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DER WIRTSCHAFT GmbH

Photovoltaic applications in commerce and industry

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WKO WIRTSCHAFTSKAMMER ÖSTERREICH

Introduction

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- Energy Institute for Business (EIW) was founded in April 2008 as a not-for-profit limited company
- **EIW** acts as a catalyst and platform for activities in the fields of energy and climate protection with a special view to the needs of Austrian businesses
- **EIW** aims at creating an active platform with representatives of the business world, academia and public authorities in order to support (especially small and medium sized) businesses to step up their implementation of climate protection measures.

Introduction (II)

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- By gathering and disseminating information on products, technologies and services to improve energy efficiency, **EIW** raises awareness on economic and ecological advantages of the responsible, efficient use of energy resources.
- The owners of **EIW** are representatives of interest groups in industry and business:
  - the Austrian Federal Economic Chamber • the Federation of Austrian Industries • the Association of the Austrian Electrical and Electronics Industries • the Working Group for Sustainability in Drinks Packaging

Framework for renewable energy

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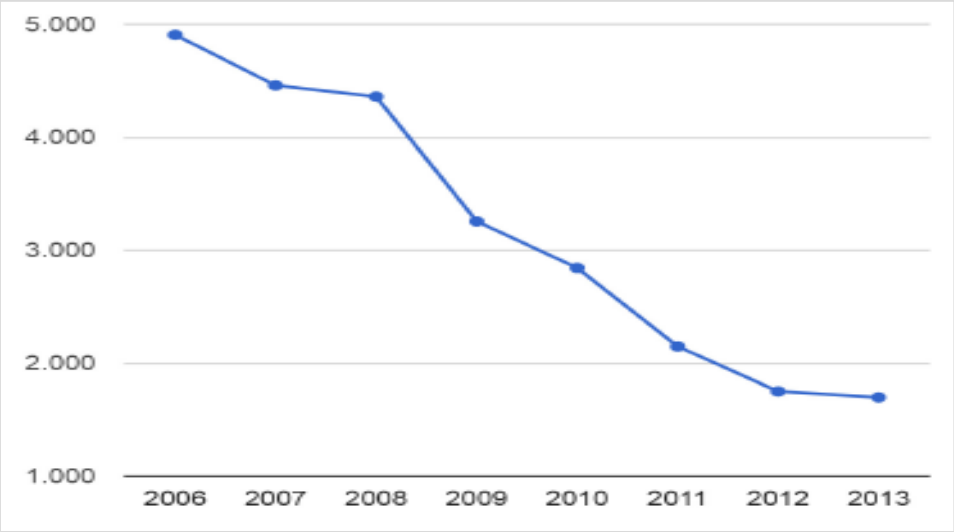
- Energy and climate goals for 2030:
  - 40% cut in greenhouse gas emissions (compared to 1990 levels)
  - To achieve at least a 27% share of renewable energy consumption
  - Energy efficiency to play a vital role, but no specific target at this point
- New Guidelines on State aid to energy from renewable sources:
  - Integration of renewables into internal electricity market
  - Replacement of feed-in tariffs by premiums
  - Phase out of subsidies until 2030

Investment costs

- Support schemes and increasing competition from Asia have lead to sinking prices for solar modules (with solar modules from Germany still about 40 percent above the prices of Chinese products)
- Total costs of investment for PV-installations with a capacity of less than 10 kWp in 2013: between 1.000 and 1.650 €/kWp



Quelle: BSW-Solar, EuPD Research

- Total cost in cents per kilowatt-hour produced in Central Europe today: 8-14 ct/kWh (depreciation over 20 years)

Feed-in tariffs & electricity costs

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- Grid electricity costs of a petrol station in Lower Austria and Carinthia in 2014 (total electricity consumption of 146.467 kWh/a; peak load 30,7 kW):

