

Opportunities for PV in buildings

Results from the PV Catapult project

March 16th 2005

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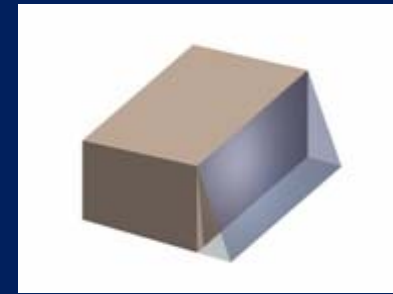
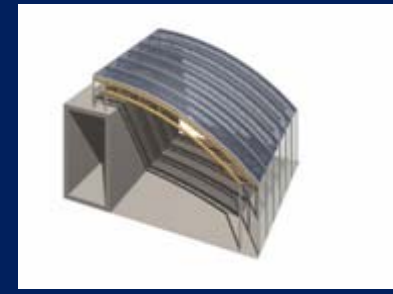
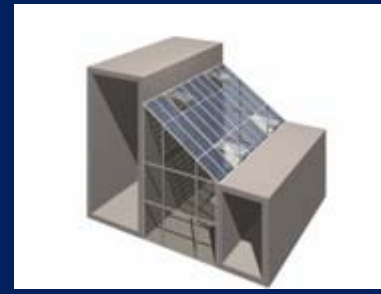
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Building integrated PV (BIPV)

Introduction BIPV







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アムステルダムに6000家以上のソーラータウンがありました。自然の力、毎日使うエネルギーに不可欠、この考え方で開発した先駆的なソーラータウンがオランダにあります。自然の力を最大限に活用している人々が住んでいるのは、オランダのハイテク都市アムステルダムです。自然の力を最大限に活用して、エネルギー、ムラに電力、アムステルダム、オランダにも、素晴らしい人にもやさしい社会を

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Why BIPV?

- Building stock 40-45 % of European energy use
- Increase in electrical energy use expected (electrical appliances)
- Climate change issue asks for reduction of greenhouse gas emissions
- Targets for renewable energy set by EU

Why BIPV?

..... and a large area of km² roofs and façades available throughout Europe that can produce electricity (or heat)



Renewable energy system should be an integral functional part of the building



BIPV

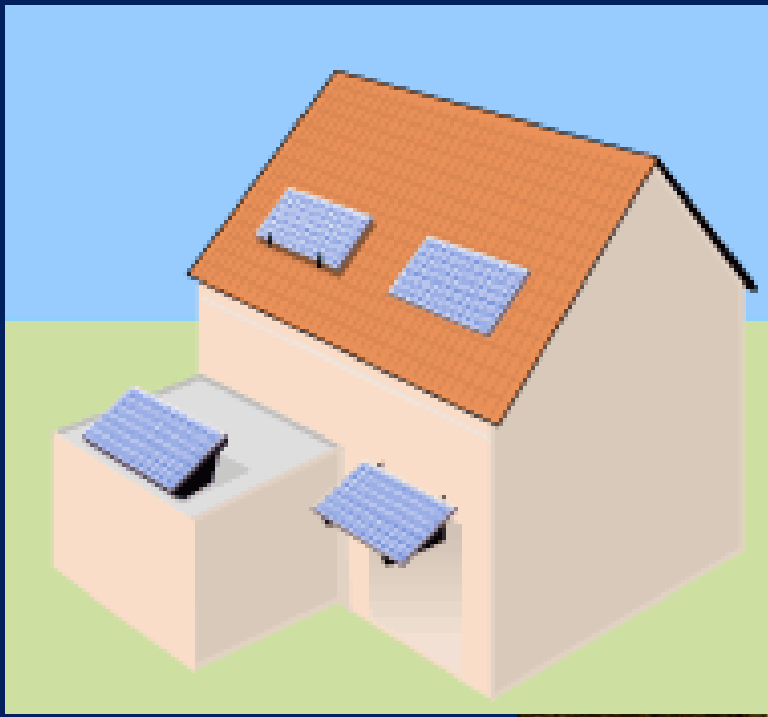
Why BIPV?

