Energy audit of a small port case - Pavilosta Marina

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EUROPEAN UNION European Regional Development Fund

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Idea of Energy Audit

Mission of the energy audit is to find economically viable measures that bring savings in energy and water consumption and decrease the CO2

emissions caused by energy consumption of the target site

- Energy audit includes
 - Analysing the current level and distribution of energy and wat er consumption
 - Identifying economically viable savings potential with financial calculations
 - Report of proposed actions and further activities
 - Carried out in close co- operation of the site personnel and auditor
 - Based on the consumption data (energy, water) of previous years and site visits with field measurements
 - Target sites are usually bigger consumers of industry, energy sector or service sector but it can be applied also for smaller sites
 - In Finland, the Energy auditing of SMEs is subsidiced. <u>Motiva</u> instructs and educates the auditors for this type of energy audit. In big picture, energy auditing is used as one tool to meet the energy efficiency goals set by EU.



Importance of the consumption data

If you can't measure it, you can't improve it. – Peter Drucker

- Same goes for energy efficiency actions -
- You can't know if your actions were succefull if you don't know the 'b efore' and 'after' situations
- From electricty consumption data offered by your electicity supplier you can (should) get hourly kWh figures for each billing meter
- District heating or gas supplier should be able to provide similar info
- Water consumption data is also important since heating of water consumes lots of energy (1kWh = 9L can be heated from 5 to 100°C)
- There are many ways to save in energy and water consumption but f irst you need to know the distribution (how much, when and where)

Questions for the audience:

- 1. Can you get the hourly el. cons. data for your use.
- 2. Do you measure and follow the water consumption? How about hot water consumption separately?



Electricity Pricing in Latvia (Pavilosta)

Until April 2022 shares of different price parts before VAT have been

5

44% transfer, 39% electricity and 17% MPC From April 2022 after 246% increase in el. price: 28% transfer, 61% electricity and 11% MPC (based on Now 2021 el. bill of Pavilosta)



.

Energy audit





Process

REMARKS Covid-19 physical distance / location

2021

Energy efficiency survey in summer/autumn Analysis of responses in January **2022** Preliminary questions in February Teams meeting in March Additional questions in April Port visit in April

Analysing the material in the spring Report of proposed actions and further activities



Port presentation

- Berth places: 20-25
- Depth: 2,5-3,5m
- Occupancy rate of the guest berths (high season/low season): 50-75% / 25-50%
- Annual electricity consumption: 20 000 - 40 000 kWh (three meters)
- Only Latvian small port at open Baltic Sea, non-freezing (source: <u>http://boatpark.lv/</u>)
- The closest point to Sweden from Latvia (80nm from Gotland)



Questions for the audience: Berthing / mooring fees in Latvia?

Is the pricing based on, for example, the energy consumed?

Case Pavilosta Marina

Services

Yacht harbor + electricity (mooring from 20€-25€) Winter storage Holiday houses / Camping Fuel station Playground for childrens / Sports field Motorboat rental Boat slip Shower, toilet, laundry

Garbage collection

Internet access

Fresh water (from well)



What about your ports?

How is the energy supplied and consumption monitored?

Case Pavilosta Marina

Energy supply

From the *Energy efficient and environmentally friendly small port* -survey:

1. The energy supply is from renewable energy sources (eg. wind power, hydro power) NO

2. Port generates part of the electricity itself (eg. solar or wind power) NO

3. Electricity consumption is monitored regularly YES

4. Port's highest energy consumers are known YES



Are these services typical also for your ports from energy comsuption point of view?

