

CB845 CBSmallPorts

Energetic small ports in Central Baltic region

Energy efficiency solutions
for small ports

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Key point no 1. Measure

Start following the consumption

Electricity, Water, Oil, District heating etc.

Make calendar notifications so you don't forget

Use graphs to make it simple to understand

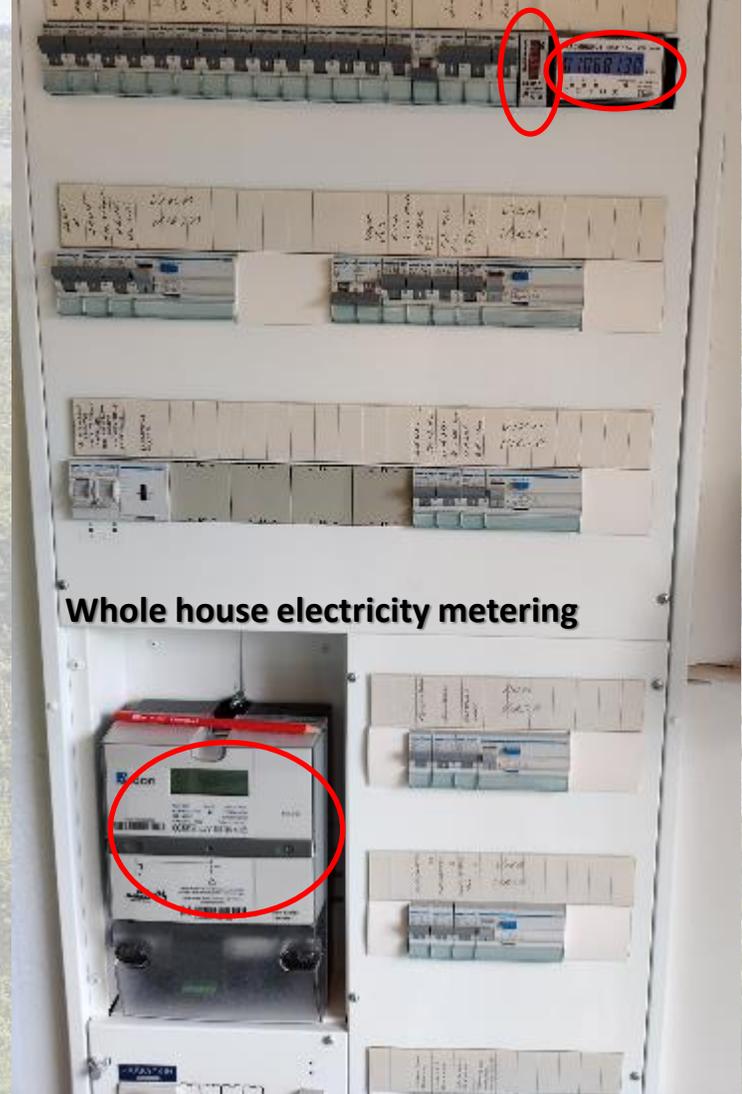
Find out existing meters and how and where to read them

Make it easy to access the accounts and data.

