

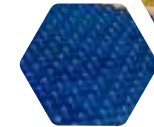
Päikesekollektorid ja akumulatsioonisüsteemid kaugküttevõrgus



Egert Killing | Müügijuht, MSc
Monika Kollo | Insener, PhD

TEEMAD

- FILTER
- Päikesekollektorite süsteem
- Akumulatsioonisüsteemid
 - Lühiajaline soojuse salvestamine
 - Pikaajaline soojuse salvestamine
- Salaspils Siltums näide





MEIE
JALAJÄLG

An aerial photograph of a sandy beach with several footprints. The footprints are arranged in a diagonal line from the bottom left towards the top right. Each footprint is accompanied by a country name and a year in white text.

VENEMAA

2009

BULGAARIA

2008

VALGEVENE

2005

LÄTI & LEEDU

1994

EESTI

1992

A top-down view of a group of people's hands stacked in a circle, symbolizing unity and teamwork. The hands are of various skin tones and are wearing black wristbands with white text. The background is a dark blue gradient.

280 inimest | 14 kontorit



MEIE ÄRISUUNAD



TOOTEVALIK

A photograph of a water treatment facility. In the foreground, there are two large, light-colored metal cabinets or control panels. Each cabinet has a digital display and several analog gauges. Below the gauges, there are yellow flow meters and various pipes. To the right of the cabinets, there is a large, vertical, blue cylindrical tank. The background shows more pipes and equipment, suggesting a complex industrial or municipal water treatment system.

VEETÖÖTLUSSEADMED

A photograph showing a large industrial assembly, possibly a heat exchanger or pump system, being hoisted by a crane. The equipment is mounted on a metal frame and features various pipes, valves, and a red cylindrical component. It is positioned in front of a large, light-blue industrial building with two open bay doors. The scene is set on a paved area, and the shadows suggest it is daytime.

SOOJUSSÕLMEDE LAHENDUSED



| JAHUTUSTORNID



| PUMBAD



AURU- JA KONDENSAADISÜSTEEMID



| ANALÜÜSISEADMED



PROTSESSI AUTOMATISEERIMINE



VÕTMED KÄTTE
LAHENDUSED

VEETÖÖTLUS- JAAMAD





AURU-
GENERAATORID

The image shows a large industrial facility, likely a power plant or refinery, with a complex network of pipes, valves, and large cylindrical vessels. The scene is brightly lit, and the equipment is organized into rows. Two blue circular callouts are overlaid on the left side of the image, containing text in Estonian. The top callout points to the upper part of the machinery, and the bottom callout points to the lower part.

KATLAMAJAD

KOOSTOOTMIS-
JAAMAD



ALTERNATIIV ENERGIA



Päikesekollektorite lahendused

**Soojus- ja absorptsioonpumpade
lahendused**





TEENUSTE ULATUS



TASUVUS-
UURINGUD



TASUVUS-
UURINGUD

LAHENDUS &
PROJEKTEERIMINE



TASUVUS-
UURINGUD

LAHENDUS &
PROJEKTEERIMINE

PAIGALDUS &
KÄIVITUS



TASUVUS-
UURINGUD

LAHENDUS &
PROJEKTEERIMINE

PAIGALDUS &
KÄIVITUS

HOOLDUS

HOOLDUS



SEMINARID



RENDI-
KONTEINERID

STEAM BOX 3

1226kW

Created by

FILTER

ENERGY WATER SOLUTIONS

www.filter.eu



KOGEMUSED

+500 MWe koostootmisjaamu





+500 MWe koostootmisjaamu

+2500 MW katlamaju



+500 MWe koostootmisjaamu

+2500 MW katlamaju

+2000 m³/h veetöötuse lahendusi



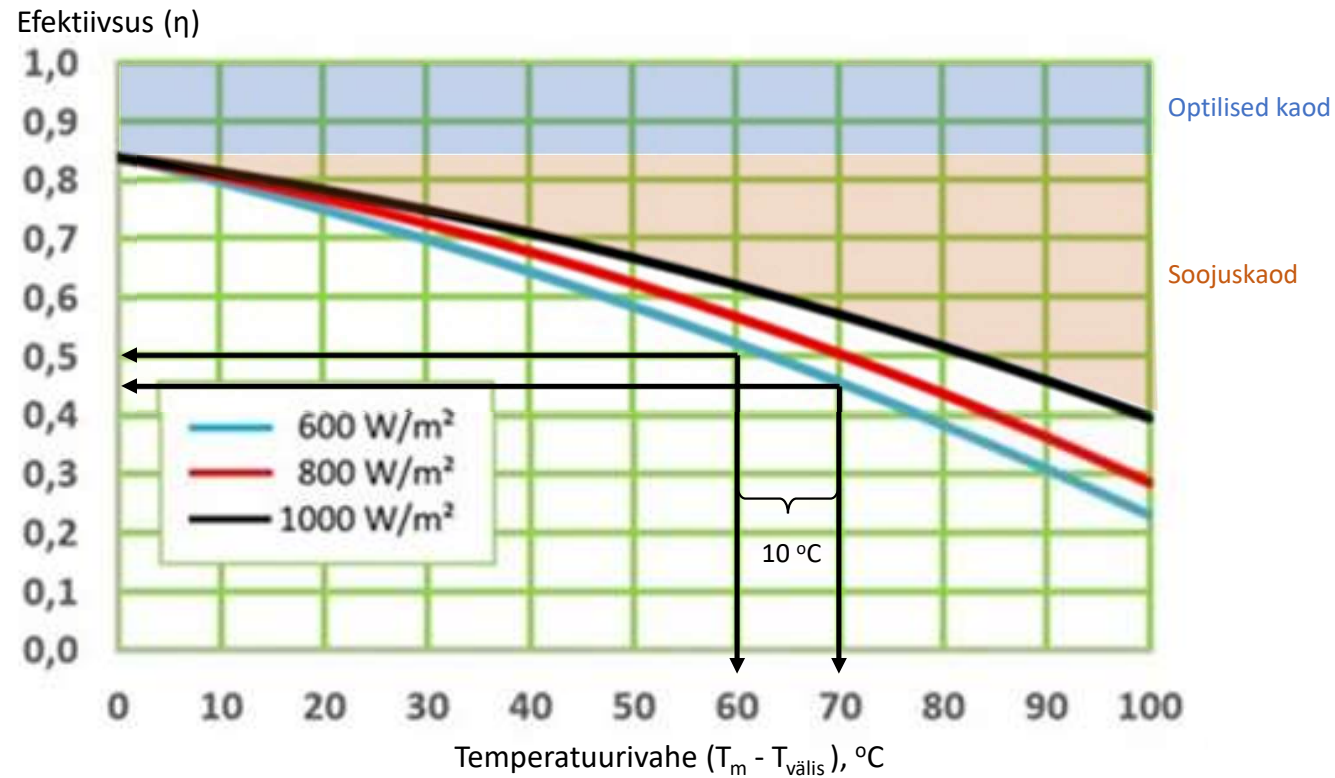
Päikesekollektor

Tasapinnaline ehk plaatkollektor



Plaatkollektorite efektiivsus

10 °C temp. vahe tõus → 5% efektiivuse langus



T_m keskmine soojuskandja temperatuur [°C]
 $T_{v\grave{a}lis}$ keskkonna temperatuur [°C]



Energia kalkulatsioon

SOOVIME TEADA

- Vajalik/võimalik päikesekollektorite jaama võimsus (MW)
- Maa-ala suurus (m^2) päikesekollektorite paigalduseks
- Soojuse salvestamise maht (m^3)

Energia kalkulatsioon

SISENDANDMED

Soojusvajadus

(Tavaliselt Põhja-Euroopas katab päikesekollektorjaam 20% kaugkütte aastasest soojusvajadusest.)

