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Erneuerbare Energie NOW

Small Wind Power

Experience in Austria

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AEE - Arbeitsgemeinschaft Erneuerbare Energie NÖ-Wien

- Non Profit Research Institute
- Association

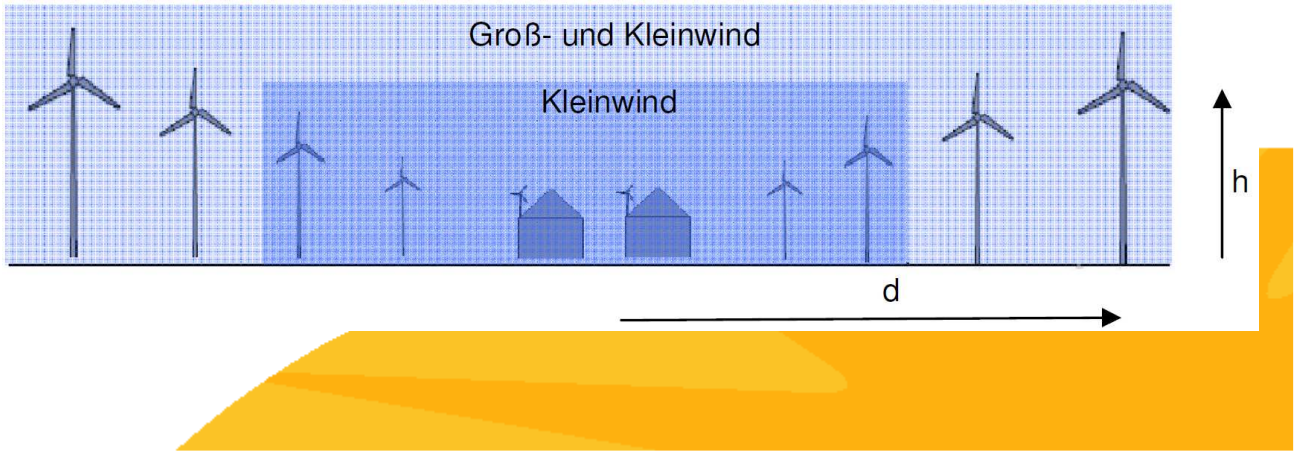
Fields:

- Research projects: Renewables and Energy Efficiency
- Consulting
- Planning and Optimization of innovative heating systems
  - Businesses
  - Apartment Buildings
  - Private Customers

Definition
What ist small wind power?

- There is no strict limit
- Limits are defined by law
- Size for own Consumption

=> <10kW



Technology - Rotor

Horizontal

Vertical

Darrieus

Savonius

Special Types

Technology – Head turning gear

- Vane

- Measurement & Motor & Gear

Technology - System

Generation

Conversion

Feed in

DC

AC

Energy below in feed limit

Own Consumption

Quality of Small Wind Turbines

- Quality must be ensured :
  - Regulations for safety must be met
  - LQ-turbines must be sorted out
  - Manufacturer must have references
  - Wind turbines should be tested on an independent test-site for over a year. (i.e. Lichtenegg, Austria)
  - Power curves must be certified
  - Usually Horizontal Turbines are more reliable

Quality of Site

- Wind speed:
  - Measurement: At least (1 year)
  - Short periods with extrapolation (must be done by experts)
  - Analysis by topography
  - References from the area

- Turbulences

Quality of Site – Wind class distribution

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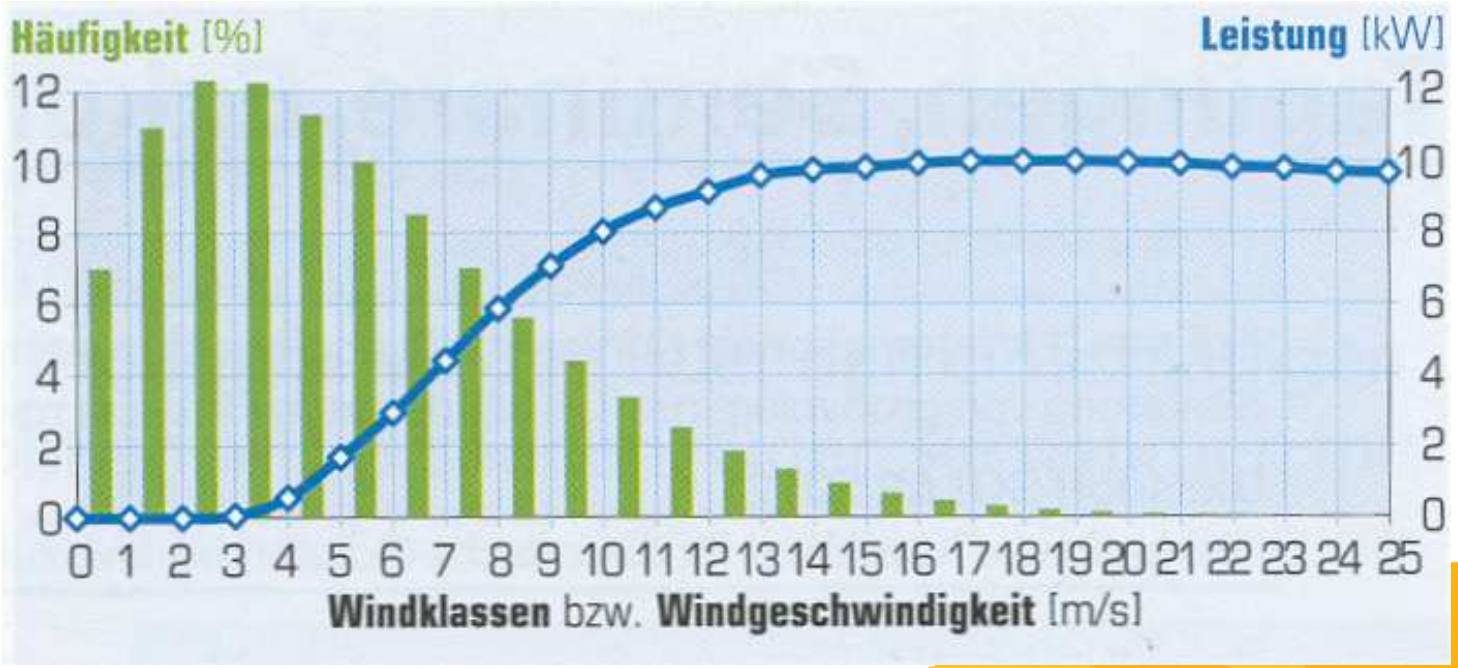
Wind distribution and