Add more meters if necessary

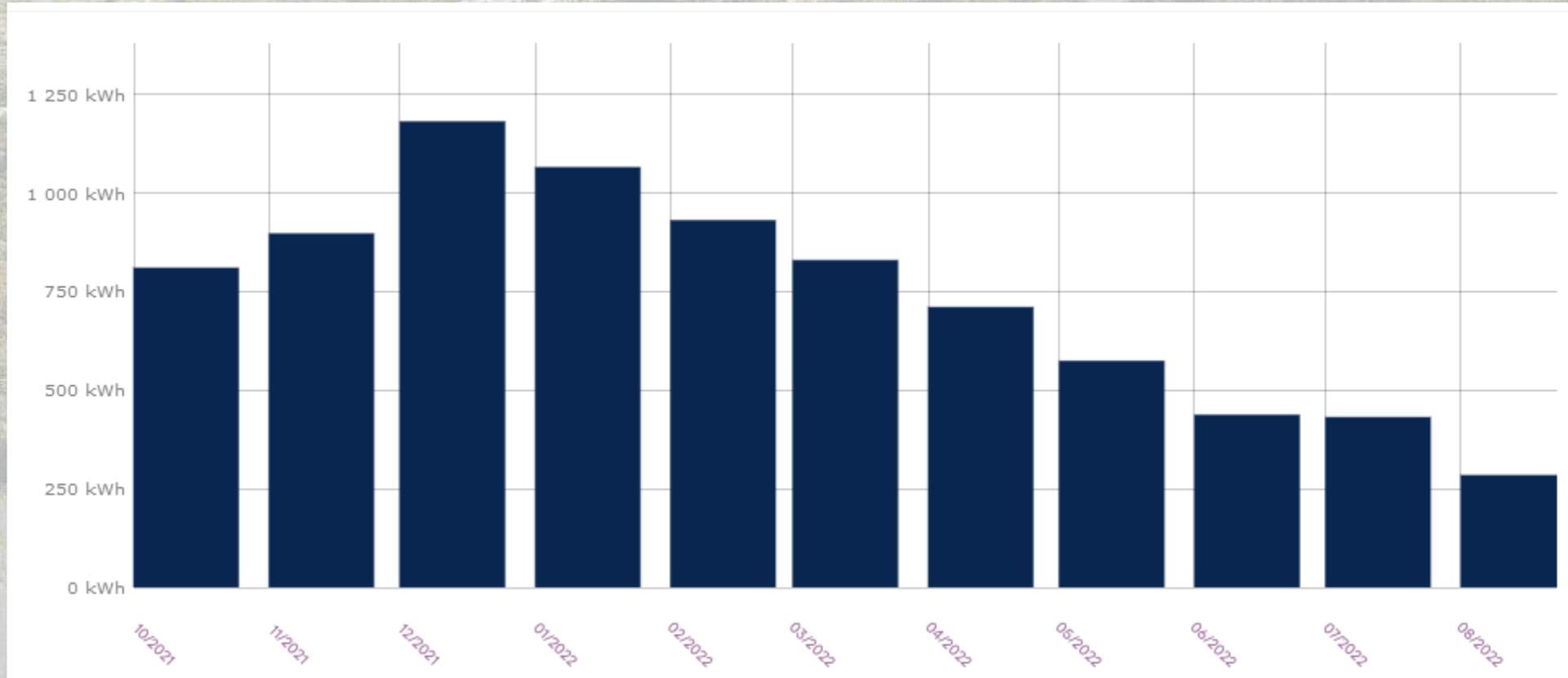
Too many function behind one meter makes it hard to find problems

Heat pump and hot water electricity metering



Reading the measurements 1/3

Example measurements from single family house.