Küttegraafikud ja asukoht

(Mida madalam pealevoolu temperatuur, seda suurem efektiivsus. Mida rohkem päikest, seda parem tootlikkus.)

Üldine info olemasoleva energia tootmise ja salvestamise kohta

(tehnoloogiline skeem, kütused ja energiaallikad, planeeritud seisakud, olemasolevad mahutid, jne.)

Vaba maa-ala

(Tüüpiliselt on vaja 2-2,5 korda suuremat maa-ala kui päikesekollektorite pindala)

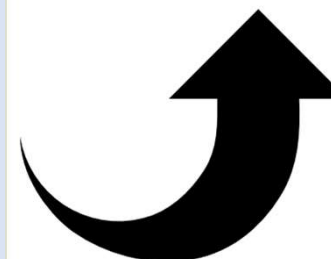
Kaugus kaugküttevõrgust

(Soojuse transport)

The image shows two pages of a technical form titled "SISENDANDMED" (Input Data). The form is divided into several sections:

- 1. Project Data:** Includes fields for Project Name, Customer Name (Company), and Location (City, Type, Region).
- 2. Solar Collector Information:** A table with columns for Type of Solar Collector, Area, Price per Unit, and Total Price. It includes a section for "Information about current type of Solar Collector" and a table for "Solar Collector Data" with columns for Type, Area, Price per Unit, and Total Price.
- 3. Energy Consumption:** A table with columns for Month, Peak Load, and Average Load. It includes a section for "Energy Consumption Data" and a table for "Energy Consumption Data" with columns for Month, Peak Load, and Average Load.
- 4. Other Information:** Includes fields for "Other Information" and a section for "Other Information" with a table for "Other Information Data" and a table for "Other Information Data".

The form is designed to collect detailed data for energy calculations and project planning.



Energia kalkulatsioon

ASUKOHA ANDMED

Meteoroloogilised andmed

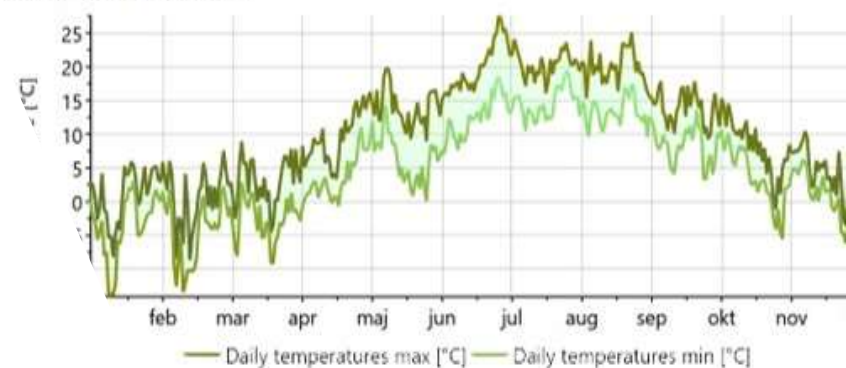
- Välisõhu temperatuur
- Päikesekiirgus

Vaba maa-ala andmed

- Pindala
- Kuju
- Reljeef
- Pinnas
- Varjud (nt kõrged hooned, puud)



Daily temperature



Energia kalkulatsioon

TULEMUSED



Version 1.04

Project number	01-08-19 Lho			Temperatureside	-	Secondary		Calculate
Project name	Bauskas			Heat exchanger dT	K	4		
Longitude	24,19	dec °	Coordinates	Total panels	#	930,0	Control Panel	
Latitude	56,41	dec °		Total solar field area	m²	11680,8		
TimeZone	Helsinki; Kyiv; Riga; Sofia; Tallinn; Vil UTC 2			Total land area	m²	28411,5	Aperture	
Solar radiation data	Meteonorm			Output pr. m²	kWh/m²/år	390		
Temperature data	Meteonorm			Heat loss	%	2,0		
	Import Meteonorm file				MWh	93		

SolarField

Panel type	# Rows	Panels pr. row	Row distance [m]	Tilt angle [°]	Azimuth angle [°]	Solar collector area [m²]	Land area [m²]	Temperature profile
HT-SolarBoost 35/10	62,0	15,0	5,00	25,0	0,0	11681	28412	Full

