Centro svizzero di competenza BiPV è stato creato in seno all'Istituto di Sostenibilità applicata all'Ambiente costruito (ISAAC) nel 2005. Il suo scopo è di ...

www.bipv.ch

Immagini relative a bipv

Segnala immagini non appropriate



Altre immagini per bipv

Fotovoltaico architettonicamente integrato - Wikipedia

https://it.wikipedia.org/wiki/Fotovoltaico_architettonicamente_integrato ▼
FAI è l'acronimo di fotovoltaico architettonicamente integrato, corrispondente in lingua italiana all'acronimo inglese BIPV che significa Building Integrated Photo ...

Building-integrated photovoltaics - Wikipedia, the free encyclopedia

https://en.wikipedia.org/wiki/Building-integrated_photovoltaics ▼ Traduci questa pagina
Building-integrated photovoltaics (BIPV) are photovoltaic materials that are used to replace conventional building materials in parts of the building envelope ...

Onyx Solar® - Integrazione Fotovoltaica Per L' Edificio (BIPV ...

www.onyxsolar.com/it/ ▼
In collaborazione con Enel Green Power, Onyx Solar® offre al mercato italiano le sue innovatrici soluzioni per integrazione fotovoltaica (BIPV). ENEL, il maggior ...

BIPV - Building Integrated Photovoltaics Guide - PolySolar

www.polsolar.co.uk/BIPV...building-integrated-photovoltaics... ▼ Traduci questa pagina
BIPV - Building-integrated photovoltaics. The photovoltaic panel is integrated into the building fabric rather than a 'tack-on' addition replacing conventional ...

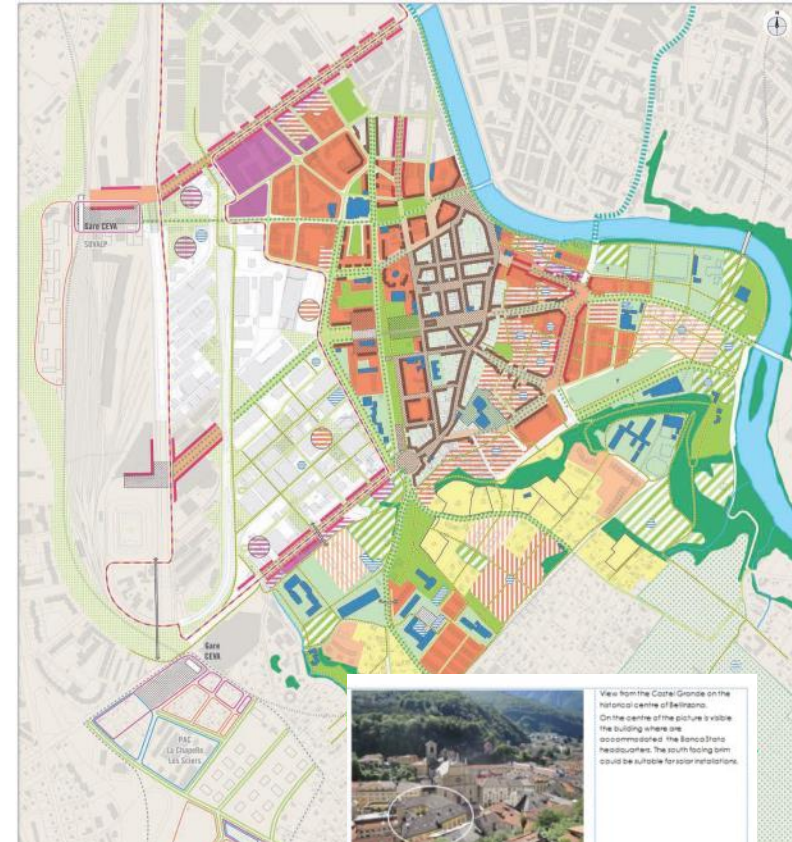
Building Integrated Photovoltaics (BIPV) | Whole Building Design Guide

<https://www.wbdg.org/resources/bipv.php> ▼ Traduci questa pagina
di S Strong - Citato da 20 - Articoli correlati
27 dic 2011 - A Building Integrated Photovoltaics (BIPV) system consists of integrating photovoltaics



BIPV at urban scale and in sensitive areas

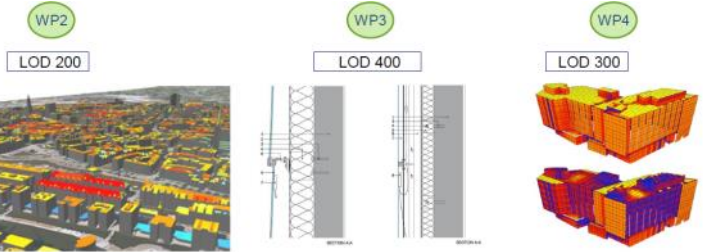
- Global solar planning in the city of solaire Carouge -Geneva (HEPIA + SUPSI)
- b-FAST: Analysis of solar façades potential in Ticino (FER)



View from the Costa Gronda on the historical centre of Bellinzona. On the centre of the picture is visible the building where one accommodated the Banca Ticina headquarters. The roof facing area could be suitable for solar installations.

View from the Costa Gronda on the area surrounding the historical centre. In the vicinity of the historical centre are located several administrative buildings with a flat roof or coverage tile.

Terraced view of the Colagrosso Square. This is the central point of the historical centre of Bellinzona. The building surrounding the square are more or less of the same height, between 10 and 12 meters. Considering this view to each other remain of the buildings, facades are the most suitable surface where to install solar technology, moreover their historical and architectural features should be protected to the detriment of renewable energy production.



		Installed element		Output					
				Façade		Roof		Other	
OUTPUT				New	Retrofit	New	Retrofit	New	Retrofit
				AIR	Air heating & ventilation	Active			
Passive									
Space heating	Active								
Combined air and water heating	Active								
	Passive								
	Water heating	Active							
WATER	Passive								
	Cooling & ventilation	Active							
	Passive								
ELECTRICITY	PVT	Active							
		Passive							

Conclusions

- ❑ PV and in particular BiPV has a high potential for urban areas
- ❑ PV technologies for the building integration are still a strange planet for many architects and a lot of conviction has to be done
- ❑ New tools and simulation instruments are capable to integrate PV in an early planning stage
- ❑ Space for a lot of innovation and research