- Function in building envelope : (Potentially) low Balance of System (BOS) costs
- (In principle) best use of existing mounting and grid infrastructure
- Integration with Home Energy System
- (Without subsidy influence) best value of electricity is at the point of use

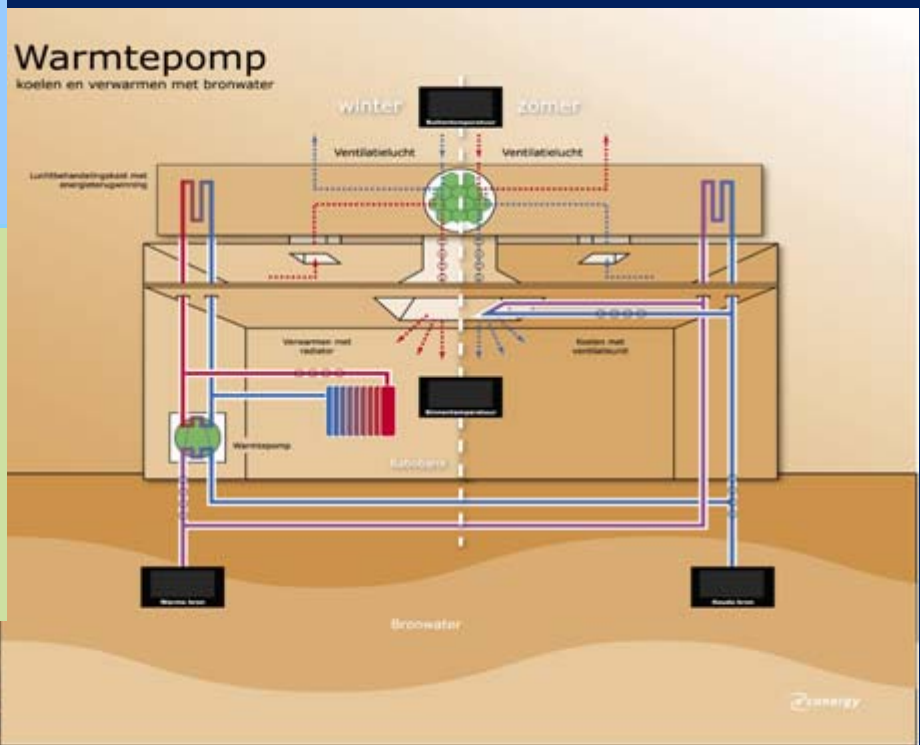
Building of tomorrow

- High level of comfort (cooling)
- Decentralized infrastructure /energy storage /load management
- Flexible (use of) buildings
- Net energy producers