	Niederösterreich	Kärnten
Arbeitpreis (Euro/kWh)	0,057	0,0728
Netztarif (Euro/kWh bzw. Euro/a)		
Netznutzungsentgelt		
Arbeitspreis	0,0388	0,0569
Leistungspauschale Euro/a	17,28	21
Netzverlustentgelt	0,00311	0,00381
Entgelt für Messleistungen Euro/a	28,8	27,96
Steuern und Abgaben		
Elektrizitätsabgabe	0,015	0,015
Ökostrompauschale Euro/a	11	11
Ökostromförderbeitrag (Arbeit)	0,015	0,015
Verbrauchsabhängige Komponenten (Euro/kWh):	0,1289	0,1635
Summe Fixkosten (Euro/a):	57,60	59,96

- Feed in tariffs in Austria:

	Building-integrated	Ground-mounted	Investment aid
2010/2011	33 – 38 Cent/kWh	25 – 35 Cent/kWh	-------
2012	19,70 Cent/kWh	18,43 Cent/kWh (< 500 kWp)	200 €/kWp
2013	18,12 Cent/kWh	16,59 Cent/kWh (< 500 kWp)	200 €/kWp
2014	12,5 Cent/kWh	10 Cent/kWh (< 500 kWp)	200 €/kWp

Industry-specific load profile

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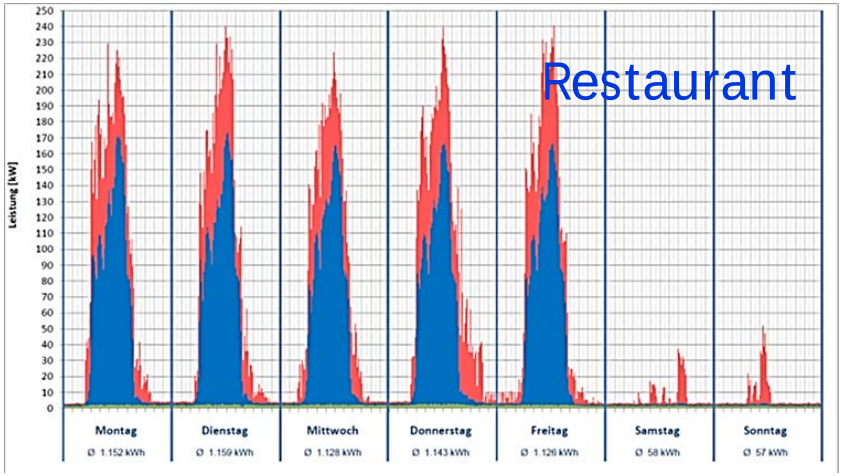