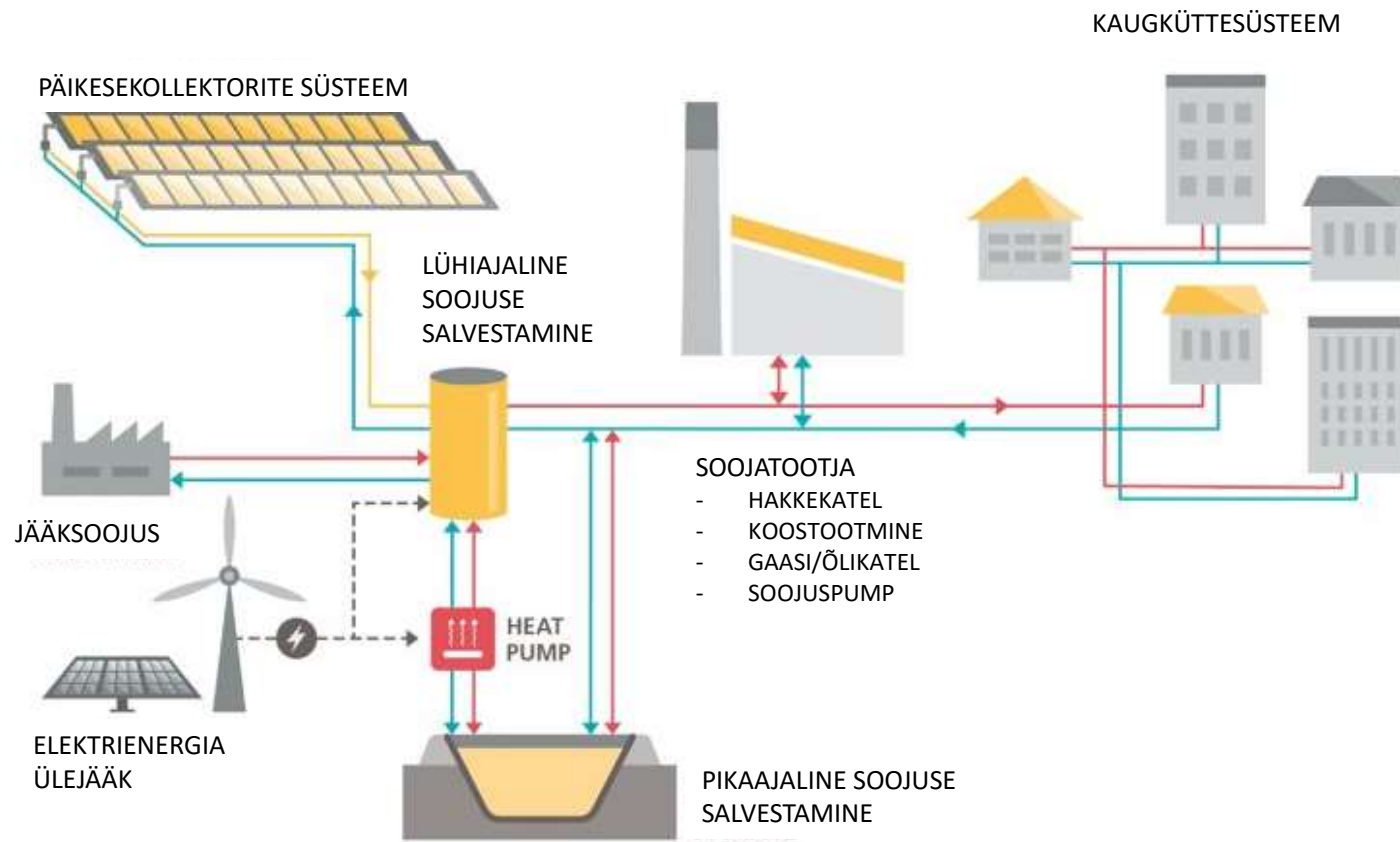


Soojuse salvestamine

- AKUMULATSIOONIMAHUTI -
Lühiajaline salvestamine
- PIT-STORAGE – pikaajaline
salvestamine



Integreeritud süsteem

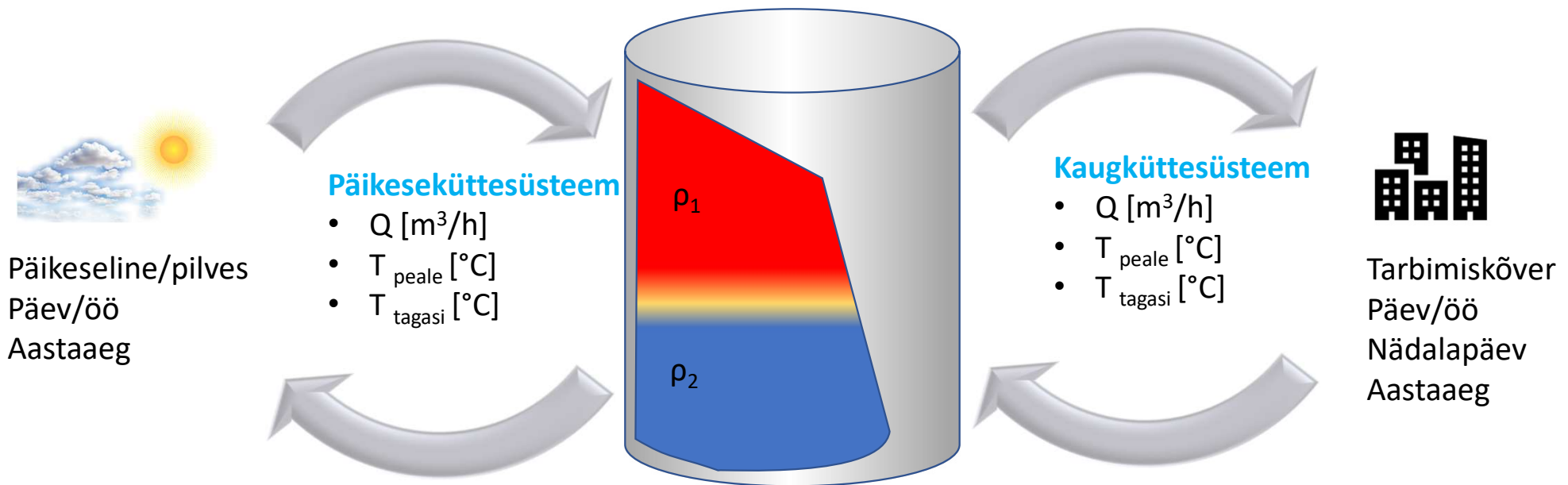


IEA SHC TASK 55

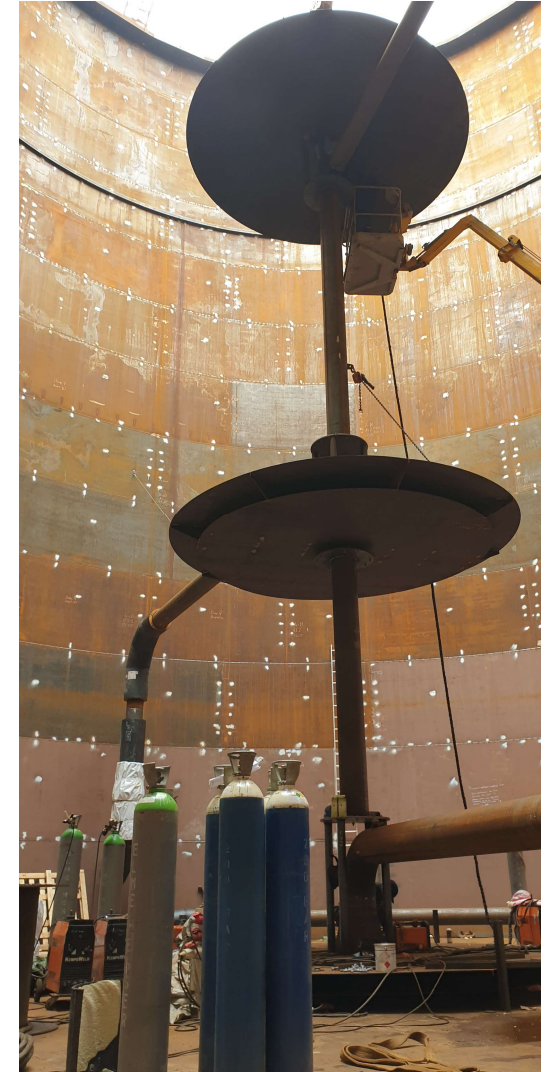
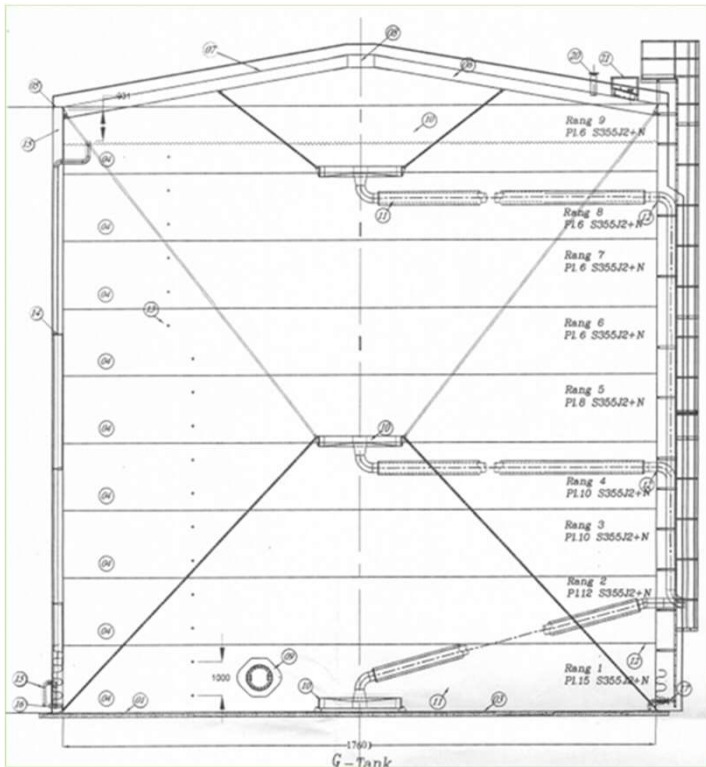
Optimaalne mahuti disain?