Power Curve

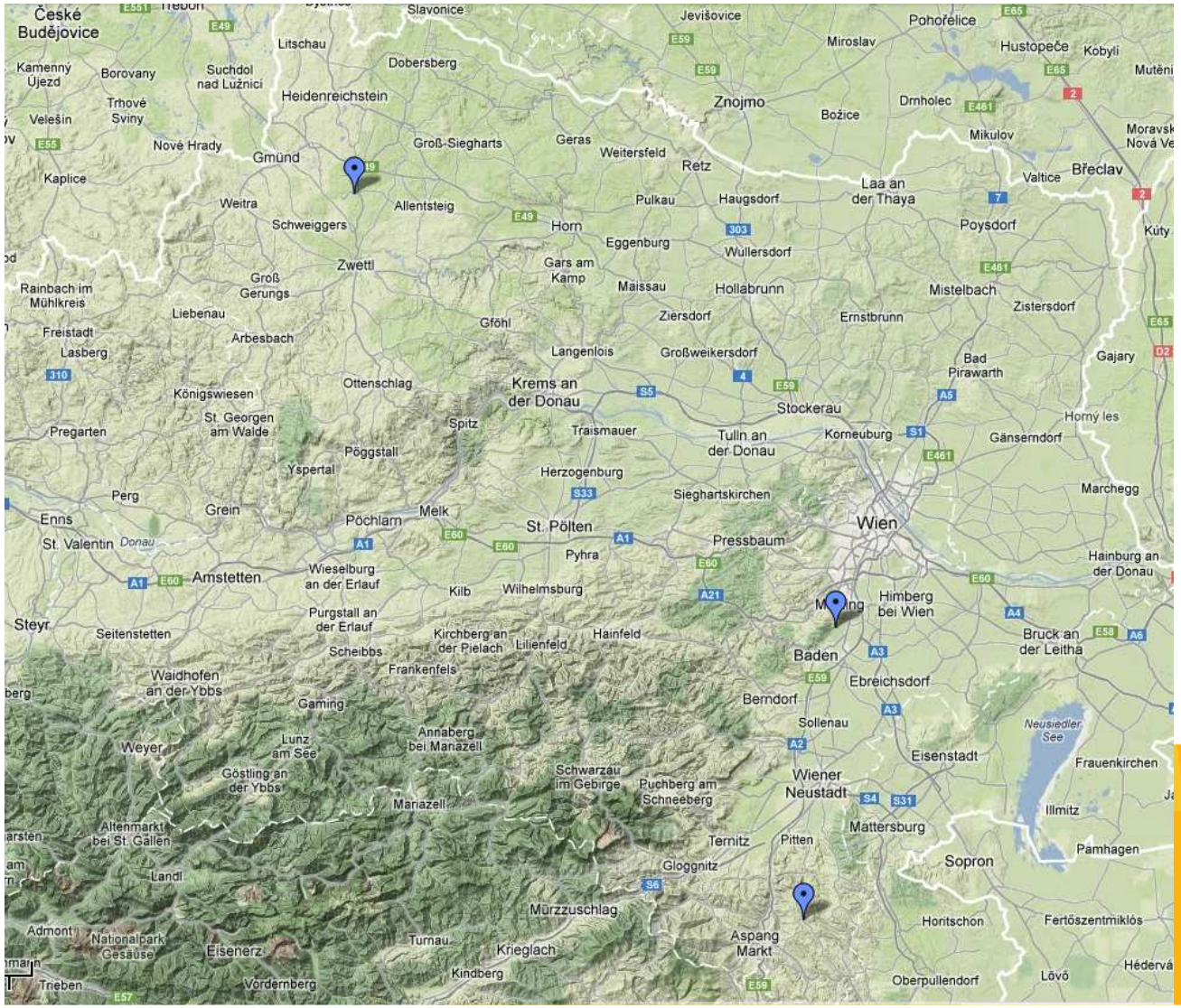


Quality of Site
Possible Yield

	[kWh/kWp/a = Full load hours/a]	[kWh/m² rotor area]
Large Wind Power:	>2000	900
Small Wind Power:		
Excellent site	>1200	>250
Good site	800-1200	150-250
Medium site	500-800	140
Bad site	<500	< 100
Photovoltaic	~1000	n.a.

- *Also the Quality of the Turbine influences these values

Examples


České Budějovice
Litschau
Dobersberg
Heidenreichstein
Znojmo
Gmünd
Groß-Siegharts
Geras
Weitersfeld
Retz
Weitra
Allentsteig
Pulkau
Haugsdorf
Horn
Eggenburg
Zwettl
Gars am Kamp
Maissau
Hollabrunn
Rainbach im Mühlkreis
Liebenau
Gföhl
Ziersdorf
Ernstbrunn
Mistelbach
Freistadt
Arbesbach
Langenlois
Großweikersdorf
Lasberg
Ottenschlag
Krems an der Donau
Stockerau
Königswiesen
St. Georgen am Walde
Spitz
Traismauer
Tulln an der Donau
Korneuburg
Pregarten
Pöggstall
Ysperdorf
Herzogenburg
Sieghartskirchen
Perg
Grein
Enns
Pöchlarn
Melk
St. Pölten
Wien
St. Valentin
Donau
Pressbaum
Pyhra
Amstetten
Wieselburg an der Erlauf
Kilb
Wilhelmsburg
Himberg bei Wien
Steyr
Seitenstetten
Purgstall an der Erlauf
Kirchberg an der Pielach
Lilienfeld
Hainfeld
Scheibbs
Frankenfels
Baden
Bruck an der Leitha
Waidhofen an der Ybbs
Ebreichsdorf
Gaming
Berndorf
Sollenau
Weyer
Lunz am See
Annaberg bei Mariazell
Eisenstadt
Neusiedler See
Frauenkirchen
Göstling an der Ybbs
Schwarzau im Gebirge
Puchberg am Schneeberg
Wiener Neustadt
Mariazell
Illmitz
Altenmarkt bei St. Gallen
Mattersburg
Ternitz
Pitten
Pamhagen
Gloggnitz
Sopron
Landl
Mürzzuschlag
Horitschon
Fertőszentmiklós
Admont
Nationalpark Gesäuse
Eisenerz
Turnau
Krieglach
Aspang Markt
Kindberg
Oberpullendorf
Lövő
Trieben
Vordernberg