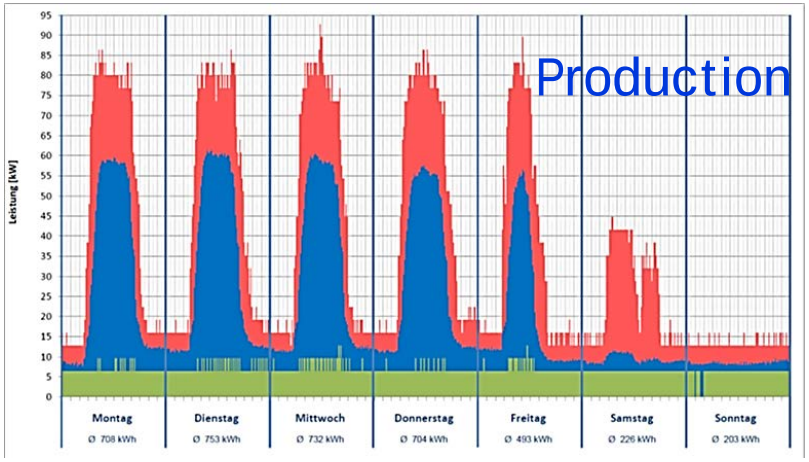

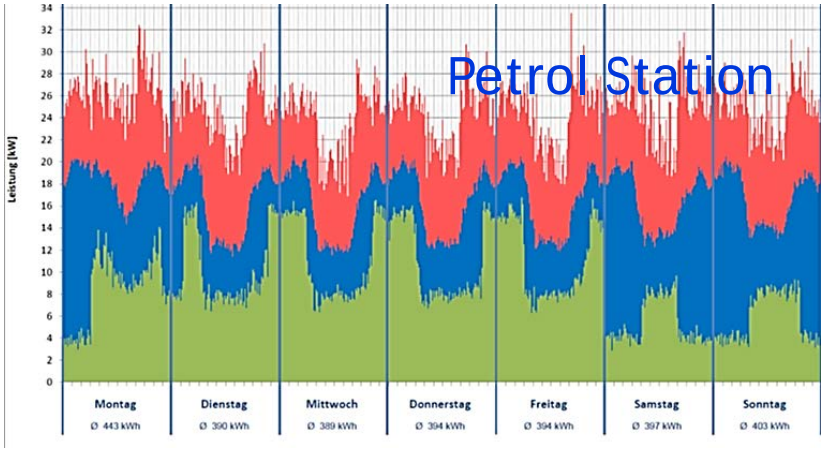

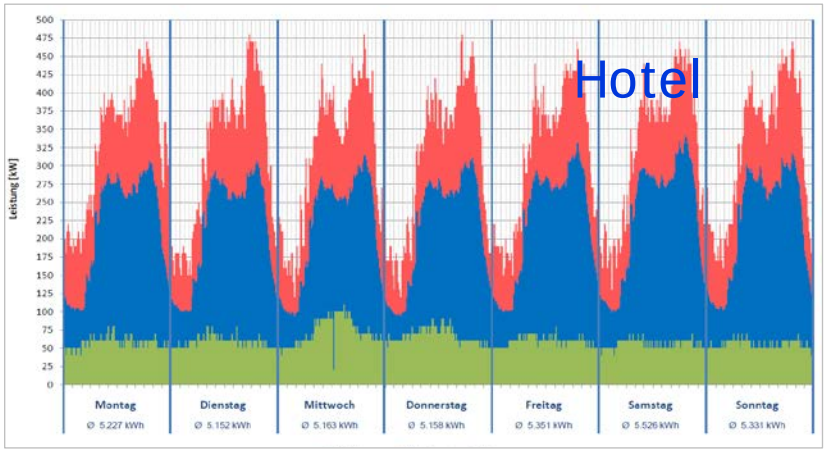

- **Minimum** Median Maximum

Production profiles

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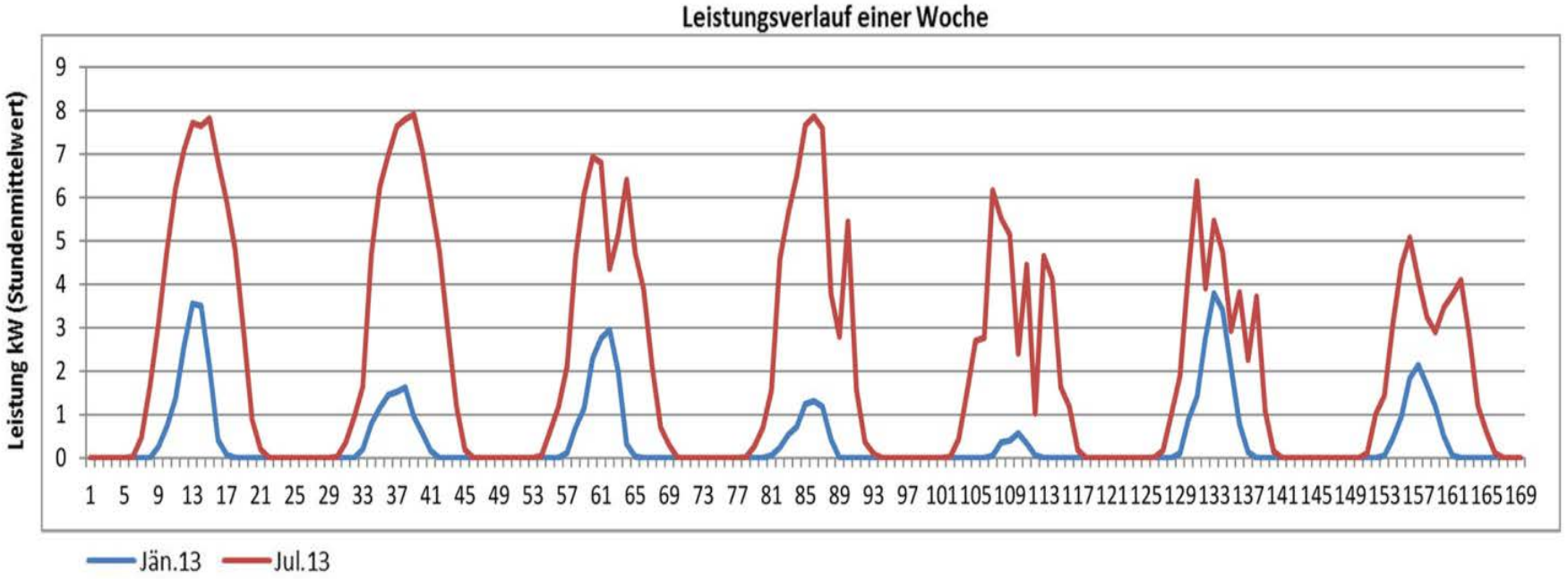
- Electricity generated from a PV-Installation (10 kWp capacity) in Carinthia during the first weeks of January and July 2013:



Quelle: PVI GmbH, Klagenfurt

Focus on self consumption

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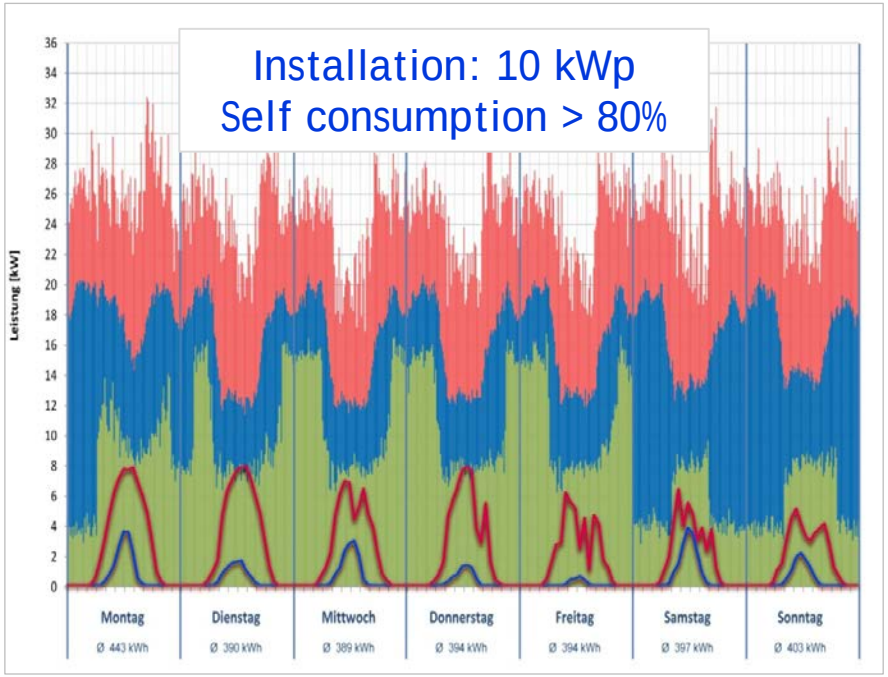
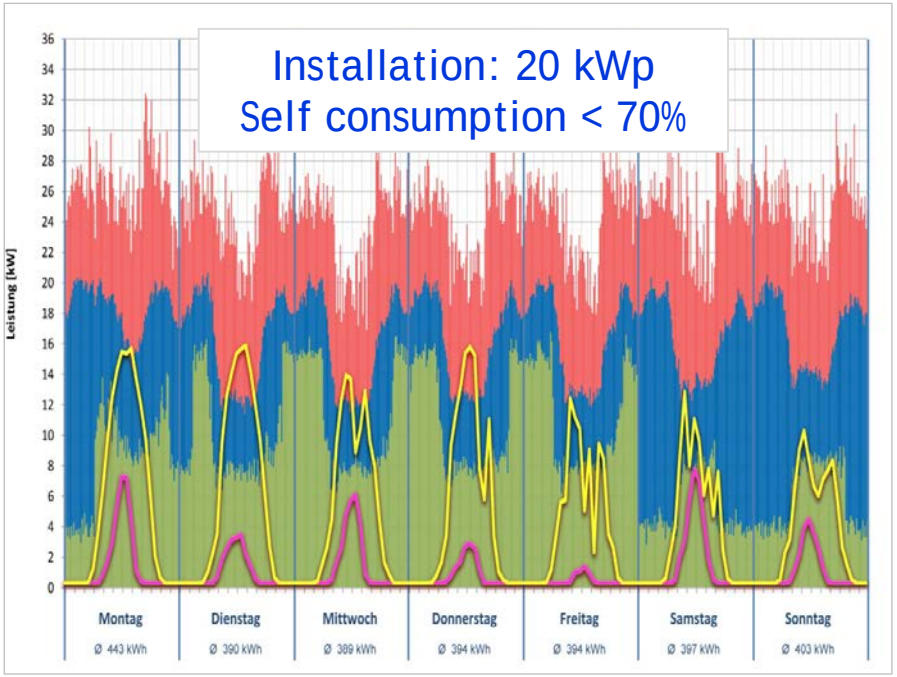
- Optimized use of solar power installation for a petrol station (total electricity consumption of 146.467 kWh/a; peak load 30,7 kW) in Carinthia