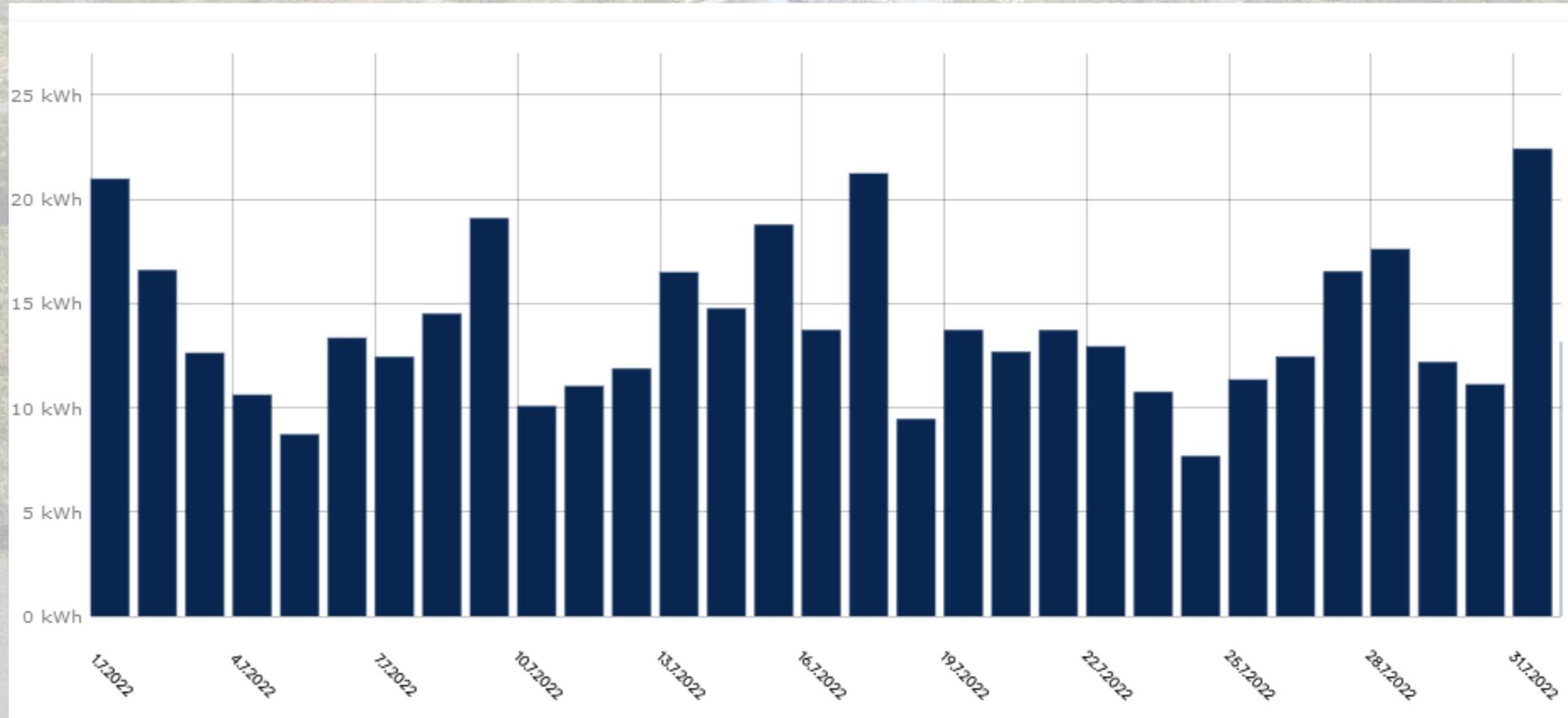
Yearly measurements



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Reading the measurements 2/3



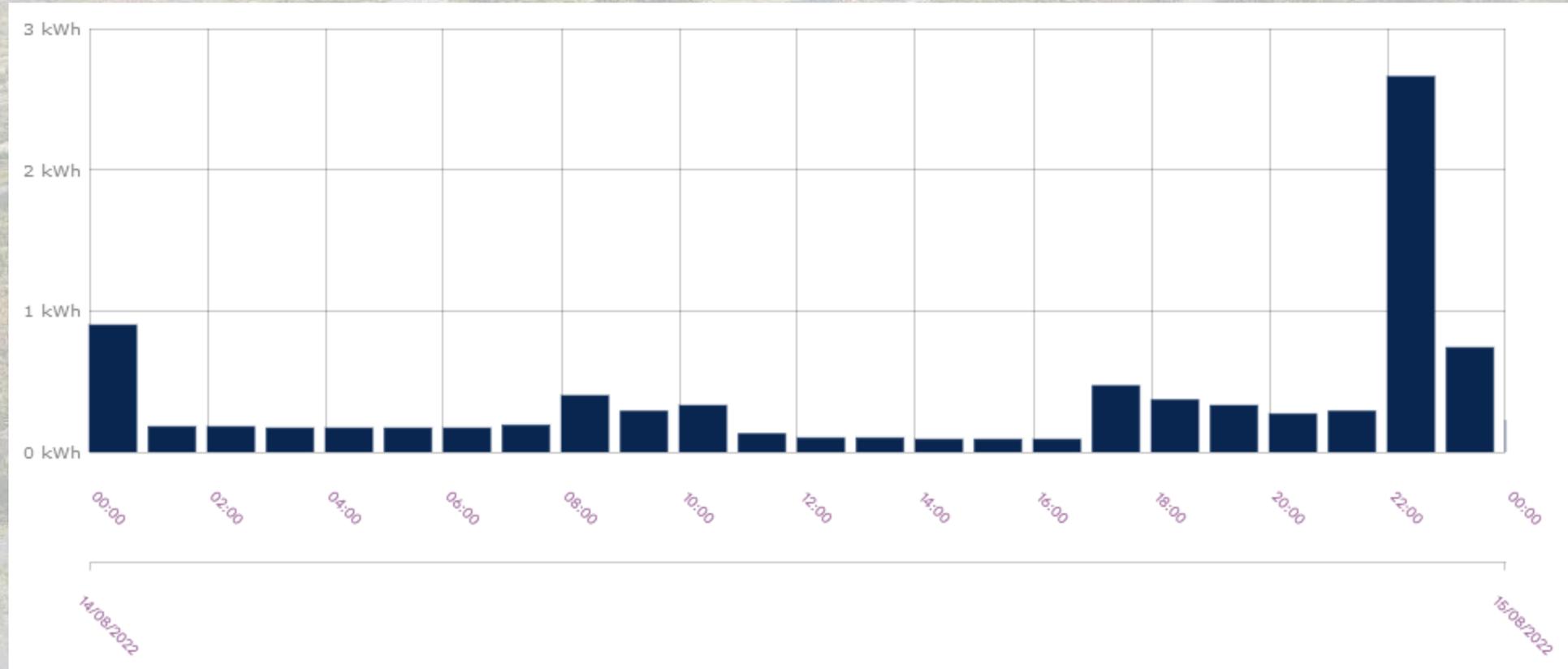
Daily measurements



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Reading the measurements 3/3



Hourly measurements



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Don't assume, check and find out

Check and mark up system settings

Timers and thermostats for heating, cooling, lighting and ventilation

Actual temperatures

Search known events from measurement data and find anomalies

Find out what devices consume the most and when

Find out if consumption can be reduced technically or is it user based

Try to educate, not patronize

From the field:

Ship yard temperature higher than thought.