Examples

Description	Site	Full load hours measured [h/a] (rounded)
KW1	Hilly, rural area	600
KW2	Flat land, open urban area, i.e. business area	1000
KW3	Alps foothills, rural	1800

Quality of Site
Small wind power in urban areas

- Influence by and of the SWP:

  of

  - Obstacles decrease the yield

  by

  - Shading
  - Sound, noise
  - Vibrations
  - SWP on buildings is a challange

Quality of Site
Small wind power in urban area

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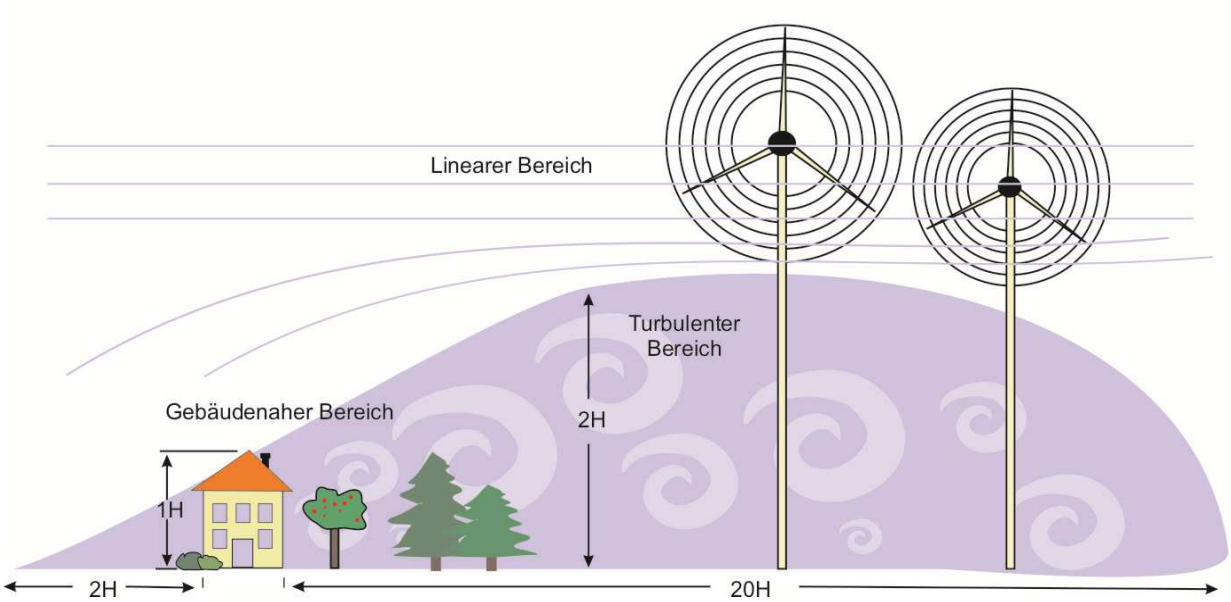

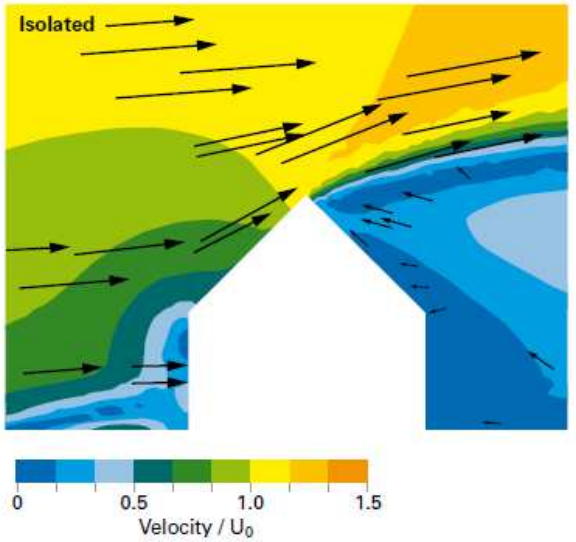

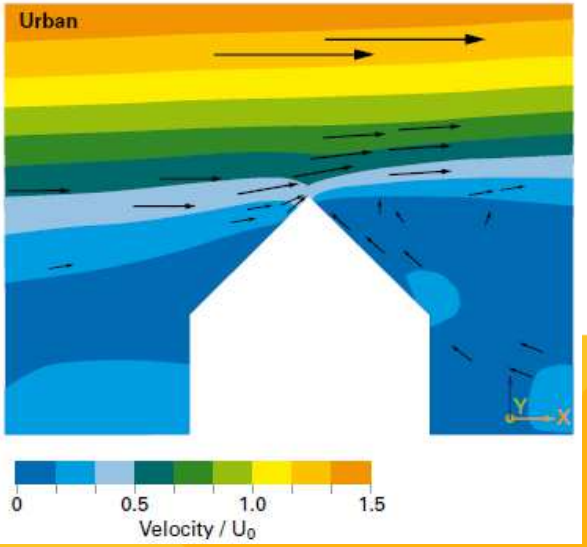

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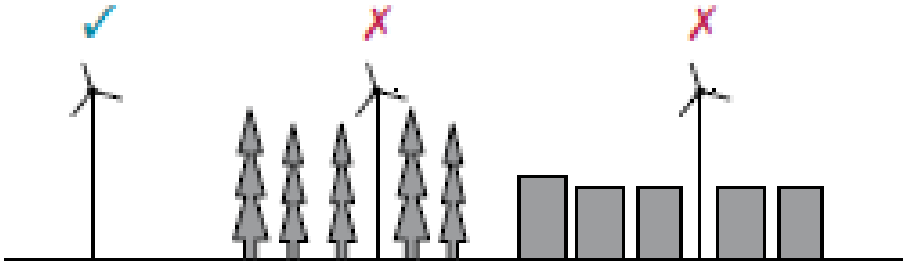

