Megatrend: Large-scale PV for companies 96 systems installed with regional support

Falling prices for photovoltaic (PV) systems and increasing interest in the energy transition have resulted in ever more companies installing PV systems. PV is an important element in decarbonising companies and achieving a fully renewable energy supply.

PV self-consumption systems, where the solar electricity is (almost) entirely consumed on site, are an interesting solution. In 2018-2019, the region of Upper Austria ran the programme "Large PV for Companies", which supported the installation of PV systems in companies with funding, advice and scientific evaluation. The programme was developed on the experience gained from other regional programmes for PV and solar power storage. In total, 96 PV self-consumption systems with an output of 7 MWp were installed and funded with 1.2 million Euro.

The programme at a glance

PV self-consumption systems for companies

- 2018 and 2019
- 96 PV self-consumption systems funded
- installed capacity: 7 MWp
  - up to 10 kWp: 10 systems
  - 10-20 kWp: 25 systems
  - 20-50 kWp: 31 systems
  - 50-100 kWp: 14 systems
  - 100-200 kWp: 10 systems
  - over 200 kWp: 6 systems
- self-consumption rate: 70-100 %
- subsidy: 200 Euro/kWp
- scientific evaluation
- total funding: 1.2 million Euro

Solar battery storage

- 462 solar power storage units funded
  - 55 companies, 407 individuals
- total storage capacity: 5,179 kWh
  - 1,522 kWh in companies, 3,657 kWh for individuals
  - between 5-225 kWh per installation
- funding: approx. 1.8 million Euro

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Why is PV self-consumption particularly interesting for companies?

With a PV system for self-consumption, the electricity generated by the building is used directly on site. Only excess electricity is fed into the grid. Many companies have a high electricity demand, large roof area, and often the possibility to use (nearly) all of the PV electricity themselves. This makes them interesting candidates for such PV installations.

The economic profitability of a PV system can be significantly improved by increasing the self-consumption rate – especially if the system is operated without feed-in tariff subsidies. The correct design and alignment of the PV system are crucial. Demand-based dimensioning means that the size of the PV system matches the company's electricity demand profile. The regional energy agency of Upper Austria (OÖ Energiesparverband) developed a planning tool to help with this aspect.

In addition, there are several ways of increasing a system's self-consumption rate, such as with a smart energy management system, temporal adjustment of consumption loads, heat/cold generation, solar power storage and electromobility.

A rule of thumb for the economic dimensioning of self-consumption systems for companies:

- balanced daily load profile and weekend demand: 10 % solar coverage
- high daily peak and low weekend demand: 5 % solar coverage

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	Reform-Werke	**Hans Arthofer GmbH&Co.KG.**	**Braucommune**
Location	Wels	Hartkirchen	Freistadt
Installed capacity (kWp)	500	160	185
Yield (kWh/year)	490,000	157,600	192,475
Building type	on several buildings	factory hall	production hall

Lessons learnt

Experiences from the regional programme for PV self-consumption systems for companies:

- self-consumption rates of 70-100 % achieved, depending on load profile and system design
- If dimensioned properly, PV self-consumption systems are economically attractive (profitability of 6-7 %) and have good payback periods.
- Solar power storage systems increase the PV self-consumption rate.
- If the price of PV systems continues to decrease, self-consumption systems will be profitable even without subsidies.
- PV installations can also be economically viable with other models than feed-in tariffs.
- Companies learn a lot about their electricity demand profile when considering a self-consumption system.
- steep learning curve in PV system planning through interaction with planners
- Large-scale PV systems for companies became possible and are now widely used in Upper Austria.

Economic aspects of PV systems for self-consumption

The profitability of the PV system is strongly influenced by the following parameters:

- total cost of the system
- current electricity price and assumed development of electricity prices
- interest rate or internal rate of return.

A key aspect of the economic profitability of PV systems is that part of the electricity costs can be calculated for the next ca. 20 years. PV systems are often profitable despite a longer payback time. Profitability depends on the size and the technical and financial framework of the installation.

Example of a 250 kW_p system	
Installed capacity	250 kWp
Subsidy	250 x 200 € = 50,000 €
Investment (excl. subsidies)	750 €/kWp; 187,500 € for the system
Electricity generation	1,100 kWh/kWp and year
Price of purchased electricity	9 Cent/kWh
Profitability	6.7 % (4.2 % without subsidies)
Payback period	12.8 years (16.5 years without subsidies)

Assumptions: maintenance/operating costs: 1 % of the investment, 1 % increase/year; external electricity costs: 1 % increase/year; useful life: 20 years of operation, 20 years of depreciation; 25 % electricity tax above 25,000 kWh/year; interest rate: 2.5 % incremental or average borrowing rate in the company; external financing: 100 %; self-consumption rate: 100 %; degradation rate: 80 % of the original output in the 25th year of operation; regional funding: 200 Euro/kWp, max. 100,000 Euro; profitability according to internal rate of return; payback period according to a dynamic calculation considering interest

Solar self-consumption and solar coverage

- The **solar self-consumption rate** is the proportion of the electricity generated by the PV system that is used on site, including the solar energy storage system.
- The **solar coverage rate** (also called self-sufficiency rate) is the share of a company's electricity demand that is covered by the PV system, including the solar energy storage system.

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