Saving potential over 50 000€/a

Meat processing plant was missing heat recovery units from few ventilation units.



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Things to do now

Check you energy purchase agreement

At this point you might save a lot by checking prices often

Check that there are no extra heating that is not necessarily needed

Adjust the floor temperatures of bathrooms and similar

Make sure ventilation systems have clean filters

Dirty filters increase power consumption and reduce air quality

Make sure that refrigerators and coolers have room to breath and they are clean

Check for leaks in water piping especially on piers

Change to LED lights, payback time is now very short



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Things to do next

Insulate hot water and heating piping

Check water flows in faucets and change to low flow water fittings

Find out about

Solar

Heat pumps

Wind power

Automation

Renovating the buildings to more energy efficient



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Compair results

European commission “Best Environmental Management Practice in THE TOURISM SECTOR”
Gives Guidelines for energy consumption and examples

Goal is maximum of 6 kWh/guest-night
2 kWh/ guest-night is very good

Table 9.14: Some relevant indicators of environmental performance for campsites

Aspect	Indicator
Space heating energy consumption	kWh/m ² yr kWh/guest-night
Water heating energy consumption	kWh/guest-night
Electricity consumption	kWh/guest-night
Total energy consumption	kWh/guest-night
Total renewable energy generation	kWh/guest-night
Share renewable energy generation	%
Carbon footprint	kg CO ₂ /guest-night

Table: Best Environmental Management Practise in the Tourism Sector p.8

Solar energy

Small ports consumption is mainly in summer

So is solar energy production – Great fit!

Daily usage should be studied to find correct system size

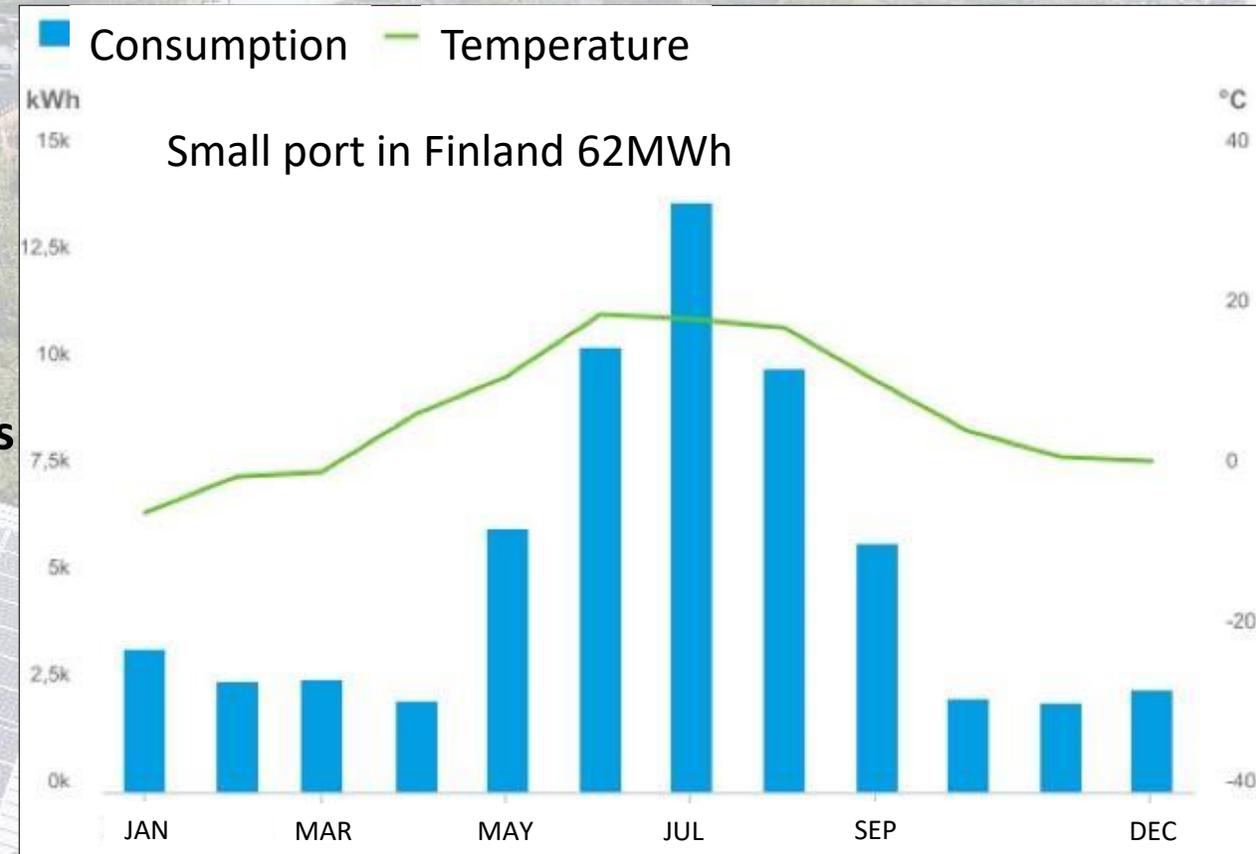
Today's prices and uncertainty prefers large panel systems