Akumulatsioonimahuti

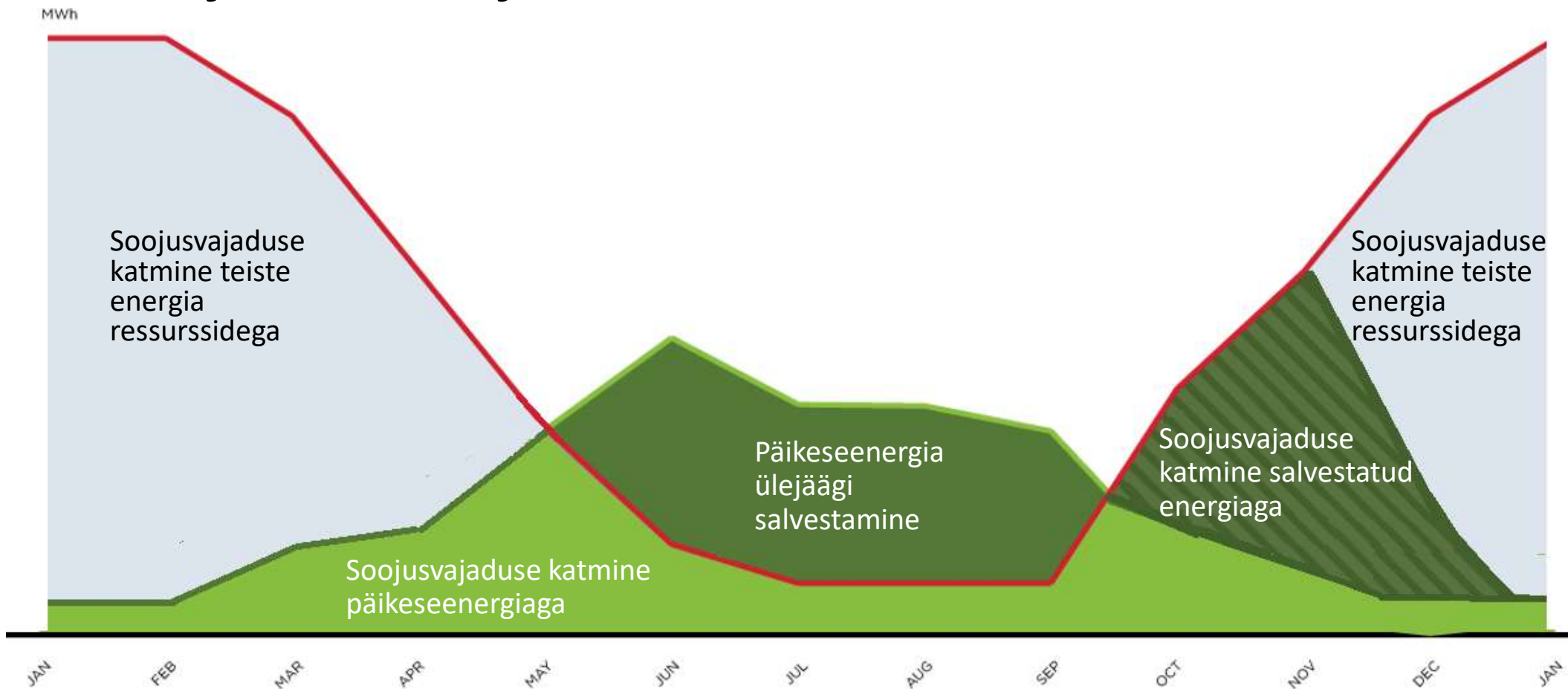
- $V_{\text{optimaalne}} [\text{m}^3]$
- Torustik
- $H/D [-]$
- Kuju
- Materjal
- Salvestusperiood