Integration with energy design



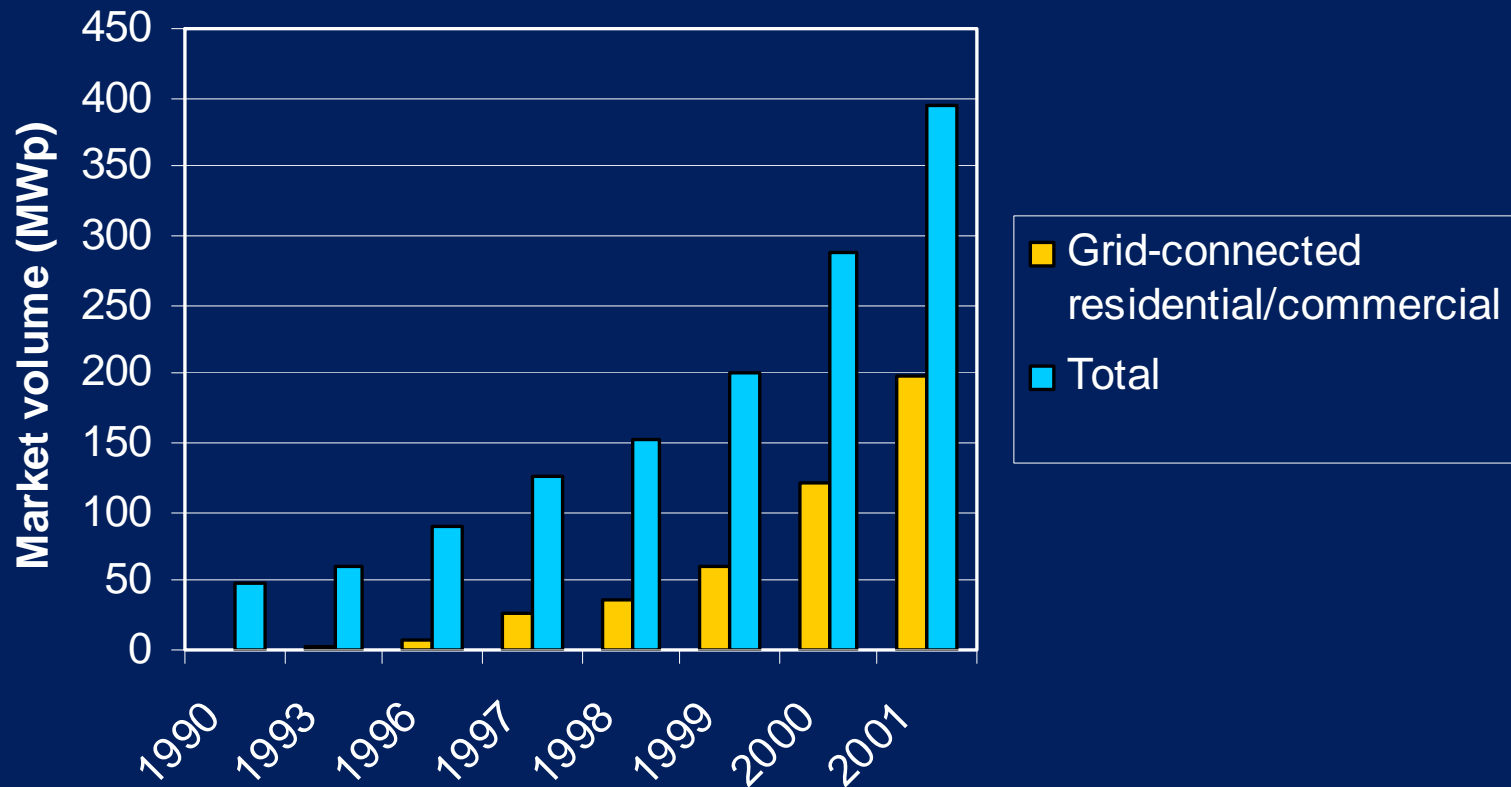
Oppervlakte:	ca. 1800 m ²
Energiebesparing:	ca. 72.000 kWh/jaar
CO ₂ reductie:	ca. 285.000 kg/jaar
<small>Rekening is gemaakt voor het energiegebruik van ca. 10 bewoners.</small>	
Opdrachtnummer:	30.11.2001



What are important developments in the current market?

- Addressing consumer (end-user) market
- Improve 'energy system product'
 - price
 - looks, aesthetics
 - quality, guarantee of yield
 - maintenance
 - gain confidence
- Increase scale

BIPV market growth



How to use these potential strengths?

- Improving BIPV products:
 - Economy
 - Looks (aesthetically pleasing)
- Improving 'regulatory framework'
- Improving positioning of BIPV:
 - energy production vs energy saving
 - acceptance by a wider public

PV Catapult project

- Coordination Action, start December 2003 – Jan. 2006
- More than 70 partners from EU industry, research community and other stakeholders of PV sector
- To coordinate specific activities in the field of photovoltaics
- Supported by 6th Framework Program of EC

Working area's PV Catapult

11 working area's (work packages):

- SWOT analysis
- Crystallising the fruits of RTD
- **Engaging the construction Industry in PV**
- Socio-economic and financial issues
- Enlarged EU market
- Emerging economies and economies in developing countries

Engaging the construction Industry in PV

Main objective:

A Roadmap for BIPV

Roadmap for BIPV

- Describes present and future market
- Defines the gap between these two
- Gives recommendations how to bridge the gap
 - Strategy
 - R&D targets
 - Action plan