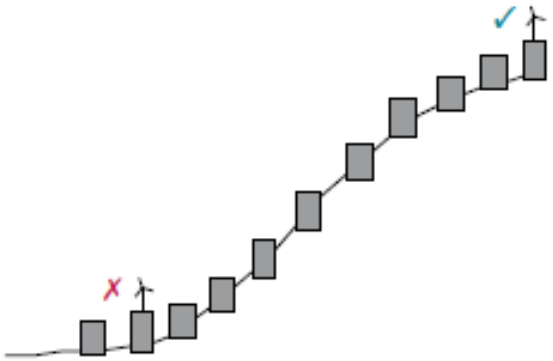

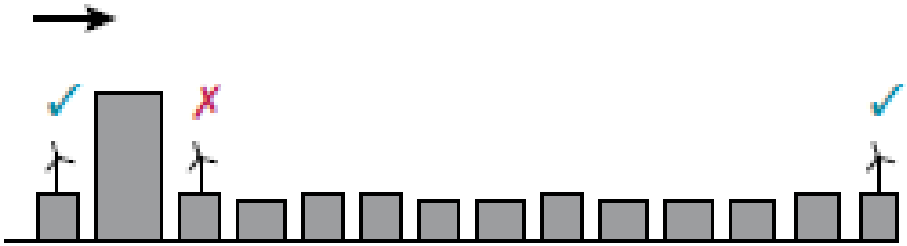

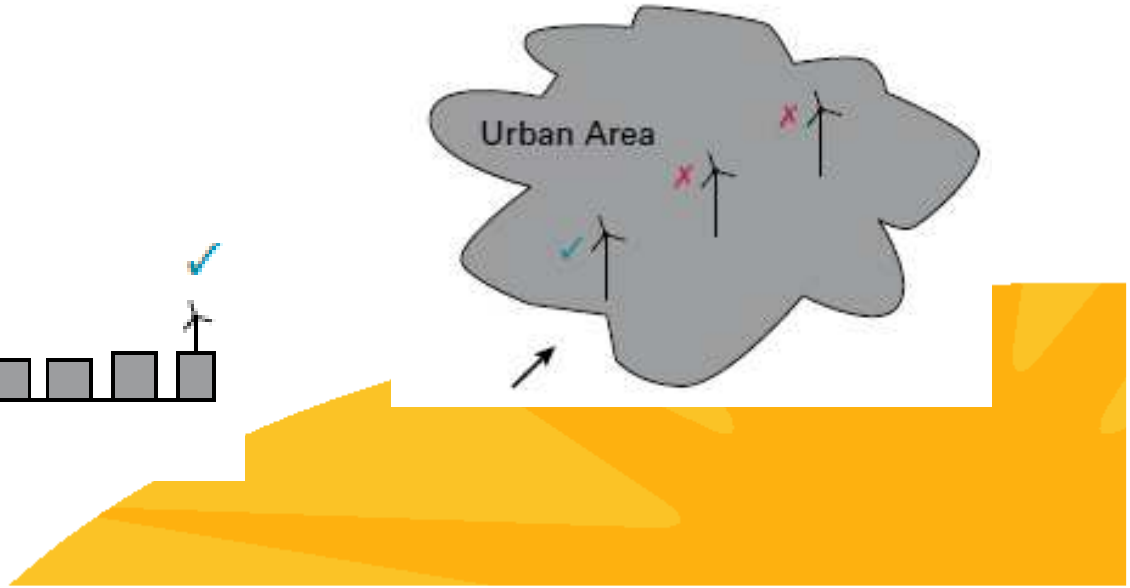

Quality of Site
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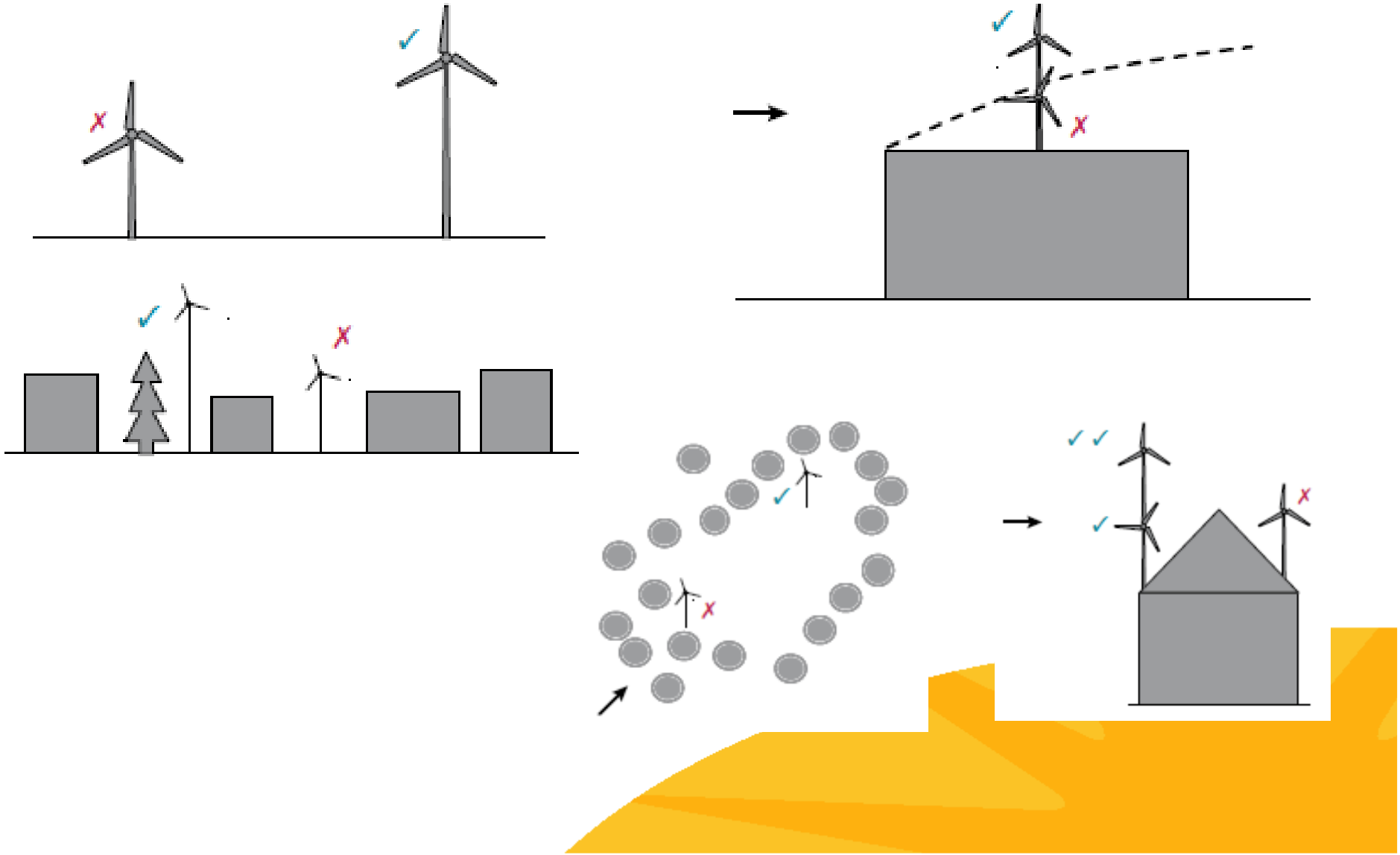
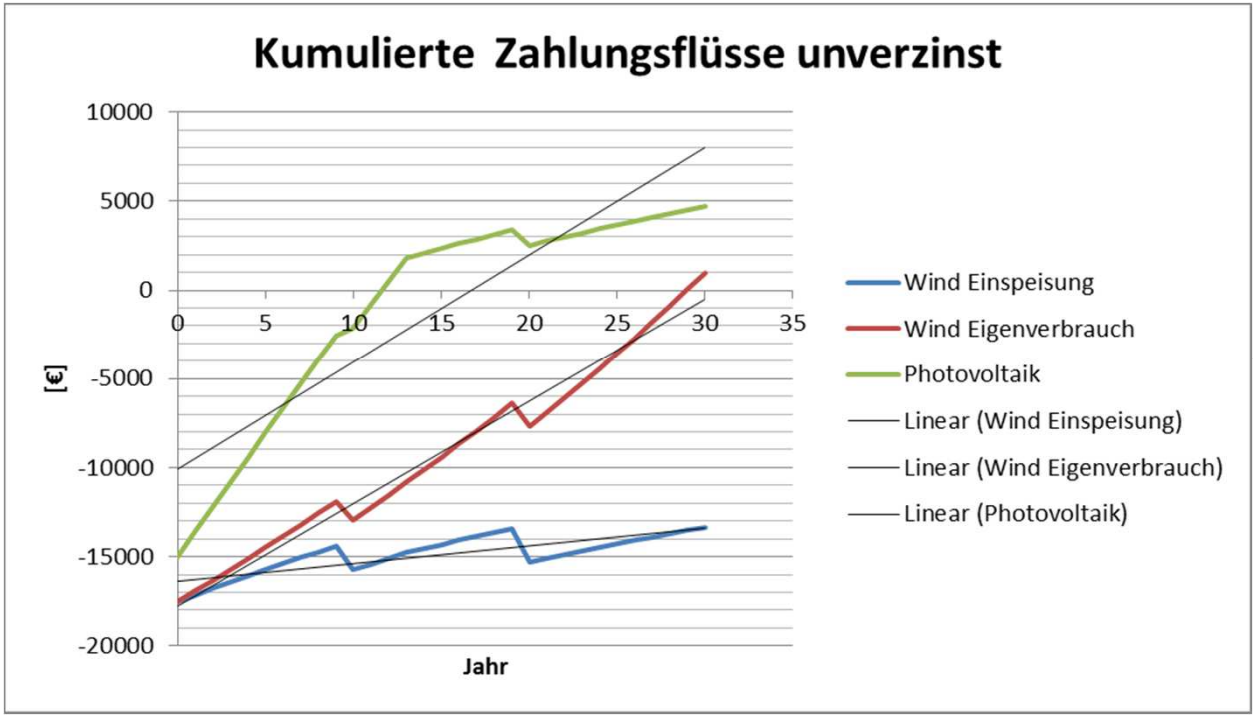


Economy



- Feed in tariff: 9,45c/kWh. (regardless if 1kW or 1MW)
- Own Consumption: Saving of ~15c/kWh (variable costs per kWh)

  - => For a rentable operation subsidy of: 20-30c/kWh
  - => For investment subsidies: Quality assessment of site and turbine is crucial!

