

AKADEEMIA 5A ÜHISELAMU RENOVEERIMINE

Kalle Kuusk

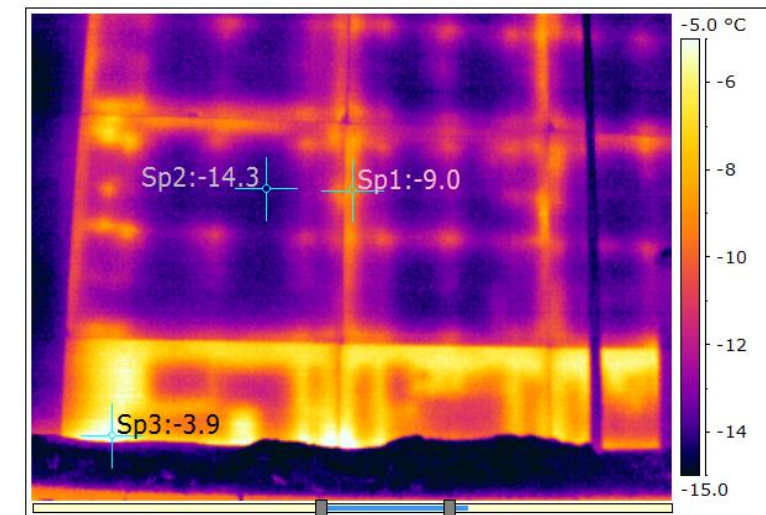
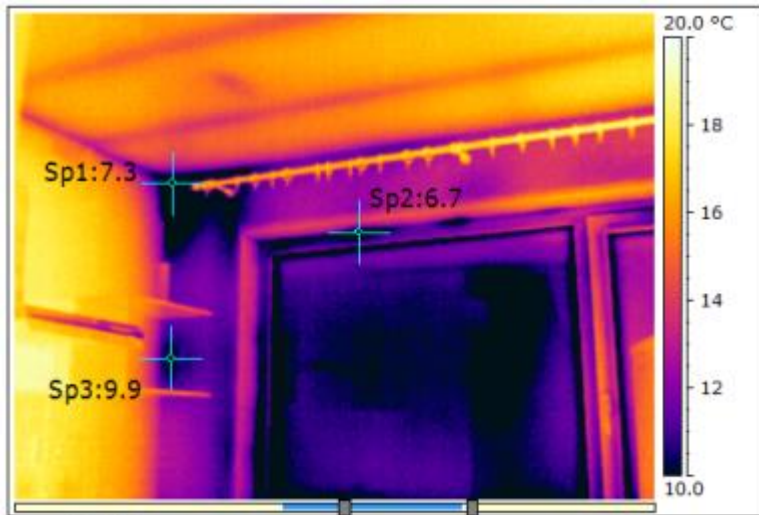
17.04.2019

RENOVEERIMISEELNE OLUKORD

- Raudbetoon suurpaneelelamu (seeria 121)
- Ehitusaasta 1986
- 5 korrust, 80 korterit
- Energiamärgise klass F
- Suur energiatarve, sisekliima probleemid



**TAL
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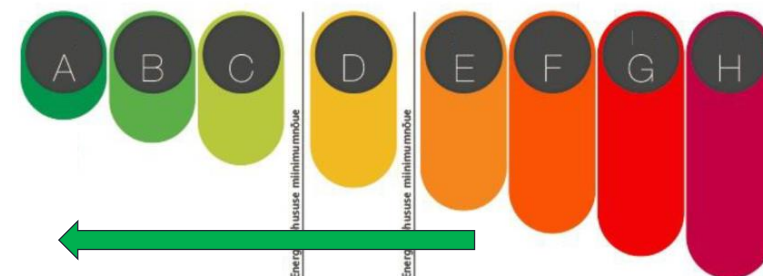
LIGINULLENERGIAHOONEKS RENOVEERIMINE

Tehases eeltoodetud lisasoojustus- elemendid:

- Välisseinad $U=0.11 \text{ W/(m}^2\text{K)}$
- Aknad $U=0.85 \text{ W/(m}^2\text{K)}$
- Katus $U=0.10 \text{ W/(m}^2\text{K)}$

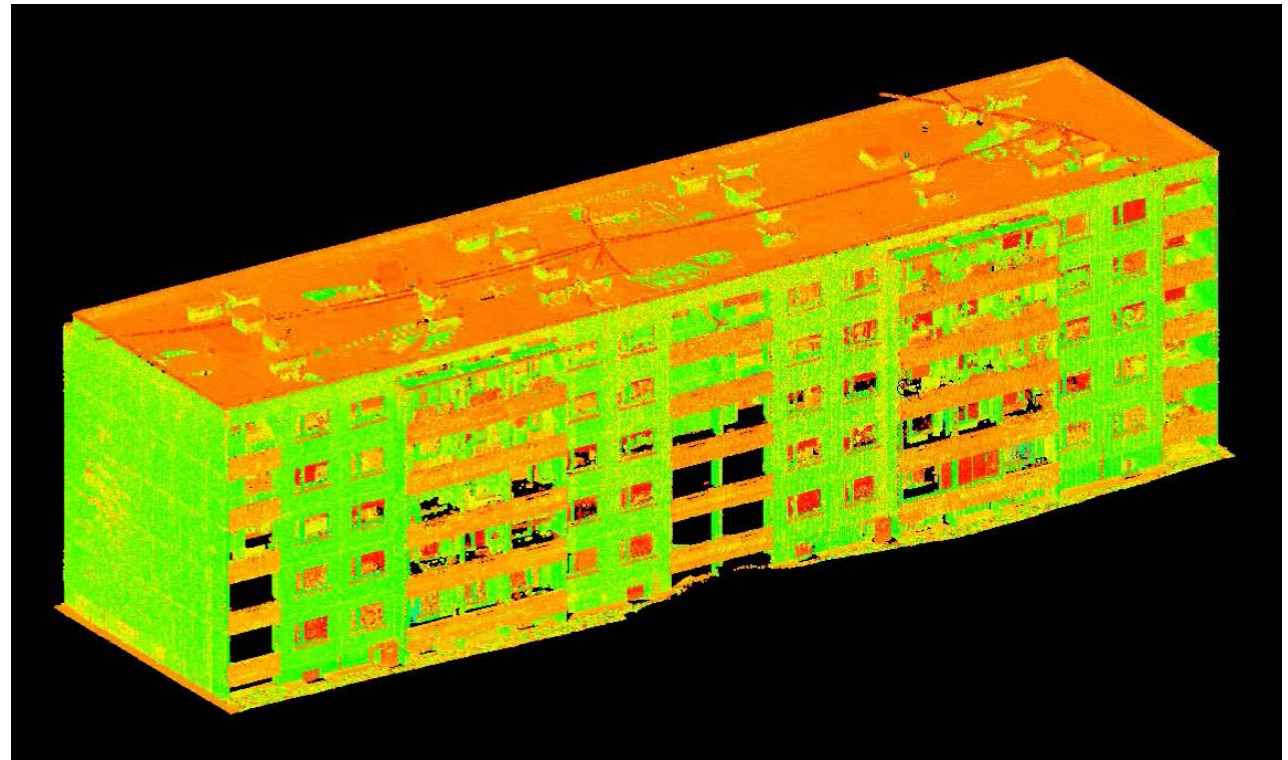
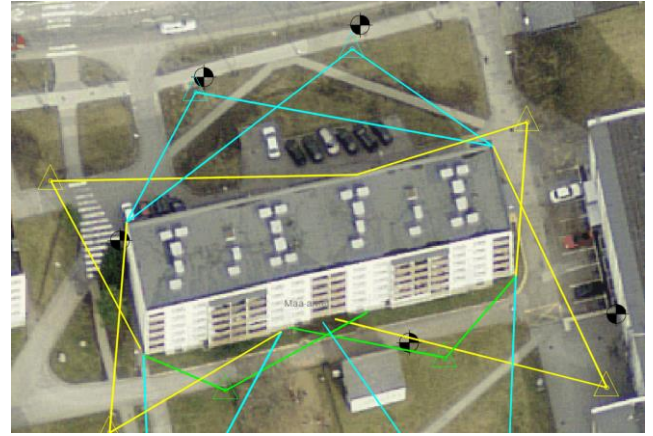
Tehnosüsteemid:

- Soojustagastusega ventilatsioonisüsteem
- Uus kahetoru küttesüsteem
- Päikesepaneelid (elekter)
- Päikesekollektorid (soe vesi)
- Heitvee soojustagastus



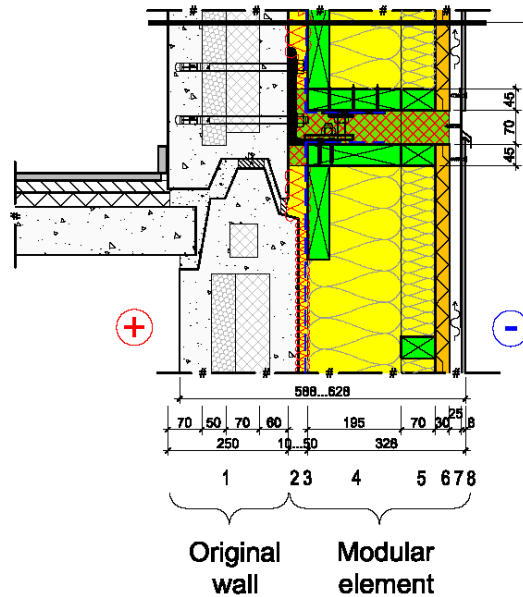
HOONE ÜLESMÕÕDISTUS

- 10 jaama, 7 reeperit
- Välitööde kestus 2 päeva



VÄLISSEINAD

C

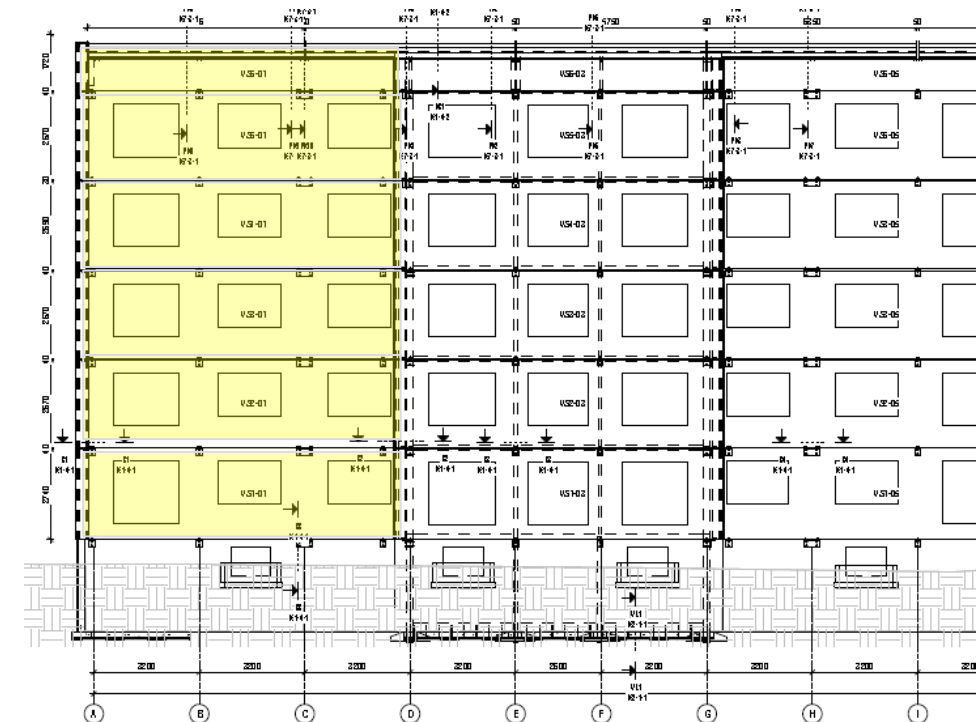
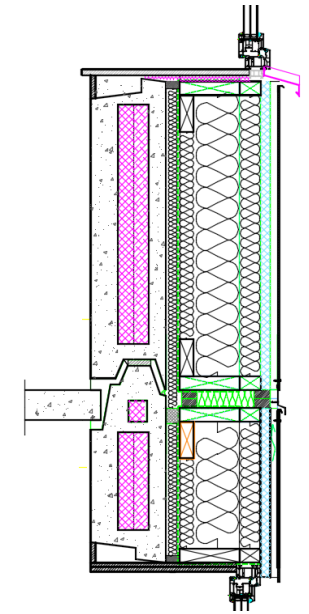