Self consumption & payback period

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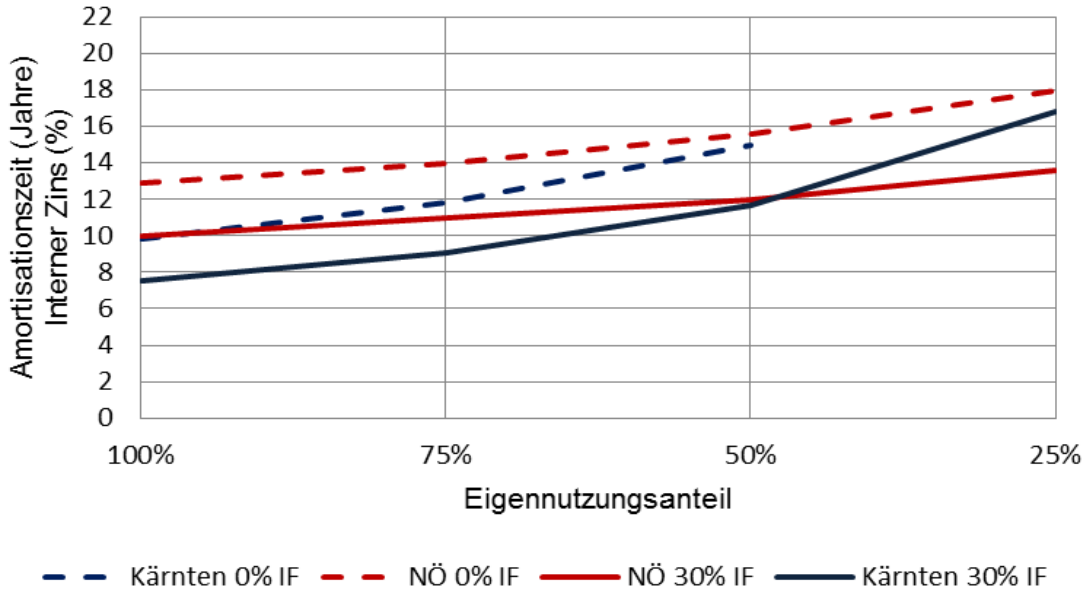
- Self consumption ratio and payback period at different investment aid ratios in Austria and Carinthia (10 kW installation; 1.500 €/kWp; 0% and 30% investment aid):



Without an investment aid of 30% - even at 100 % self consumption of the solar power - payback periods shorter than 10 years are not possible!