Opportunities in Europe for PV in buildings

Some statistical data:

- Population (2004): 380 million EU15 / 455 million EU 25
- Residential buildings 208 million (EU25)
- Newly built: 1.8 million (EU15; 2002)

Construction industry in Europe

- Construction investment 910 billion € (EU15-2003)
 - Activities :
 - House building 24%
 - Non residential 31%
 - Civil engineering 20%
 - Rehabilitation and maintenance 25%
 - 9.8% of Gross Domestic Product (GDP) (EU15)
 - 28.5% of industrial employment ; 7.1 % of Europe's workforce
- Source: FIEC (European Construction Industry Federation)

Market development (1/3)

Present PV market:

- Growth 30% over recent years
- Cumulative installed PV power : 1.8 GWp (2003)
- Grid connected 1.4 GWp (2003)
- Area : 1 kWp approx. 9 m² thus 1.4 GWp 12.6 km²

- Market sectors BIPV
 - Residential (90%) and non-residential (10%)

Market development (2/3)

Future market:

- 3 main market segments
 - Architectural commissions (niche)
 - Residential buildings (bulk market)
 - Non residential (offices, hotels, hospitals, industrial buildings, schools)
- Residential:
 - Newly built and (retrofit of) existing buildings

Market development (3/3)

- For main residential market new concepts and new products are necessary

Outlook

	PV (GWp)	BIPV	km2	breakthrough
2010	3	2.25	24	Module as standard building product
2020	41	21	123	New generation of building products based on new materials
2030	500	250	1500	

Cost reductions

- Present costs € 5 /Wp
 - Modules € 3 /Wp
 - BOS 40-60% of the costs

- Cost reduction to € 2 - 2.5 /Wp in 2020
 - Modules approx. € 1 /Wp
 - BOS € 1-1.5 /Wp

Directions

Requirements for BIPV developments are:

- The building product itself is proven and accepted and has a reasonable market share
- The BIPV product needs to be prefabricated to a large extent – no electrical installation works must be done on the outside during placement
- The BIPV product should be able to be placed in the regular building process, by non-PV experts
- Solutions need to be sought both for new and existing buildings

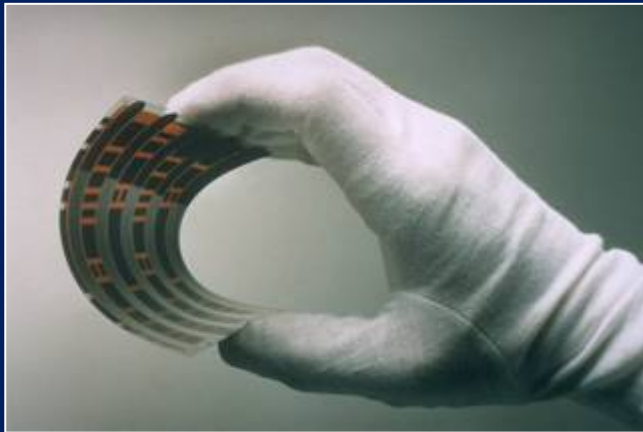
Directions

Integrating PV with other building elements:

- Steel or aluminium – all foil based
- Trespa or Rockpanel or materials that are alike
- Concrete
- Tiles or shingles
- Bituminous/PVC material

Products for building integration

BIPV products (1/3)



BIPV products (2/3)



BIPV products (3/3)

- Kalzip® AluPlusSolar



Example of new product development

Development of a prefab roof element for industrial buildings:

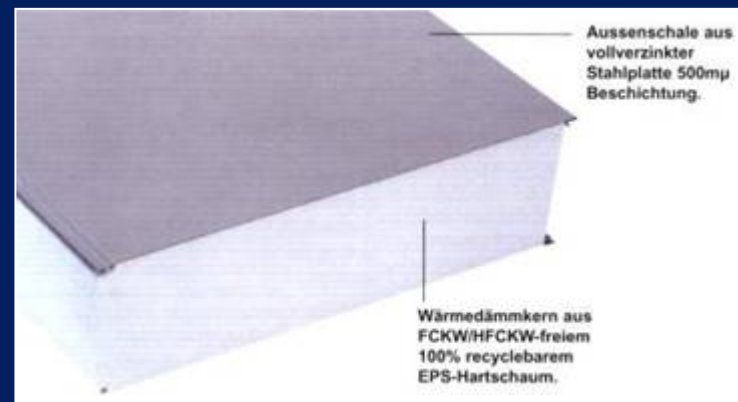
Step 1: Existing building element

Step 2: Product (re)design

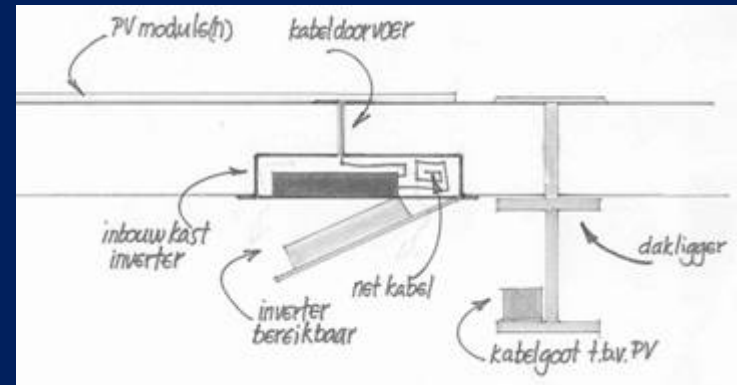
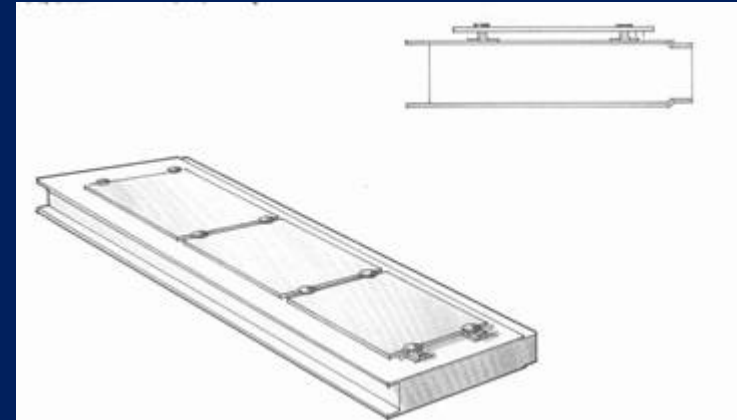
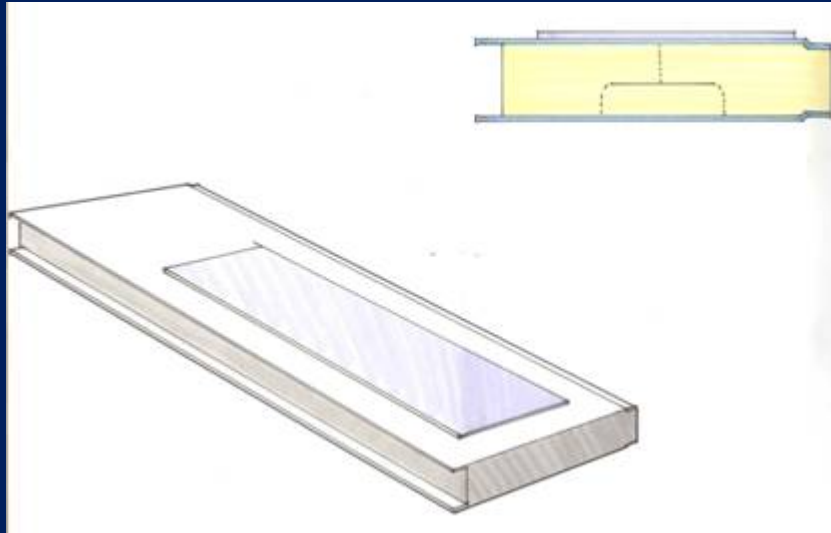
Step 3: Final product with PV