Economy / Market

- About 300 – 500 SWT in the country installed in Austria

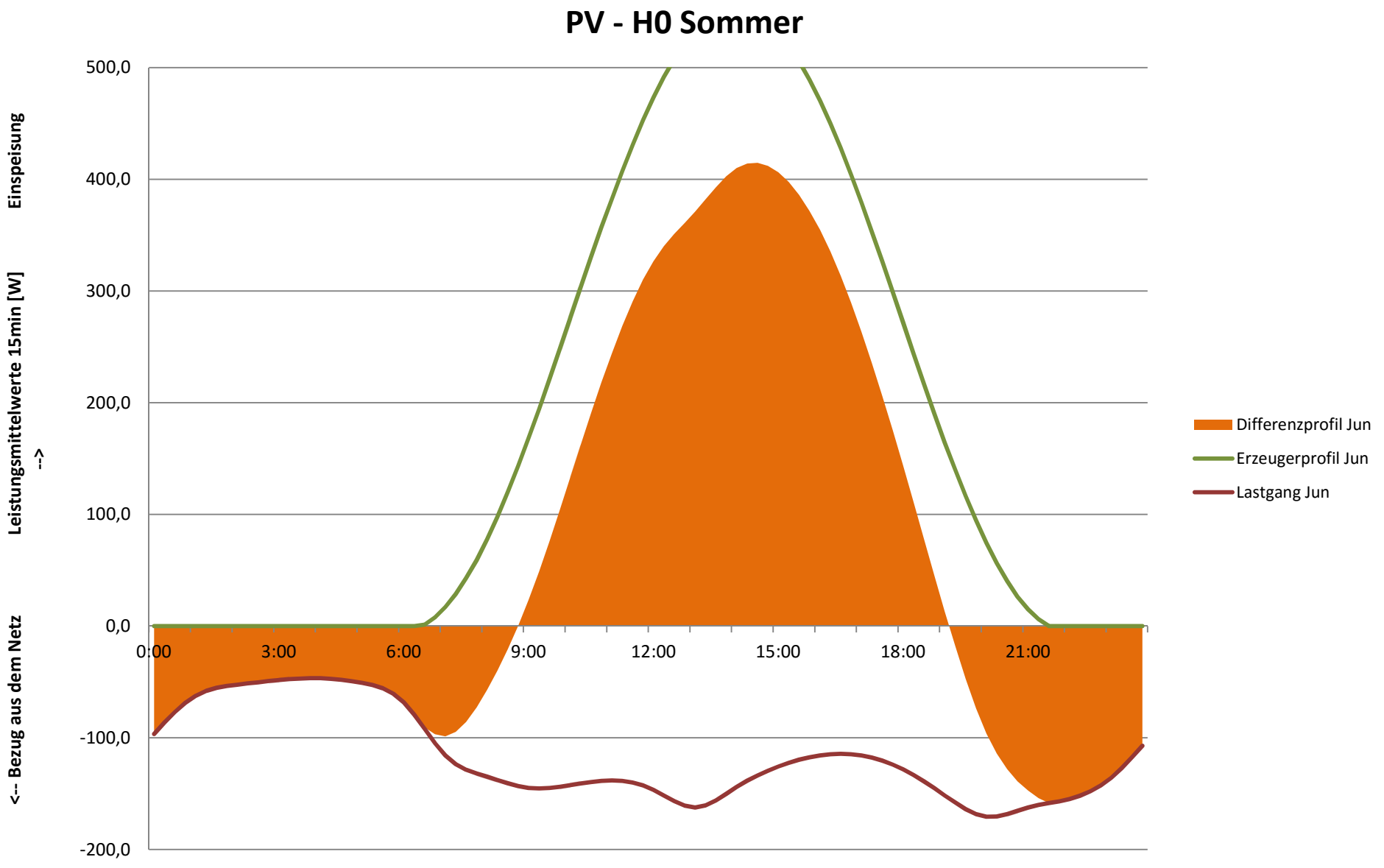
- Target market:
  - Agriculture
  - Small Businesses
  - Rural homes
  - Not homes in centre of a village

Self load coverage

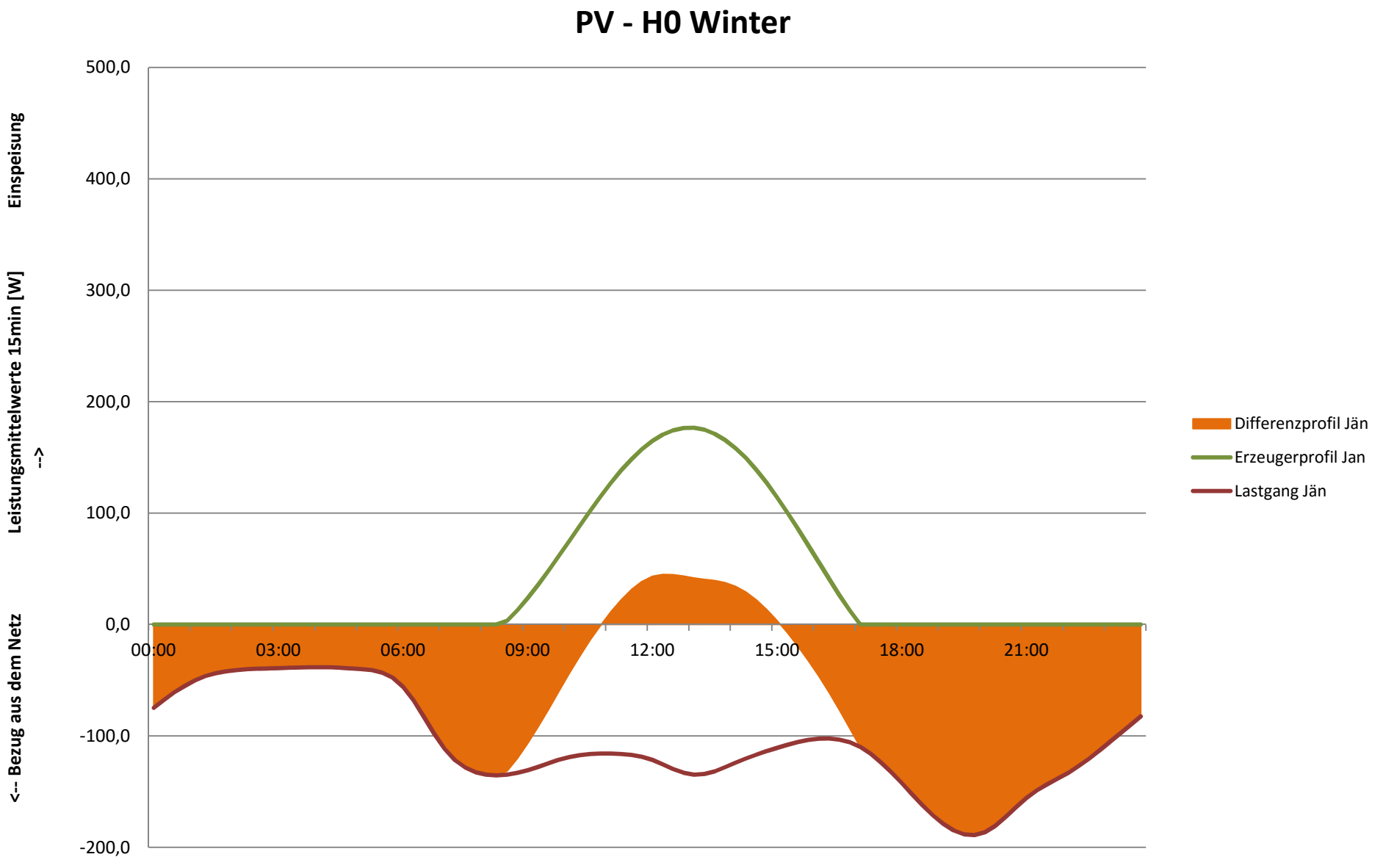
- Cover the own load curve not only balance over the year
- It is relevant WHEN energy is consumed and generated
- Small wind offers a good basis for covering household demand(H_0)