Difuusorid



Pikaajaline soojuste salvestamine

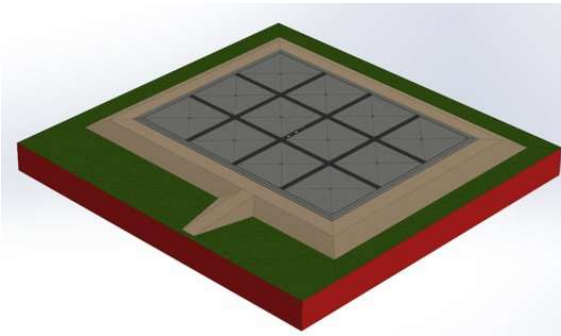


Pikaajaline soojuse salvestamine - *PIT-STORAGE*

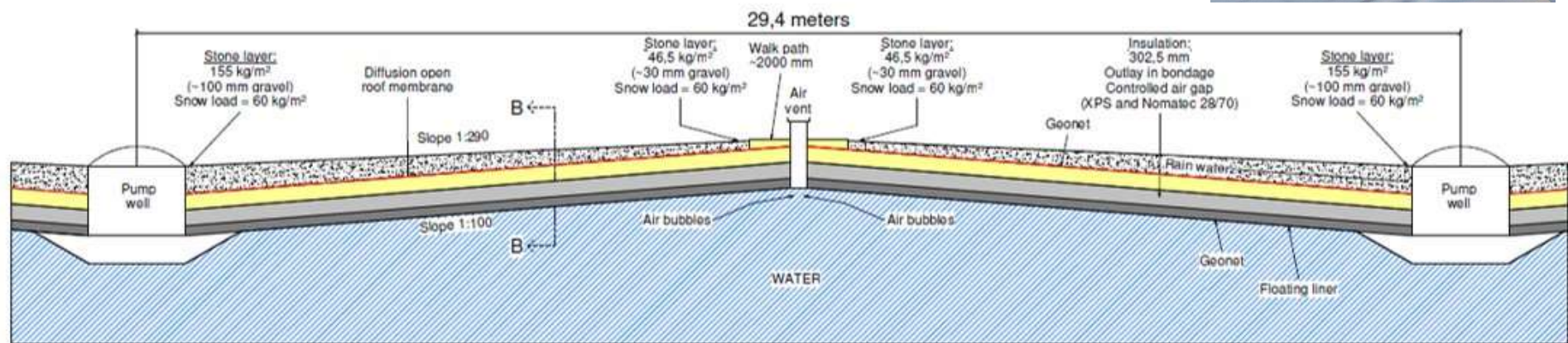
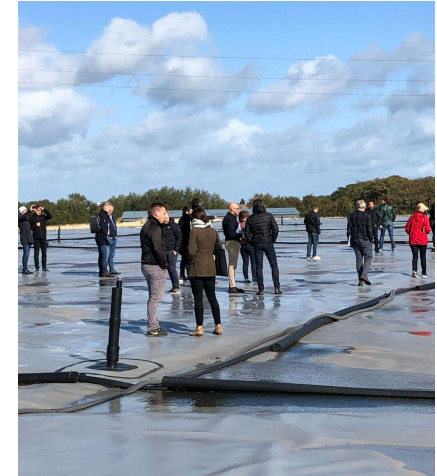
75 000 m³ soojussalvesti Marstalis Taanis



Pikaajaline soojuse salvestamine - *PIT-STORAGE*

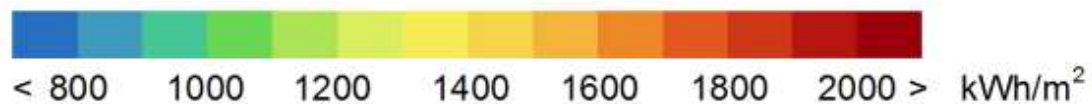


KATE KOOSNEB 30 x 30 m MOODULITEST



An aerial photograph of an industrial site, likely a paper mill or chemical plant. A large, rectangular array of blue solar panels is installed in a field. In the foreground, there is a tall, white cylindrical storage tank with the company logo and name. Several industrial buildings with yellow and grey roofs are visible, along with a tall smokestack. The site is surrounded by green trees and fields.

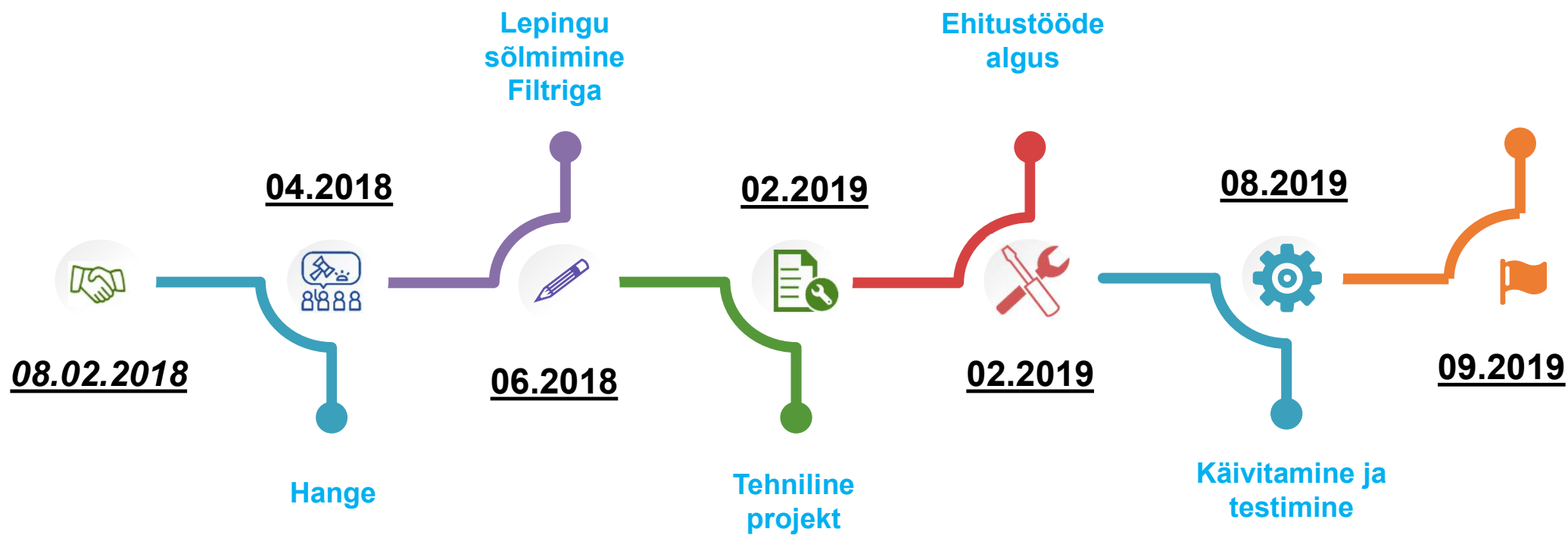
Salaspils Siltums




Maailma juhtiv päikesekollektorite süsteemide kasutaja
kaugküttes- **Taani**

Taani kollektorite kogupindala- **1 303 838m²**

Installeeritud päikesekollektorite koguvõimsus-
917,7 MW



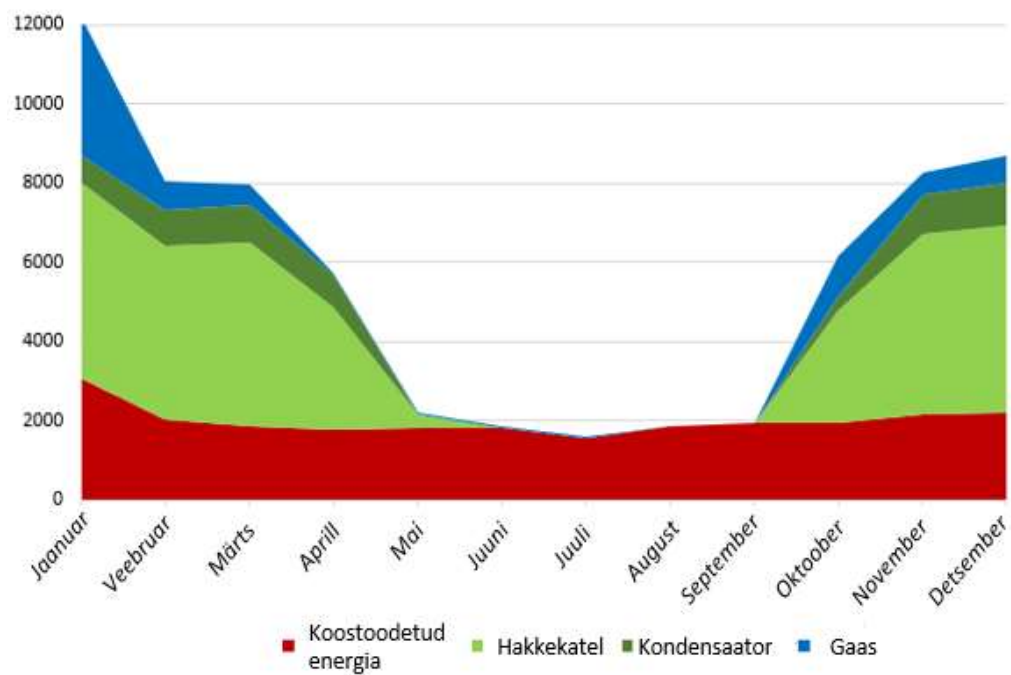


1720 päikesekollektorit pindalaga 21 672 m²
Aastane planeeritav energiatoodang 12 000 MWh
Tipuvõimsus 14,5 MW