Present situation

- Industrial building



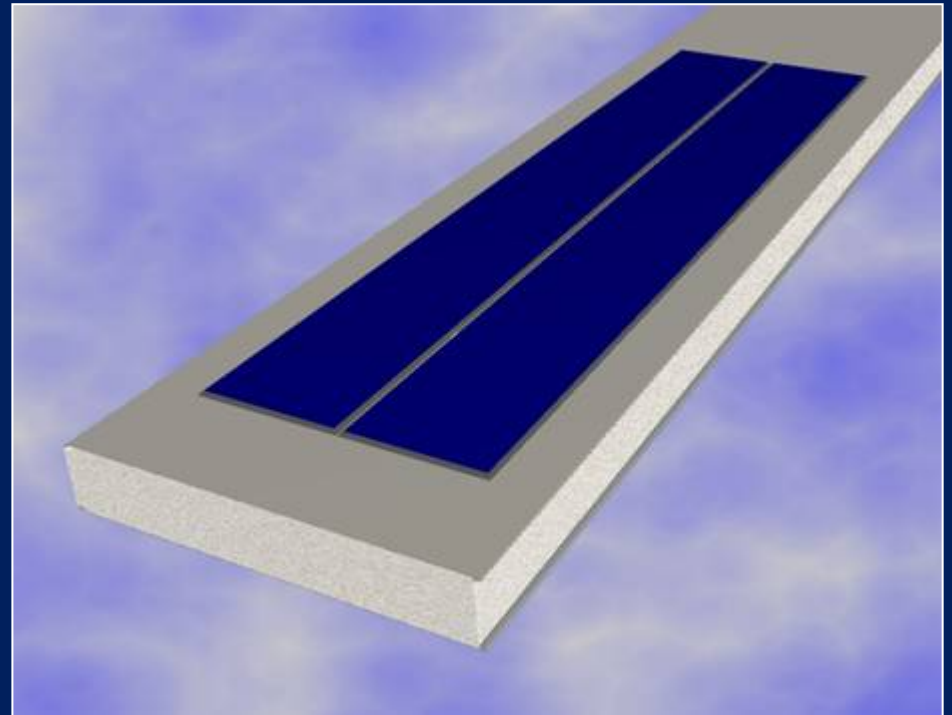
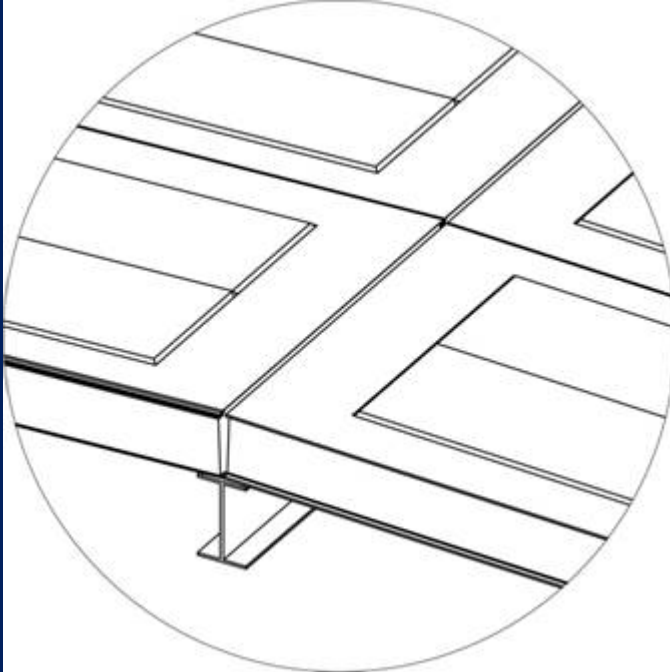
Product design (1/2)



Product design (2/2)



Final product



Summary

Workshop

- 13th of May 2005 – PV CAtapult Workshop :
WP4 Engaging the construction industry in PV

Integrating solar in the built environment
Developing a Roadmap for BIPV

- Venue: ADEME, Sophia Antipolis, France

Acknowledgements