- More self consumption possible than with PV
- Combination of PV and Small wind ist positive from a load perspective

Photovoltaik



Photovoltaik



Kleinwind - Sommer

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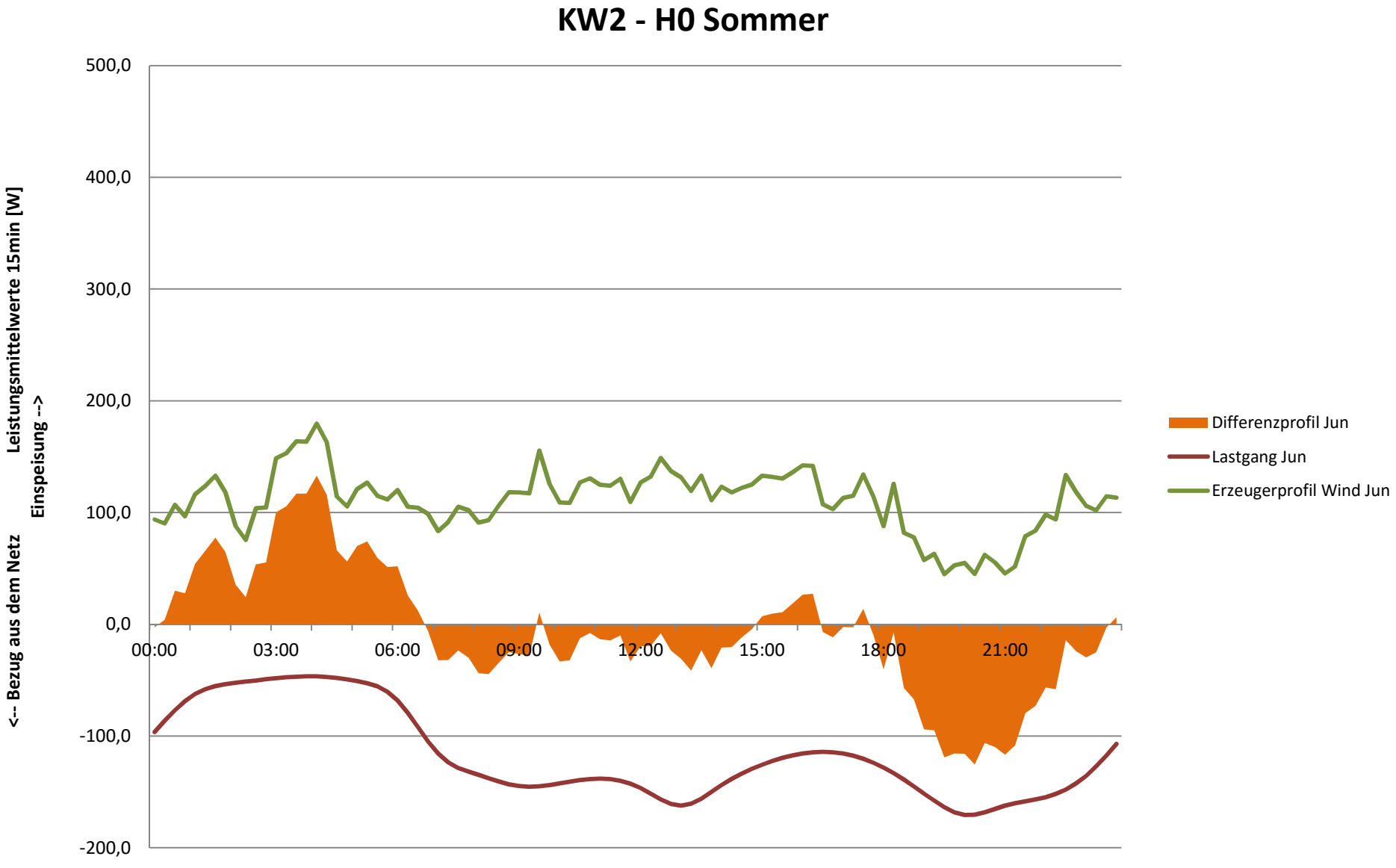
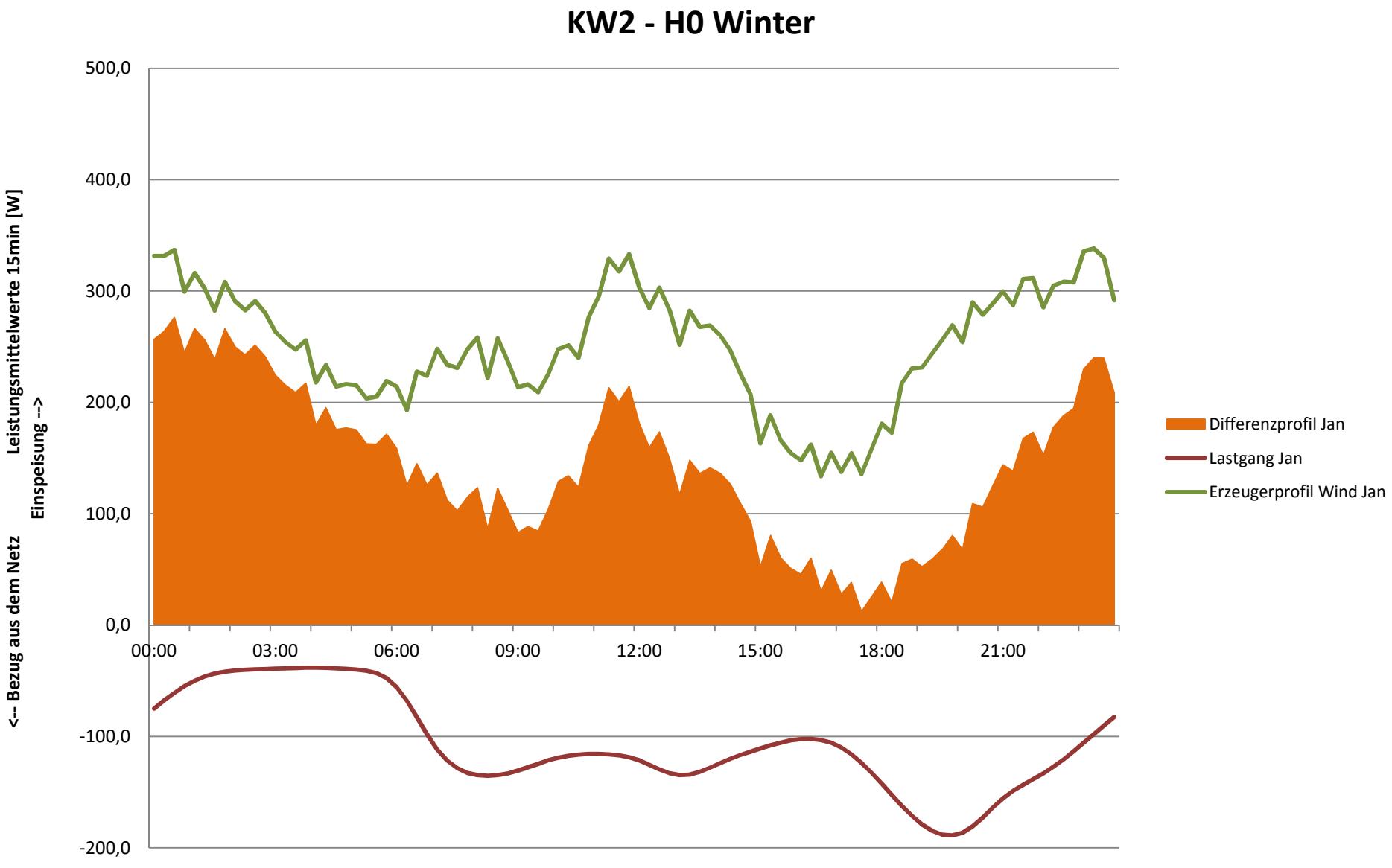


