One year of independent BIPV consultancy
Experiences, examples and lessons learned

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Outline

• Introduction
• The consulting agency for BIPV – BAIP
• Case studies
• Lessons learned
Introduction

Need & Potential

![Market Potential of BIPV in Europe](chart)

- **Green Deal / 2010/31/EU**
  - Efficient PV technologies
  - Market potential
- Well established (lazy) construction market
- Market share

Reality

“Photovoltaics only has a future, if it can be integrated harmoniously into architecture”

Charles Fritts, 1880
(Inventor of the first solar module)
Challenges for PV industry

- Customized solutions (size, shape, transparency, colours...)
- Easy to plan and cost-effective standard elements
- Integration into new façade elements
  ➔ Combination of construction materials & electricity generating elements
- Application-related properties (Resilience against temporary (local) shading)
- Legal aspects (materials, glare, safety, ...)
- Certification and testing
- Partnerships required with construction companies
  (module manufacturer usually not a direct contractor on-site)
Challenges for architects

- Gathering information about possibilities in design, technical solutions and boundary conditions
- Use of further education and qualifications
- Reduction of reservations
- Going into intercommunication with module manufactures
- Accepting changes in common planning process (work flow, content, cost structure...)
- Recognizing chances and responsibilities and acting
Common process flow of planning and execution

Service phases according to HOAI (Fee structure for architects and engineers)
Bridging the gap

Builder-owners
Architects
Investors
Planners

- Experienced team of PV scientists, architects and experts in knowledge transfer and communication
- Imbedded in the HZB science infrastructure, funded by HELMHOLTZ
- Strong partners like chambers of architects, BIPV alliance, university, sustainability council and research
We provide...

• **free consultancy** for the initial stakeholders of construction and renovation projects

• Individual consulting → **independent, product-neutral, free-of-cost**

• Development and organisation of **workshops and lectures** for the target group (e.g. together with chambers of architects)

• **Dialogue** between research and manufacturing AND architects and end users (round tables)

• Collaboration with universities → **educating and teaching**

We aim...

• **inspiring and supporting the stakeholders of construction and renovation, to consider BIPV (or at least PV) in der projects.**
Individual consultancy

- Builder owner (private/public/industry/...)
- Representatives of owner communities
- Architects in specific projects (e.g. requested by builder owner)
- Architects in preparation of competitions
- Berlin Senate Chancellery – construction departments of public properties

- Renovation / construction / development of sub-districts
- Technology / design / legal aspects / fire protection/ yield estimations / ...
Training courses and workshops

- Individual events for architect’s and planner’s offices
- Workshops and trainings jointly organized with chambers of architects* and the German Sustainability Council
- Collaborations with “Solarzentrum Berlin” experts in general aspects of PV, energy law, models of operation, ...
- Strong interest (architects, planners, administration...)  
- (Covid19 restrictions: some events postponed and/or changed into online courses)

* Credit points for members
Case study 1

Heightening of residential building

Owner: private
Architects: Mensing Timofticiuc Architekten
status: planning phase (SP3)

Story-addition on existing multifamily house. “Conflict” between Owner (yield!) and architect (design!) about integration

Project: Solutions for well-integrated, high-yield PV

Motivation:
Story-addition (increased living space)
Building owner demands holistic energy concept incl. PV, storage and green roof

Findings:
• Fundamental aspects of PV unknown (although experienced architect)
• Owner had contacted module manufactures → advice towards non-integrated standard modules
• Architect had already pre-selected black c-Si modules
• Architect very open for advices, suggestions

Pictures in courtesy by Anca Timofticiuc.
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Our service:
• Design opportunities
• PV system simulation (range/size, yield, location)
• Conveying to “Solarzentrum Berlin” for legal aspects of being an energy producer

First conclusions:
• Design (invisibility) important -->
• Support from PV industry “misleading” (no customer-orientation)
• Finally, system size determined (< 10 kWp) by to regulatory aspects (EEG levy)
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BIPV solution will be realized!

Pictures in courtesy by Anca Timofticiuc.
Case study 2

Public buildings in Berlin

Owner: City of Berlin
Architects: various / sometimes departments of construction
status: SP0 .. SP3

Politics and high-level administration put pressure on their own construction departments ➔ evaluation of PV implementation

Projects: Renovations and new constructions
Schools, university buildings, hospitals, ...

Motivation:
nZEB directive (2010/31 EU)
Climate change / social pressure / Fridays for future / conviction

Findings:
• Individual decision makers are key persons
• Different stakeholders need to be convinced
• Reservations have to be reduced
• Local benefit often not existing
• Operator’s models are needed
• Green roof conflicts

First conclusions:
Communication with people in charge important
Also politicians need to be enlightened

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Case study 3

Zentrum für Photonik und Optische Technologien

Owner: Wista Management GmbH
Architects: Sauerbruch Hutton
Constructed: 1998

Very high demand for design (colours)
Complete glass façade
Coloured blinds indoor, coloured design inside

Project: Replacement of blinds / Evaluation of PV active, coloured blinds

Motivation:
Use of PV / demonstration / positive impact
Replacement of broken blinds
Individual energy supply for each blind (avoidance of wiring)

Findings:
• Design opportunities (colours, PV-blinds, transparency...) unknown

First conclusions:
Existing concepts do not fulfil (complex) colour requirements
BIPV real lab

Project: BIPV real lab – coloured CIGS façade as ventilated curtain wall

Motivation:
Advanced analysis of façade-integrated CIGS solar modules as complete PV system under real conditions

- Measurement of yield, temperatures, ventilation with respect to specific location inside façade (N, S, W) and ventilation/isolation conditions

Findings (so far):
- Steep learning curve on the entire chain of realizing a building with a PV façade

First conclusions:
- “If there is a will, there will be a way”
- General building approval for used modules/building elements is quite helpful.
- ...
Summary / lessons learned

• There is a need for a serious, independent free BIPV consultancy.
• There are architects and planners, willing to learn and to work with (B)PV.
• Design, technologies and legal aspects of BIPV are all quite relevant topics.
• Fire protection is a point of discussion in about 50% of concretely discussed BIPV projects.*
• Political and administrative decision makers are key persons.
• Roof top installations are still often preferred (costs/yield optimization).
• Good operator’s models are strongly required.
• The earlier PV is considered in the planning phase, the lower additional cost, the saver the time plan and the higher the probability of success.

* The Alliance BIPV (in cooperation with BAIP) will publish a guideline for fire protection soon.
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