Strategies to increase the deployment of PV in façades

Christian Renken
Managing Director

CR Energie Sarl,
1868 Collombey, Switzerland
info@crenergie.ch
Strategies to increase the deployment of PV in façades

Service office for renewable energies and energy efficiency

Competences:

• PV in Façades and Architecture
  Design engineering, Execution planning, Normative examination

• Self-consumption of PV energy
  Engineering and Realization of Islanding PV installations

• Expert reports
  Technical assessments, Cost calculations and Damage analyses
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Technical aspects to create PV façades

- Limited roof surface on apartment and office buildings
- Regulations of roof greening in cities
- Minimization of negative grid influences by reduction of peak energy

Source: Internet
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Direct use of solar energy

- Self-consumption up to 80% without storage system
- Reduction of energy costs by self consumption: 23 – 25 cent / kWh
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PV in façades - aesthetic verses performance

Architectural requirements

• Flexible
• Individual
• Combinable
• Competitive

Source: ©csem-viteos_2015
## Strategies to increase the deployment of PV in façades

### PV panels a competitive cladding material

<table>
<thead>
<tr>
<th>Example</th>
<th>Cladding materials</th>
<th>Price per m² [CHF]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>wood</td>
<td>220.-</td>
</tr>
<tr>
<td>2</td>
<td>fibre cement</td>
<td>310.-</td>
</tr>
<tr>
<td>3</td>
<td>natural stone</td>
<td>360.-</td>
</tr>
<tr>
<td>4</td>
<td>coloured glass</td>
<td>145.-</td>
</tr>
<tr>
<td>5</td>
<td>aluminium</td>
<td>130.-</td>
</tr>
<tr>
<td>6</td>
<td>acryl glass</td>
<td>155.-</td>
</tr>
<tr>
<td>7</td>
<td>PV panel crystalline - glass/backsheet</td>
<td>200.-</td>
</tr>
<tr>
<td>8</td>
<td>PV panel crystalline - glass/glass translucent</td>
<td>500.-</td>
</tr>
<tr>
<td>9</td>
<td>thin film PV panel - fixed dimensions</td>
<td>80.-</td>
</tr>
</tbody>
</table>

Price indication of cladding materials
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Added value of PV in façades

<table>
<thead>
<tr>
<th>Simulated energy balance</th>
<th>kWh</th>
<th>%</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual energy consumption</td>
<td>86'000</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Energy yield PV façade</td>
<td>42'340</td>
<td>49%</td>
<td>average 350 kWp/kWp/a</td>
</tr>
<tr>
<td>Solar coverage of total energy consumption</td>
<td>31'600</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Self-consumption of PV</td>
<td></td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>Energy feed-in to the grid</td>
<td>10'740</td>
<td>25%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profitability</th>
<th>Energy rate</th>
<th>Periode</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy costs by the energy provider</td>
<td>0.2485</td>
<td>21'371.00</td>
<td>30</td>
</tr>
<tr>
<td>Reduction of energy costs by self consumption of PV energy</td>
<td>0.2485</td>
<td>7'852.60</td>
<td></td>
</tr>
<tr>
<td>Feed-in tariff</td>
<td>0.08</td>
<td>859.20</td>
<td></td>
</tr>
<tr>
<td>Cost reduction</td>
<td>8'711.80</td>
<td>30</td>
<td>261'354.00</td>
</tr>
<tr>
<td>Final energy costs of the energy provider</td>
<td>12'659.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital investment of PV façade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on capital</td>
<td>1.70%</td>
<td></td>
<td>261'354.00</td>
</tr>
</tbody>
</table>

Preliminary study of two apartment building with totally 120 kWp PV on all façades
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Realization process with different stakeholders

Architect

Technical Information

Consulting Service

Constructing Engineer

Mounting

Building Owner

Technical Information

Solar Engineer

Installation

Structural Engineer

Statics & Fire Safety
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Planning process of PV in façades

- Photovoltaic should be integrated in the architectural basic design and NOT afterwards
- Reduction of complexity of panel design and dimensions as well as of the construction and connection plates
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Fulfil of technical requirements and standards of façade constructions and electrical installations
Conclusions

• Reaching plus energy standards of real estates by using also the façades for PV
• Increasing of PV self-consumption up to 80% without storage system with a return on capital of 1.5 – 2.0%
• Price rating on the base of costs / m² and not costs / kWp
• Cooperation of architects and engineers starting from the basic design of a project
• Coordination of the stakeholders during the realizations process
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