Storage Incentives or Demand Side Management: is PV on the right track?

28th EUPVSEC | Paris, France
Bryan Ekus | Partner | IBESA
IBESA’s common vision is:
“To promote a path of cooperation and mutual support in achieving proactive solutions between all sectors within Photovoltaic (PV) Power Generation, Battery Storage and the Smart Grid Technology value chain.”
Topics

- The PV industry is searching for new business models for the time after the FiT-driven boom.
- Which business models are possible?
- How is the structure of a PV self-consumption system?
- Why is storage for residential & commercial PV systems an interesting case?
- How profitable is a residential PV storage system?
- Which role play storage incentives for the establishment of PV-self-consumption systems?
New Business Models for PV

Several new business models are in sight...

- Direct marketing of PV current
- Efficiency increasing by monitoring, operation & maintenance
- Power purchasing agreements (PPA)
- PV utility scale storage
- Residential & commercial PV storage systems
- Demand Site Management
New Business Models for PV

...but in this presentation we are concentrating on PV storage solutions.
Structure of a PV Storage System

The integration of a battery system in a PV plant is complex.

- Beginning today, storage solutions are added to existing and new systems.
- Additional hardware and software is required for smooth interaction of the integrated energy system with the grid and appliances.

Demand site management:
- Demand side management of different local consumer units (e.g. dish washer) can be enabled by control unit.
- Time-of-use control units help to higher the share of PV self-consumption by organizing local demand according to PV production.

Source: “Electricity Storage”, EuPD Research 2012
Possible Target Segments

Market segmentation according to the PV business

1. Residential Market
   - Private person investing in solar power
   - Mostly on residential buildings
   - Typical size: 0-10 kWp

2. Small Commercial Market
   - Private or commercial body investing into solar power.
   - Mostly on the small private owned businesses
   - Typical size: 10-50 kWp

3. Commercial Market
   - Commercial body or company integrating a PV (supermarkets)
   - Typically on large industrial facilities
   - Typical size: 50-1,000 kWp
Potential: Residential vs. Commercial

Load shifting with storage device is better applicable to private households.

Decentralized Rooftop Market - Household, Weekdays -
Low correlation with electricity generation
→ Storage is required to shift the load

Decentralized Rooftop Market - Commercial 8-18 o'clock, Weekdays -
High correlation with electricity generation
→ Storage not necessarily required (little potential to shift load)
Potential: Residential vs. Commercial

Load shifting with storage device is better applicable to private households.

Decentralized Rooftop Market - Household, Weekdays -

- Low correlation with electricity generation
  - Storage is required to shift the load

Decentralized Rooftop Market - Commercial 8-18 o'clock, Weekdays -

- High correlation with electricity generation
  - Storage not necessarily required (little potential to shift load)
Household Electricity Prices

Rising private electricity prices (e.g. Germany) make PV storage systems more profitable.
# Possible Target Segments

Thus, the first market for PV storage will be the residential market.

<table>
<thead>
<tr>
<th>Market Potential for Storage Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Residential Market</strong></td>
</tr>
<tr>
<td>- Private person investing in solar power</td>
</tr>
<tr>
<td>- Mostly on residential buildings</td>
</tr>
<tr>
<td>- Typical size: 0-10 kWp</td>
</tr>
<tr>
<td><strong>2 Small Commercial Market</strong></td>
</tr>
<tr>
<td>- Private or commercial body investing into solar power.</td>
</tr>
<tr>
<td>- Mostly on the small private owned businesses</td>
</tr>
<tr>
<td>- Typical size: 10-50 kWp</td>
</tr>
<tr>
<td><strong>3 Commercial Market</strong></td>
</tr>
<tr>
<td>- Commercial body or company integrating a PV (supermarkets)</td>
</tr>
<tr>
<td>- Typically on large industrial facilities</td>
</tr>
<tr>
<td>- Typical size: 50-1,000 kWp</td>
</tr>
</tbody>
</table>
Profitability of PV Storage Systems
The example of the German incentive scheme for battery systems
Profitability of PV Storage Systems

NPV PV System Depending on Battery System Prices

Net present value (NPV)

\[ \text{NPV}(i) = \sum_{t=0}^{N} \frac{R_t}{(1 + i)^t} \]

Source: EuPD Research 2013
Profitability of PV Storage Systems

NPV PV system and battery prices

NPV PV System Depending on Battery System Prices

Source: EuPD Research 2013

Break Even Point

Today

NPV PV System incl. Storage
Profitability of PV Storage Systems

NPV PV system and battery prices

NPV PV System Depending on Battery System Prices

Break Even Point

Storage is the better choice

Source: EuPD Research 2013

NPV PV System incl. Storage

NPV only PV
Profitability of PV Storage Systems

NPV PV system and battery prices – Impact of support scheme

Source: EuPD Research 2013

Storage support scheme
- 660 €/kWh battery capacity
- max. 3,000 €/system
- Budget 25 Mio. €

Profitability of PV Storage Systems
Profitability of PV Storage Systems

NPV PV system and battery prices – Impact of FiT reduction

Source: EuPD Research 2013

NPV PV System Depending on Battery System Prices

Storage support scheme

Today

Storage is the better choice

Break Even Point

NPV lost because of FiT reduction

NPV PV System incl. Storage (13.9 Cent)

NPV only PV (13.9 Cent)

NPV PV System incl. Storage (15.6 Cent)

NPV only PV (15.6 Cent)
Conclusion

- Renewables are highly volatile: This is considered to be their Achilles’ heel. Storage solutions can solve this problem.

- First market for PV storage solutions will be in the small scale residential segment, since load shifting is easier and the rising electricity price pressure makes self-consumption systems with (or without) storage devices profitable.

- Incentives for battery systems can help to reduce the currently high investment costs of PV storage systems and therefore improve the market breakthrough by fostering customer acceptance.

- Battery systems and control units will ease demand side management and higher self-consumption rates.

- PV business models will change from profit driven to energy (and cost) saving.
Europe
Adenauerallee 134
D-53113 Bonn
Phone +49(0)228-97143-0
Fax +49(0)228-97143-11
europe@ibesalliance.org

USA East
P.O. Box 771507
Orlando, Florida 32877
Tel: +1 407 856 9100
Fax: +1 407 856 9500
ekus@ibesalliance.org

USA West
870 Market Street, Suite 1055
San Francisco, CA 94102
welcome@ibesalliance.org

www.IBESAAlliance.org