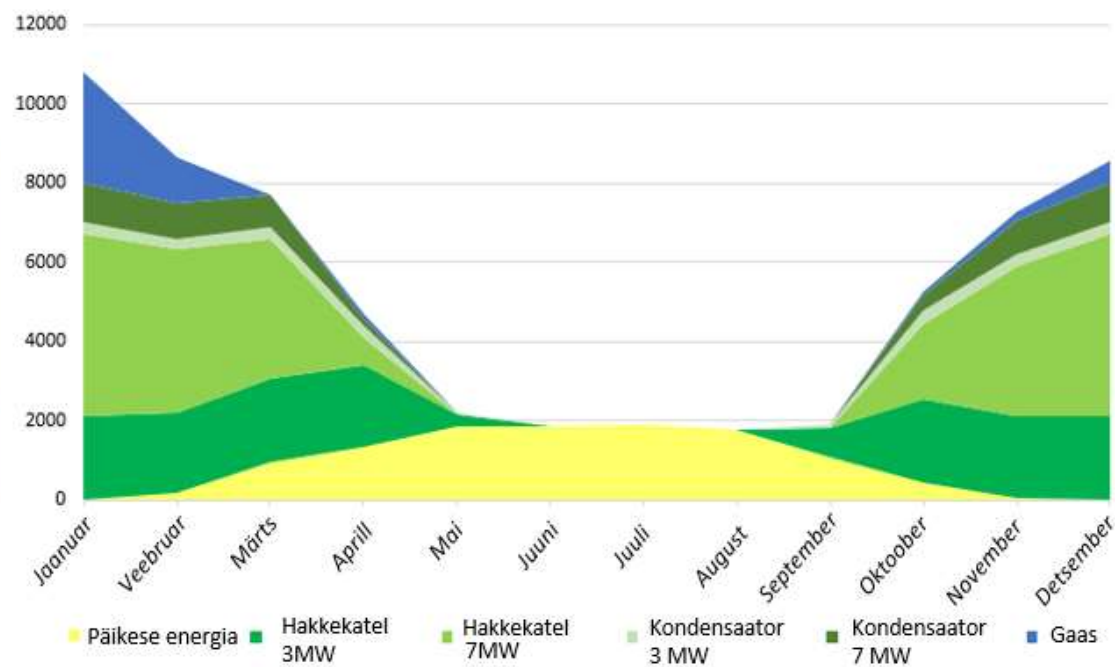
Akumulatsioonimahuti 8000 m³

3 MW hakkekatlamaja

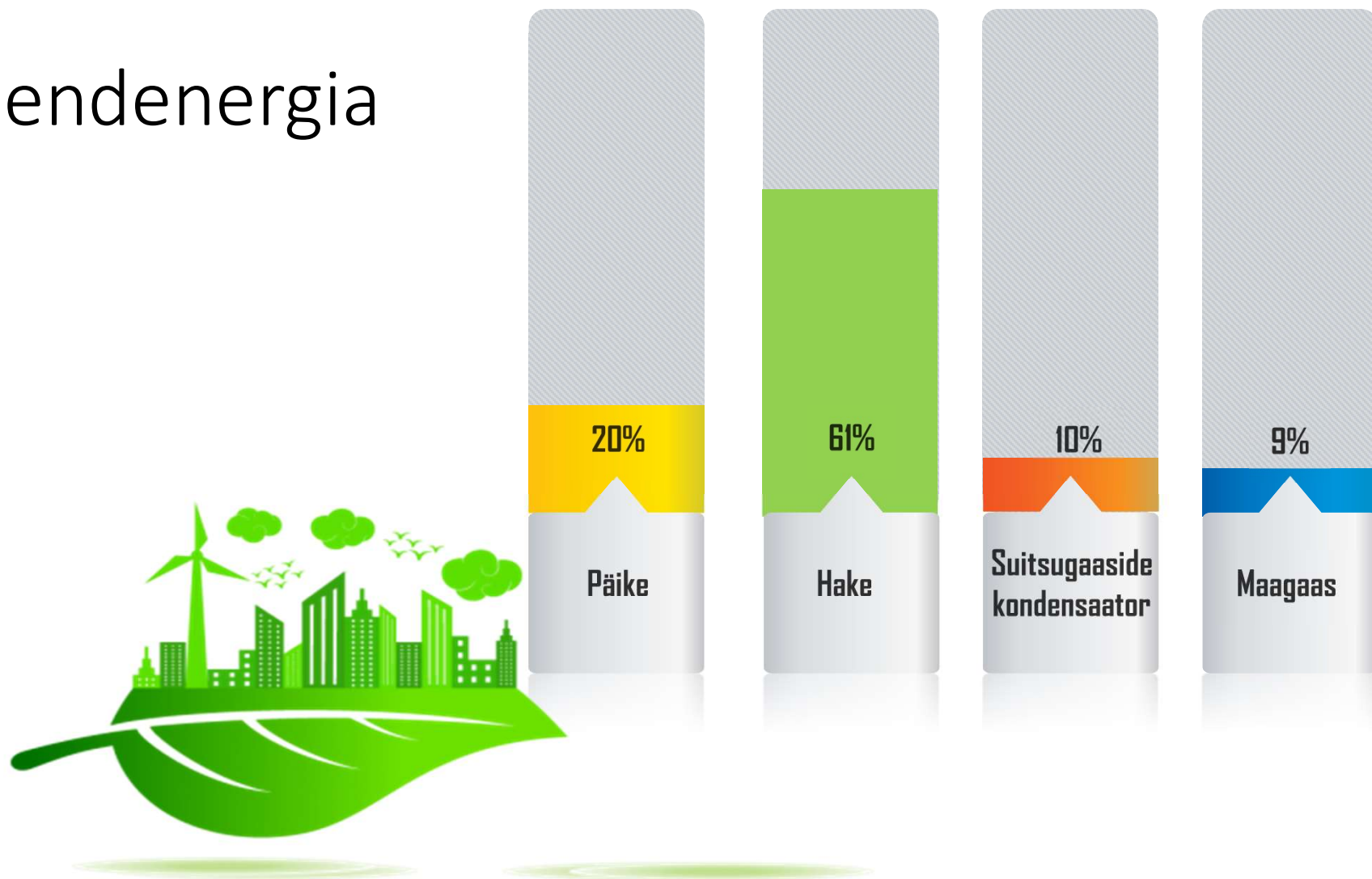
2016



Planeeritav



Salaspils sisendenergia jaotus

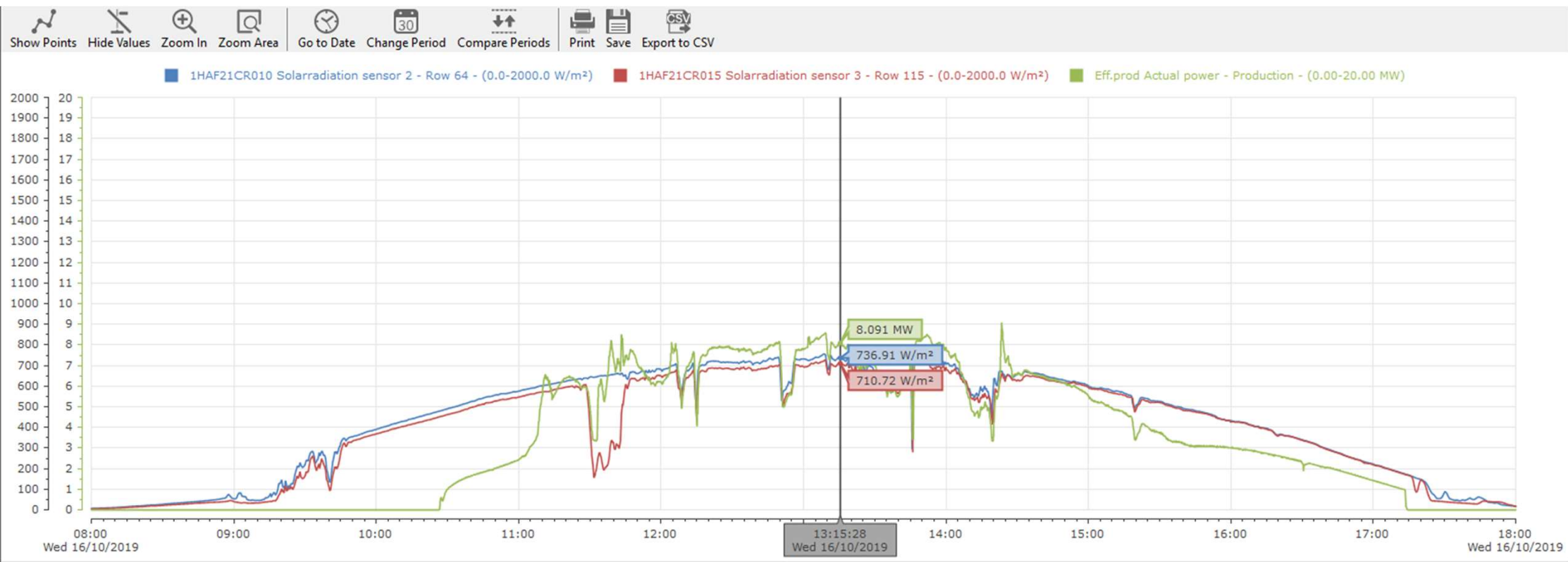