1. Existing concrete panel	250mm
2. Filling mineral wool (A1; $\lambda_D=0.035$ W/(mK))	10...50mm
3. Air&vapor retarder (vapor resistance $Z_p=1.6...27 \times 10^9$ (m ² sPa)/kg)	
4. Timber frame 45×195mm cc.600mm / min.wool (A1; $\lambda_D=0.035$ W/(mK))	195mm
5. Timber frame 45×70mm cc.600mm / min.wool (A1; $\lambda_D=0.035$ W/(mK))	70mm
6. Semi-rigid mineral wool slab with special wind barrier facing (vapor permeability $\delta_p=150 \times 10^{-12}$ kg/(msPa); taped joints, A2-s1,d0; $\lambda_D=0.031$ W/(mK))	30mm
7. Ventilated airgap	25mm
8. Facade board - rainscreen	8mm



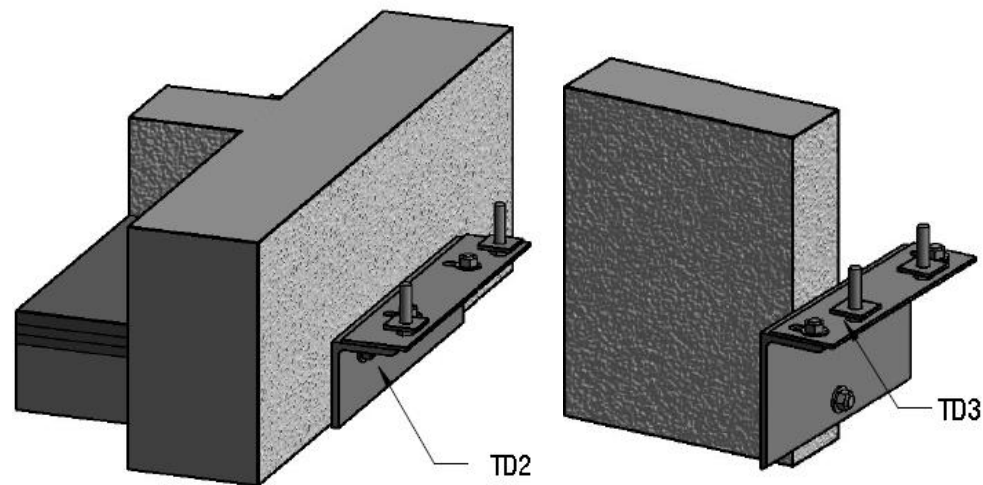
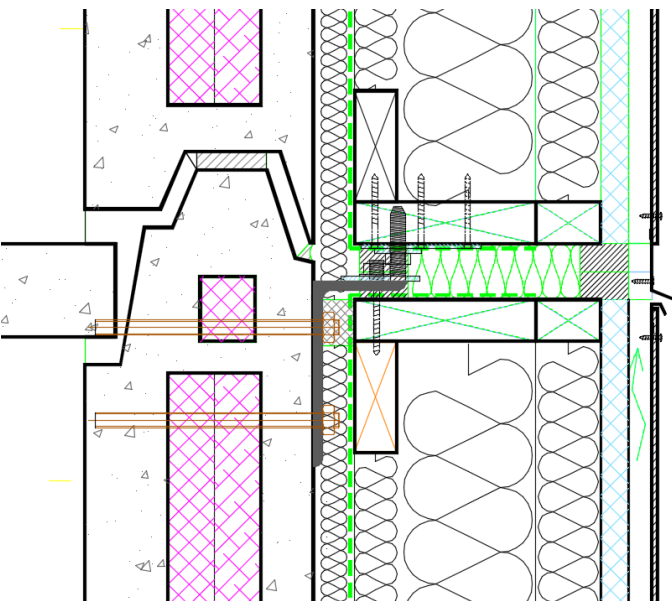
VÄLISSEINAD