Systems can be split into many roofs

South-East orientation for morning production

South-West for evening

Single roof systems usually a bit cheaper



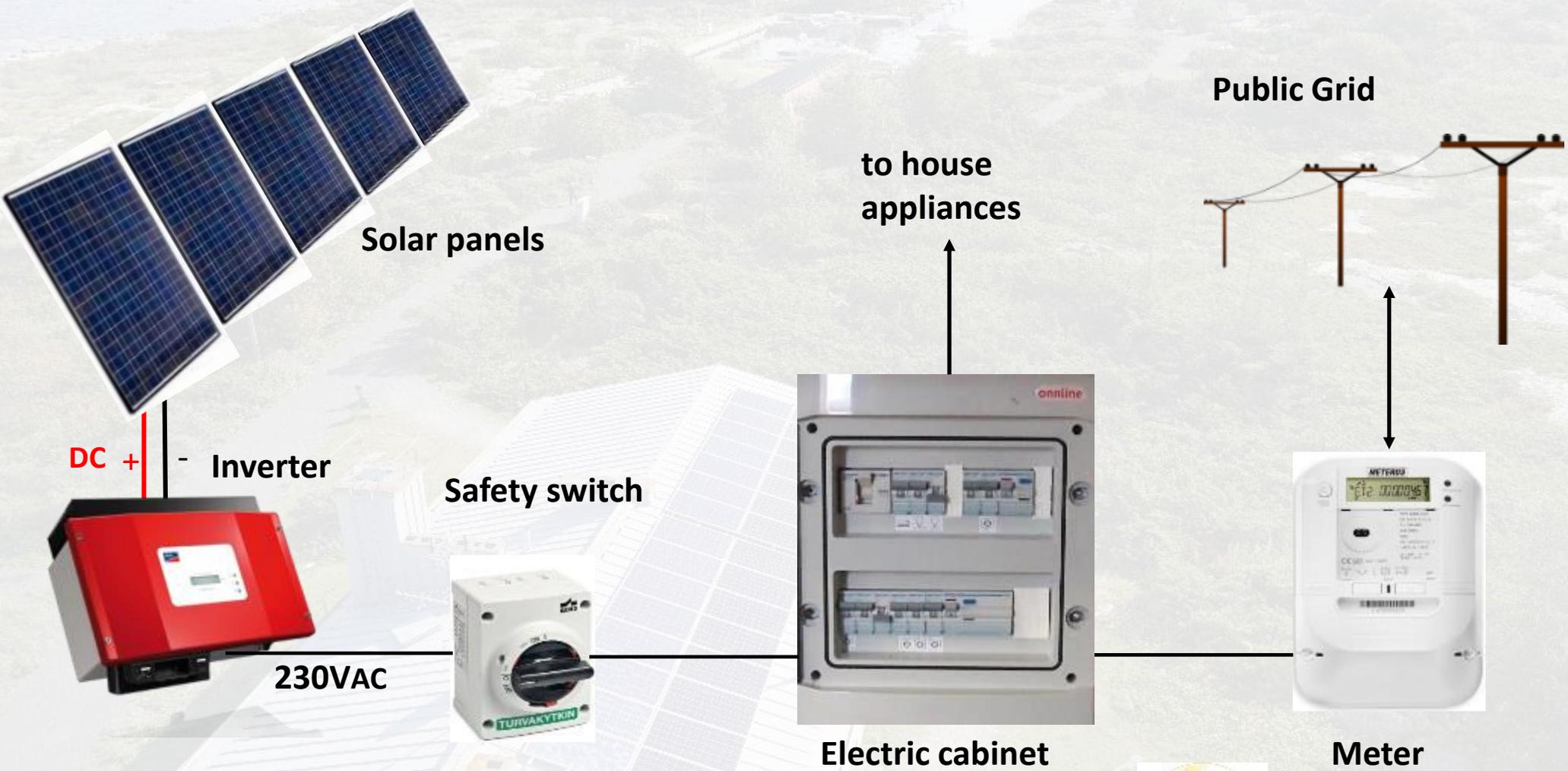
Picture: Modified of figure from Teemu Heikkinen