Case Pavilosta Marina

Most significant energy consuming services

Hot water production/consumption (many boilers, every house)

Sauna (in one camping house) 8kW stove

Electricity for boats

Other buildings facilities

(heating, cooling, cooking stove, fridge, lihting)

Camping area (electricity)

Outdoor/area lighting

Fuel station (space heating, lighting)



Implemented energy efficiency technologies

Led lighting + motion sensors (partly) Lighting automation Heatpumps Heat recovery (air recuperator system)



Heating and cooling of buildings

- 1. Are there heated/cooled buildings in the port? YES
- These buildings are regularly checked for adjustments and operation of the heating system YES
- 3. These buildings has been checked for tightness of the doors and windows during past year NO
- 4. The mechanical ventilation system of these buildings are regularly cleaned and maintained YES



Buildings & heating

Harbor service building 39.7 m2, without heaters, built in 2019

White camping with 7 separate rooms 111,2 m2, with air recuperator system, build in 2006, reconstruction 2018

Four separate camping houses, small houses 19,35 m2 each and bigger houses 33/93 m2 each, with electrical heaters, build in 2008



Water consumption & wastewater handling

- two water well systems (each equipped with water consumption meter)
- 100 m3 / year
- Hot water boilers of about 2000Land about 16kW rated power

Possibilities to handle dirty and contaminated water

own/local wastewater treatment system

Case Pavilosta Marina --Hourly electricity data analyze





Camping and Marina

Case Pavilosta Marina --Hourly electricity data analyze





Case Pavilosta Marina --Hourly electricity data analyze

High season sample week from beginning of July 2021

Consumption varies between 3 and 16 kWh, and low consuming hours are generally between 01:00 and 08:00

Camping and Marina





Pavilosta Marina el. Consumption Summary			
	2020	2021	2022
Annual consumption kWh	23 443	28 375	
Season consumption (May-Sep) kWh	17 769	19 384	
Off season consumption (Oct-April) kWh	5 673	8 991	
Season consumption (May-Sep) %	76 %	68 %	
Off season consumption (Oct-April) %	24 %	32 %	
Jan-March consumption	2 016	2 630	3 839



Are there any subsidies available for SMEs investing in renewable energy?

Case Pavilosta Marina

Preliminary improvement suggestions

1. Solar power plant

- To compensate the high season el. consumption and high electicity prices
- Daily peaks in consumption are mostly during sunny hours
- Production monitoring can be used for further consumption-production match optimization

Example calculation

- 10 kWp PV system
- Installed price 12 000€ (ref <u>https://aurinkosahkoakotiin.fi/tarjoukset/</u>)
- Estimated shadeless production in Pavilosta c. 9800kWh (panels to south, with 20° inclination) (ref <u>https://re.jrc.ec.europa.eu/pvg_tools/en/</u>)

If 80% of the annual production would be self-consumed and price of saved electricity would be 0.268€/kWh (Pavilosta Marina 2022)

- Saving/year: 0.8 x 9800 kWh x 0.268€/kWh = 2101€
- Payback time would be about 6 years
- (With 50% self-consumption the payback time would be about 9 years)

With current high electricity prices this would be a reasonable investment.



Preliminary improvement suggestions

2. Optimize hot water use

Adjust the temperatures to 55-60 to avoid heat losses

3. Change the camping houses lighting to from halogens to LEDs



Case Pavilosta Marina --Fuel station Hourly electricity data analyze

Fuel station



an 9th years, 2021 and 2022

Series2



Heatpump running 24/7 + one el. Heater. Power use rise during opening hour (lights and gadgets) Case Pavilosta Marina --Fuel station Hourly electricity data analyze



Case Pavilosta Marina --Fuel station Hourly electricity data analyze





Fuel station

Fuel Station el. Consmption Summary		
	2021	2022
Annual consumption kWh	16 504	
Season consumption (May-Sep) kWh	4 459	
Off season consumption (Oct-April) kWh	12 045	
Season consumption (May-Sep) %	27 %	
Off season consumption (Oct-April) %	73 %	
Jan-March consumption	6 427	5 841



Fuel station

Preliminary improvement suggestions

Use the thermostat of the electric heater --> heater goes off when certain temp achieved.

Change all lighting to LED lights

Pateicība! Thank you!