Päikeseenergia toodang 16. oktoobril

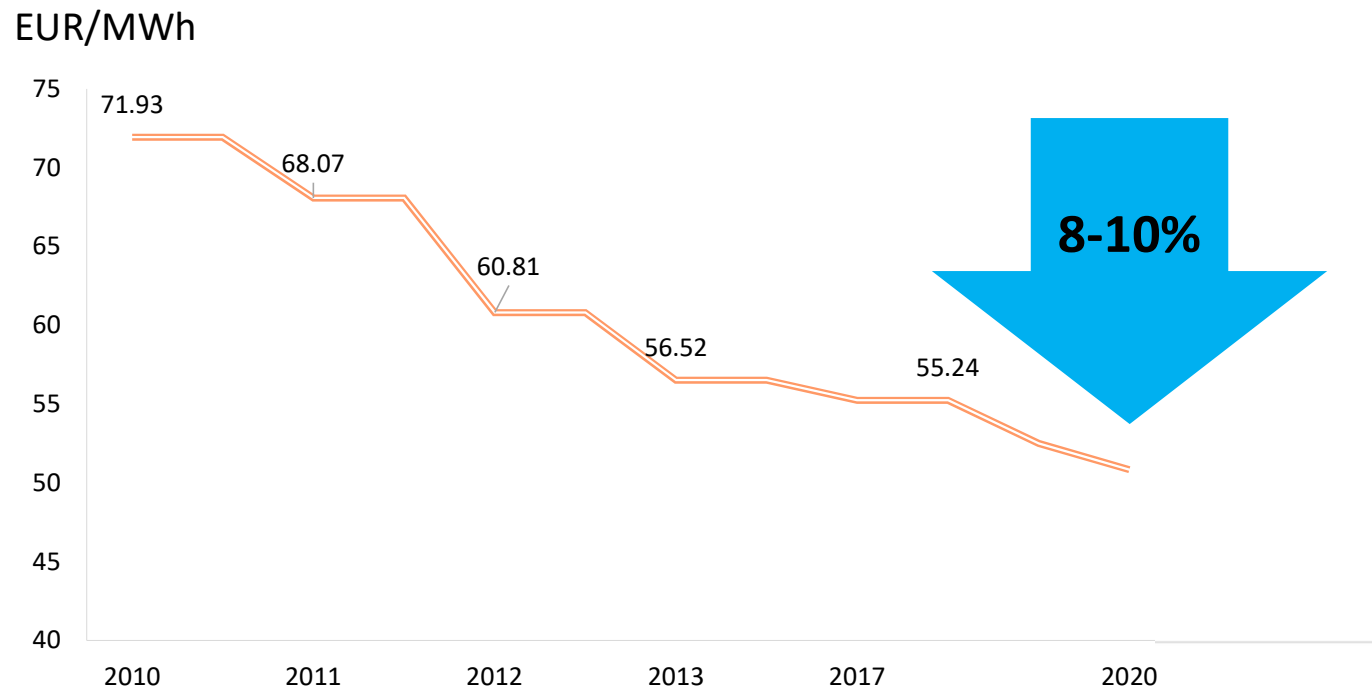
Päikese kiirgus: 724 w/m²

Toodang: 374 w/m²

Efekiivsus: 52%



Soojusenergia hind Salaspilsis



Eelised:



Tasuta energia

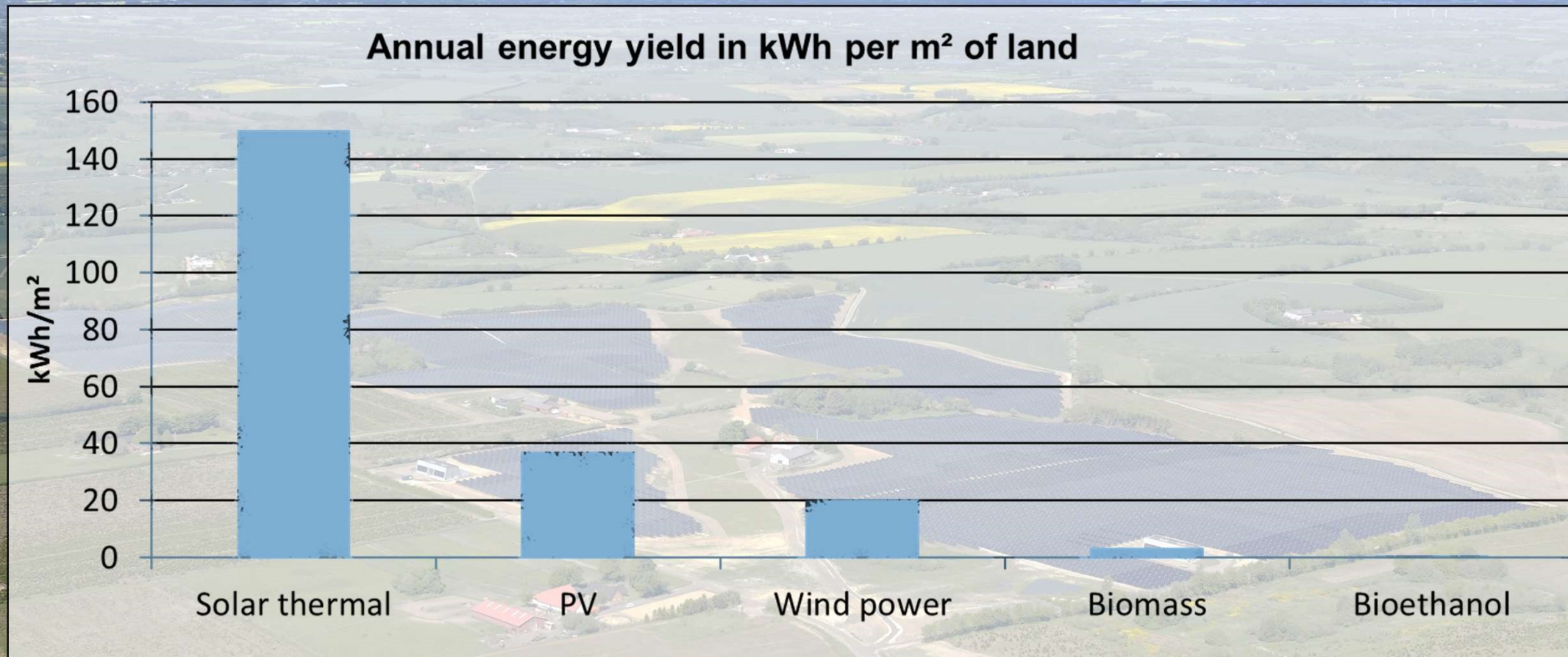


CO₂ emissioonid
vähenevad

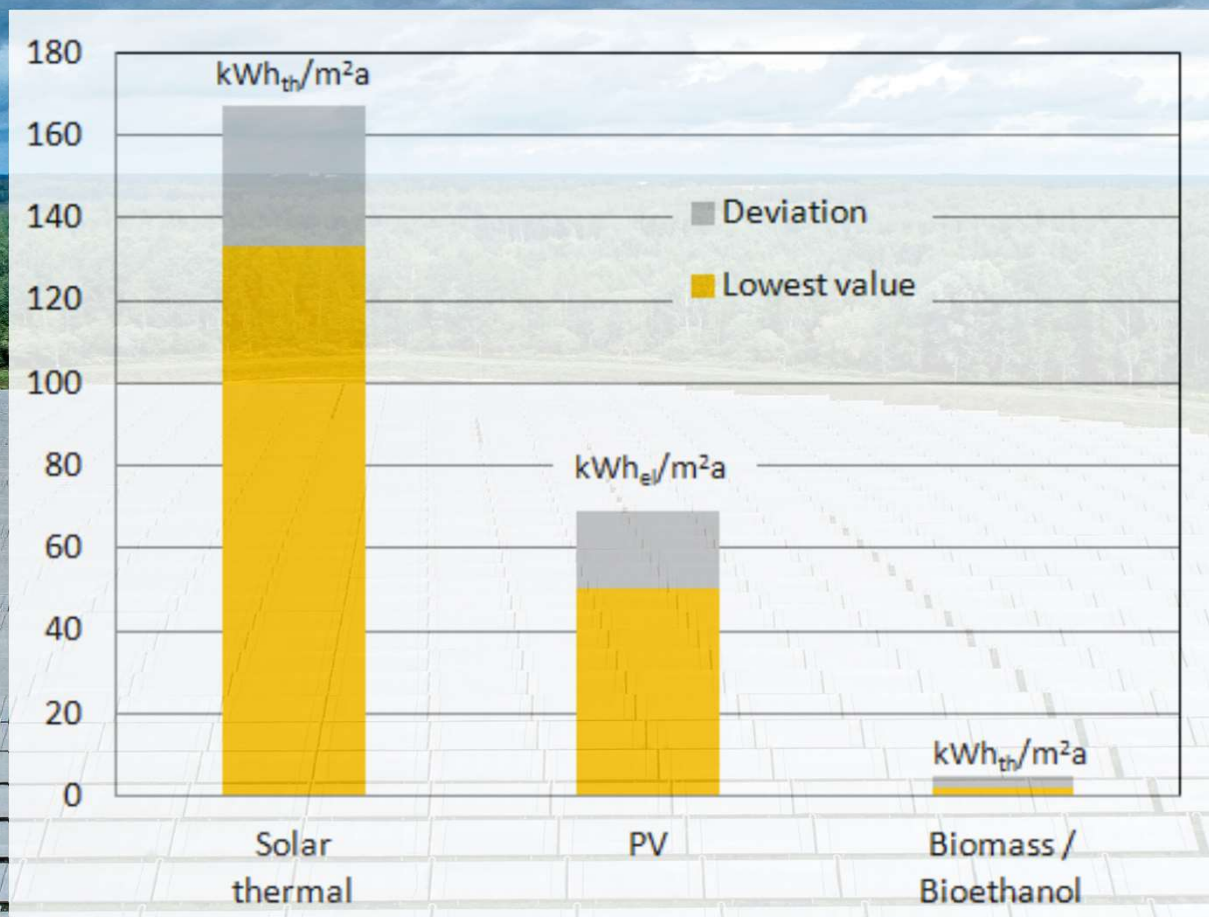


Süsteemi paindlikus
suureneb

Mõistlik maa kasutus



Miks päikeseenergia?



Registreerige ennast väljasõidule Salaspilsi:
filter@filter.ee

Jälgi meid veebis:



| filter.eu

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Akumulatsioonimahuti integreerimine