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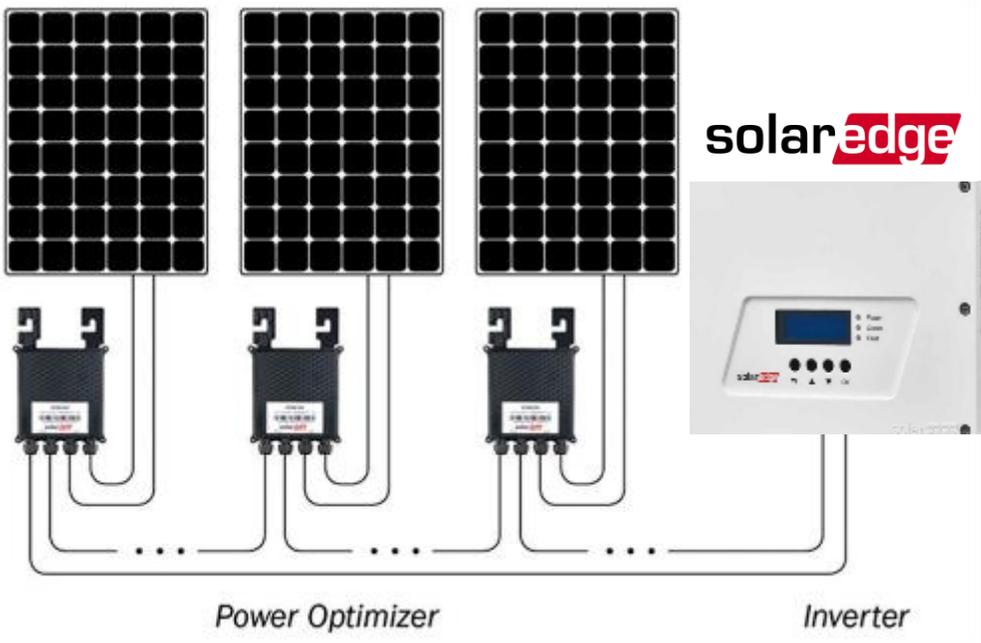
Basic On-Grid PV-system



Other system types

Optimizer system

- Every panel has its own controller.
- Shading has reduced effect
- Broken panels don't affect the system
- Single panel monitoring



Hybrid inverters and batteries

- Has PV inverter, grid- and battery connections.
- Size usually 5-15 kWh, easy to scale up
- External batteries are often modular.
- Profitability determined case by case



Kostal Piko inverter with external battery



Investments on energy efficiency

Heat pumps

Air to air (split units) are great for space heating and cooling

Air to water heat pump if there is showers and saunas or water circulating space heating

- Exhaust air heat pump doesn't work in winter if inside temperature is kept low

- Ground source heat pump is too large investment if usage in winter is low

Automation

For new buildings simple movement sensor lighting is cheaper than installing light switches

Present detection to lower heating and cooling when rooms are not used



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Aventa AV-7 6,2kW
Yearly production around 9300kWh

Wind power

Small windmills are good option for high wind areas

Relatively short pole and small wings need high winds

Maximum production is achieved with around 12 m/s winds

Production roughly 1500kWh/a per installed kilowatt

Produces also in night time

Usually best production when solar has less production

Expensive

Eye sore

Needs maintenance



Picture: Klaus Rockenbauer, www.flickr.com/rockenbauer, Oberhelfenschwil-Switzerland