Support costs for Photovoltaic

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- Support costs under the current "Ökostromgesetz":
  - Annunal budget for new solar power installations: 8 Mio p.a.
  - Installed capacity: **86,18 MWp**
  - Totals Support Costs by the end of 13 years contract term: **103,82 Mio €**
- The same amount of solar power can be installed with lower costs:

Investment costs per kWp	**€/kWp**	**1.000**	**1.250**	**1.500**	**1.750**
Installed PV capacity	MWp	86,18	86,18	86,18	86,18
Total investment costs	Mio €	86,18	107,72	129,26	150,81
30% invesetment aid	**Mio €**	**25,85**	**32,32**	**38,78**	**45,24**

Recommendations

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- Introduction of investment aid for solar power installations (20% -30%) with an high ratio of self consumption (60-80%) instead of feed-in tariffs.

- Advantages:
  - Better coincidence of generation and consumption
  - Better integration of solar power into internal electricity market
  - Improvement of grid stability and control
  - Shorter payback period for companies (based on how much electricity is not purchased from the grid)
  - Lower costs for consumers

- Disadvantages:
  - No long term guarantees

Support schemes in Austria

- PV-Installations under 5 kWp (KliEn):
  - 26,8 Mio Euro of investment aid for 2014
  - 35 % of the eligible costs or max 375 Euro/kWp for building integrated PV
- PV-Installation 5 kWp to 350 kWp („Ökostromgesetz“)
  - 8 Mio Euro for 2014
  - Feed-in tariff of 12,5 cent/kWh for building integrated PV
  - 30 % of the eligible costs or max 200 Euro/kWp for building integrated PV
- Extra solar electricity can be sold to the OeMAG (current market price of 3,75 Cent/kWh) or electric utilities (conditions and prices vary)

„Ökostromgesetz“: Installed capacity 2014 and support costs

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- „Ökostromförderung“

System		Integriert	Freifläche	Gesamt
Anteil installierte Leistung	%	85,00%	15,00%	100,00%
Einspeisetarif 2014 (nach ÖSG)	Cent/kWh	12,5	10	
Marktpreis Q1/2014	Cent/kWh	3,75	3,75	
Investitionsförderung (1/13)	Euro/a*kWp	15,38	0	
Volllaststunden/Ertrag	kWh/a*kWp	950	950	950
Installierte Leistung	**MWp**	**73,25**	**12,93**	**86,18**
Ertrag	GWh/a	69,59	12,28	81,87
Ökostromvergütung	Mio Euro/a	6,09	0,77	6,86
Investitionsförderung (1/13)	Mio Euro/a	1,13	0,00	1,13
Planungskontingent 2014	**Mio Euro/a**	**7,22**	**0,77**	**7,98**

Assumptions for calculations

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Arbeitsabhängige Strompreiskomponenten:

- Niederösterreich 13 Cent/kWh
- Kärnten: 16 Cent/kWh

Einspeisetarife:

- Gefördert nach ÖSG: 12,5 Cent/kWh + 200 Euro/kWp Investitionsförderung
- Kärnten (KELAG): Marktpreis Q1/2014 - OeMAG-Tarif 3,75 Cent/kWh
- Niederösterreich (Naturkraft): Marktpreis 7,896 Cent/kWh

PV-Anlage:

- Leistung: 10 kWp
- Jahresproduktion der PV-Anlage: Niederösterreich 10.000 kWh/Jahr, Kärnten 11.000 kWh/Jahr
- Investitionskosten: 1.500 Euro/kWp

Sonstige Annahmen:

- Betriebskosten (Versicherung, Wartung, Ersatzteile): 10 Euro/kWp und Jahr = 100 Euro/Jahr
- Ansparung Wechselrichtertausch: 0,1*Investitionskosten/13 =115 Euro/Jahr
- Steigerung aller angenommenen Tarife und Kosten (mit Ausnahme des Einspeisetarif nach ÖSG): 2%/Jahr
- Degradation PV-Anlage: 0,9%/Jahr
- Abschreibungsdauer: 15 Jahre
- Betrachtungszeitraum für den internen Zinsfuß: 20 Jahre
- 25% KÖST berücksichtigt

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