Kleinwind - Winter



Findings

- There are good Small wind power plants on the market (propeller type)
- Quality check is necessary, as there are also ones with minor quality
- Site assessment is required(best: wind measurement)
- Proper size (not to big or small)
- Small wind ON buildings is not easy, better put it on an individual mast
- Manufacturers with local support
- What about the neighbourhood?
  - Rural or urban
  - Are there neighbours? Are they influenced?
  - Or do obstacles in the neighbourhood influence wind?

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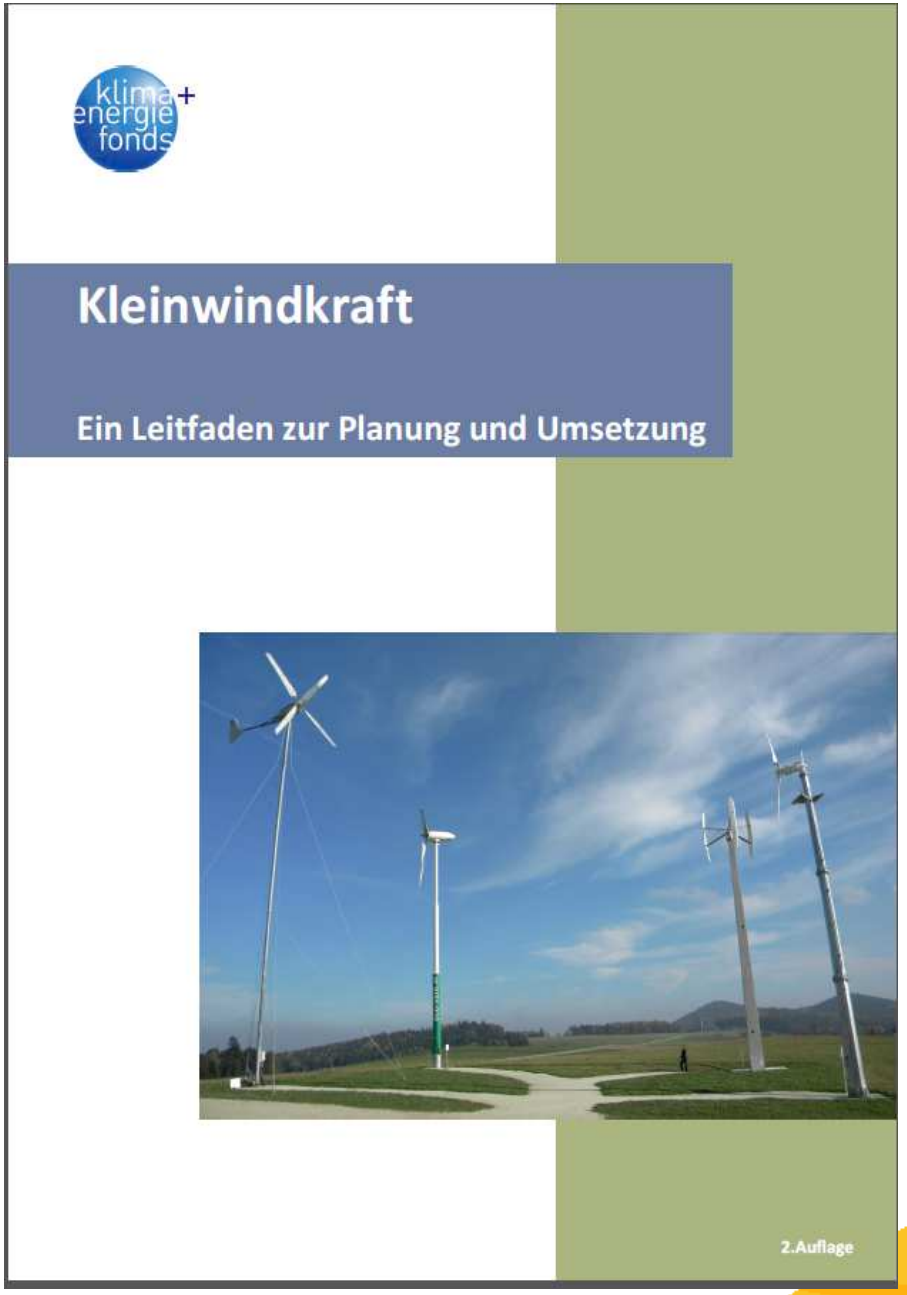

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