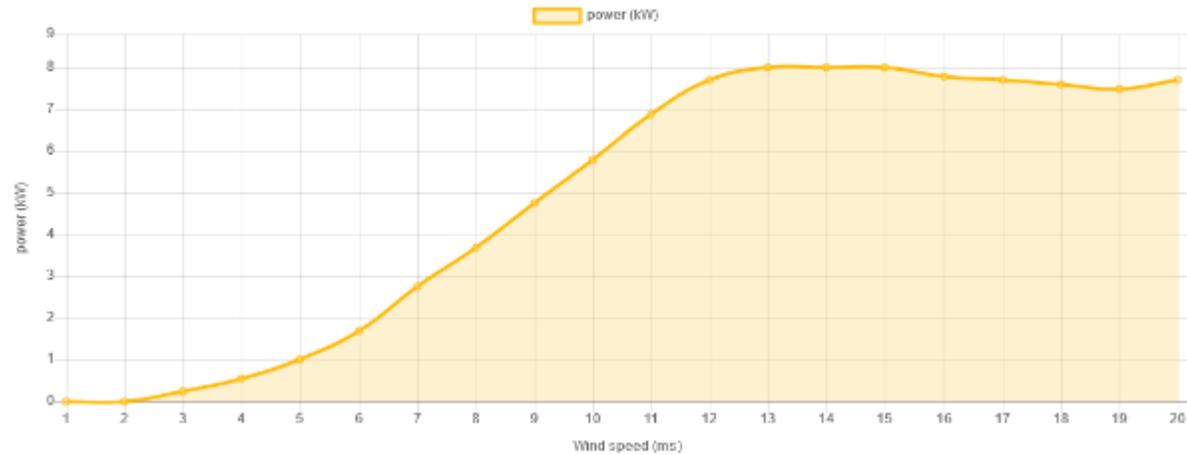
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Windpower power curves

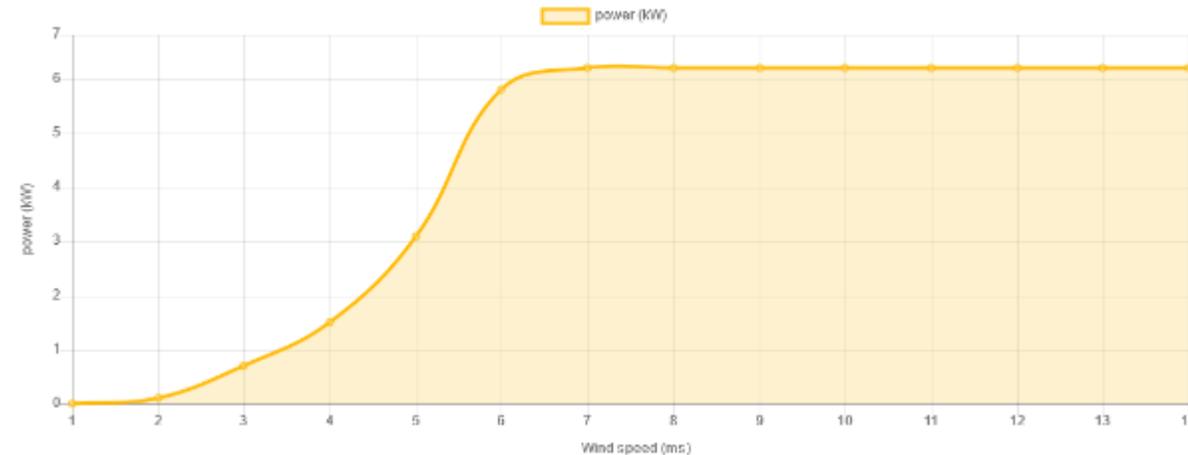
Windspot 7.5kW (height=12/14/18m diameter=6,3m)

Power curve



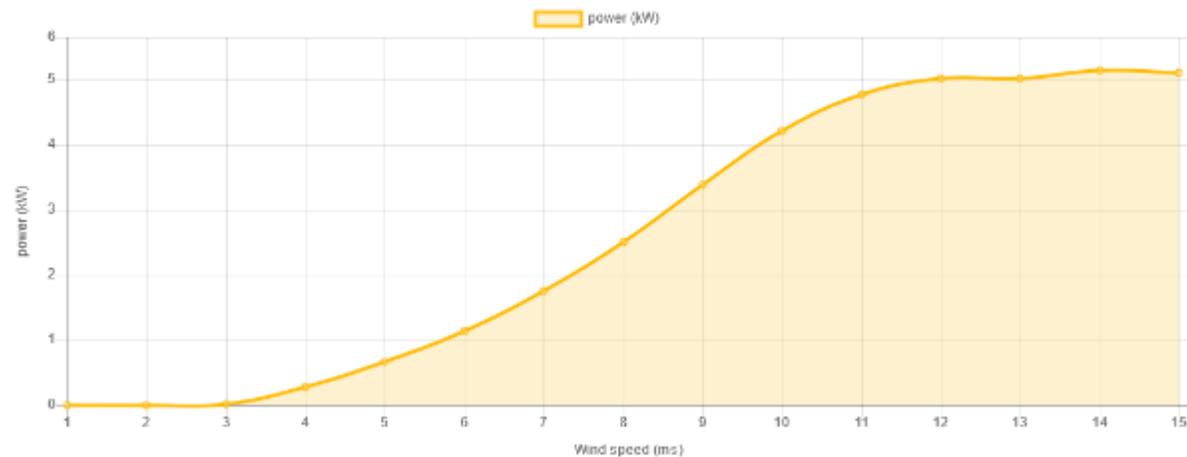
Aventa AV-7 6,2kW (h=18m d=12,8m)

Power curve



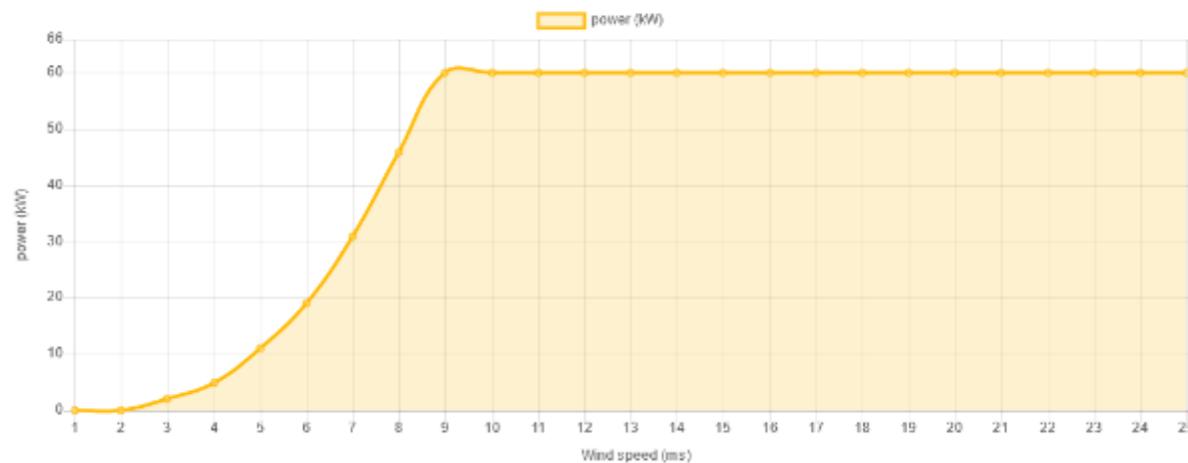
Iskra AT5-1 5kW (h=9/12/15m d=5,4m)

Power curve



Greenstorm GS 21 S 60kW (h=30/36m d=22,3m)

Power curve



Reducing guest consumption

Consider metering all Electric hook up points

Fixed fee increases electricity consumption

Consumption based billing reduces consumption (be ready for electric cars and boats)

Inform people about saving water

Use water saving fixtures



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Investments WP 11-7 (period 5)

Project partner	Port	The target of the investment	Modified (original) budget, €
University of Turku (WP 11)	Seili	Service premises renovation (two saunas + optimization of the energy management system, Optiwatti)	46 870€ (33 000€)
Airiston Matkailukeskus Oy (WP 12)	Airisto Strand	floating piers x 2, solar power plant	169 100€ (159 500€)
South-Eastern Finland University of Applied Sciences (XAMK) (WP 13)	Keihässalmi Sapokka Tervasaari	Modernize the power line (from air to underground) Solar power plant, led light post, led area lighting Guest harbour area led lighting	81 000€ (77 000€)
Bläse Kalkbruk (WP 15)	Bläse	Solar power plant, electricity / water / light to piers, pier maintenance, septic waste pumpout station	107 200 €
Municipality of Söderhamn (WP 14)	Klacksörarna	Solar power plant x 2 (off-grid) and lighting Fresh (drinking) water well and pump (manual)	29 949€ (30 049€)
MTÜ Väikesadamate Kompetentsikeskus (NGO Small Ports Competence Center) (WP 16)	Dirhami Lennusadam Lõunaranna Roograhu	Floating piers, solar power plant LED lights & service posts to piers Wind generator Solar power plant 33kW	139 687€ (321 187€)
Foundation Hiiumaa Harbors (WP 17)	Kärdla Orjaku Soru	Smart lighting Smart lighting & service posts Smart lighting & service posts	42 000 €

Kotkan meripäivät

27. - 30.7.2022

Uiva boat fair

18. - 21.8.2022



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Thank You

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