- Elementide mõõdud ~9.3 x 2.7m
- Elemendis 2-3 akent, tehases paigaldatud
- Ühe elemendi paigalduse aeg: 15...20 minutit

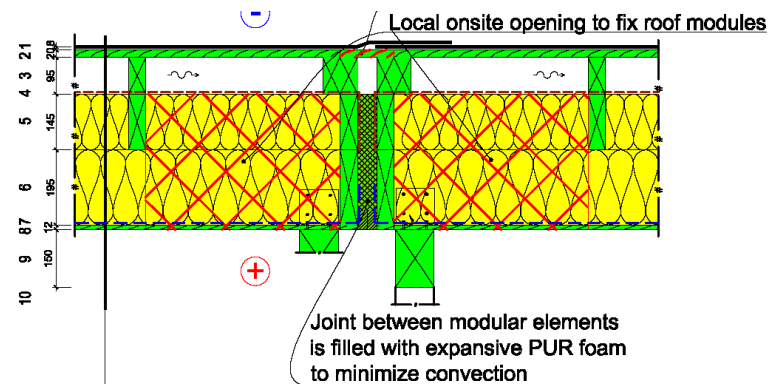


SEINAELEMENTIDE KINNITAMINE

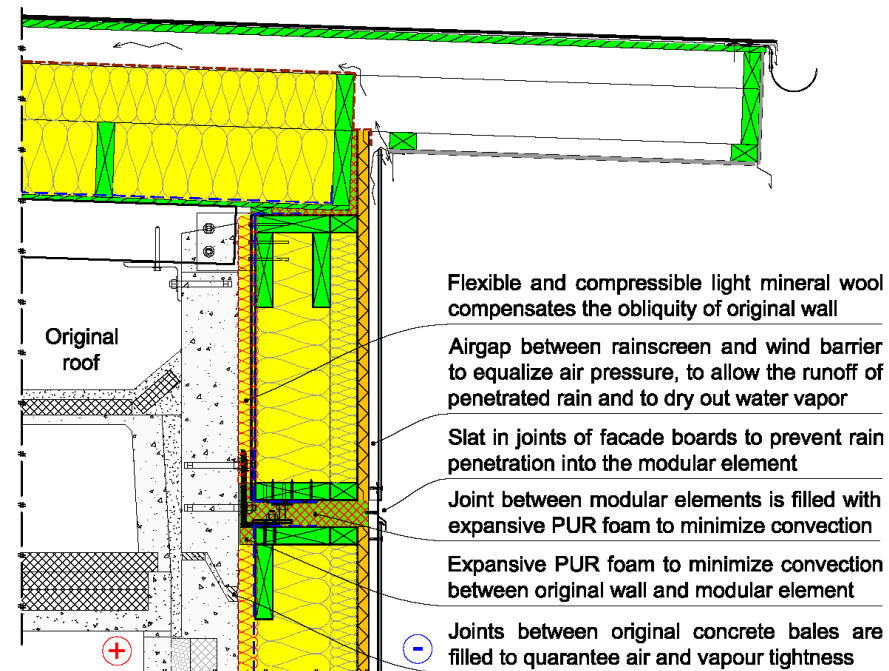
- Kolmes suunas reguleeritavad kinnitused



KATUS

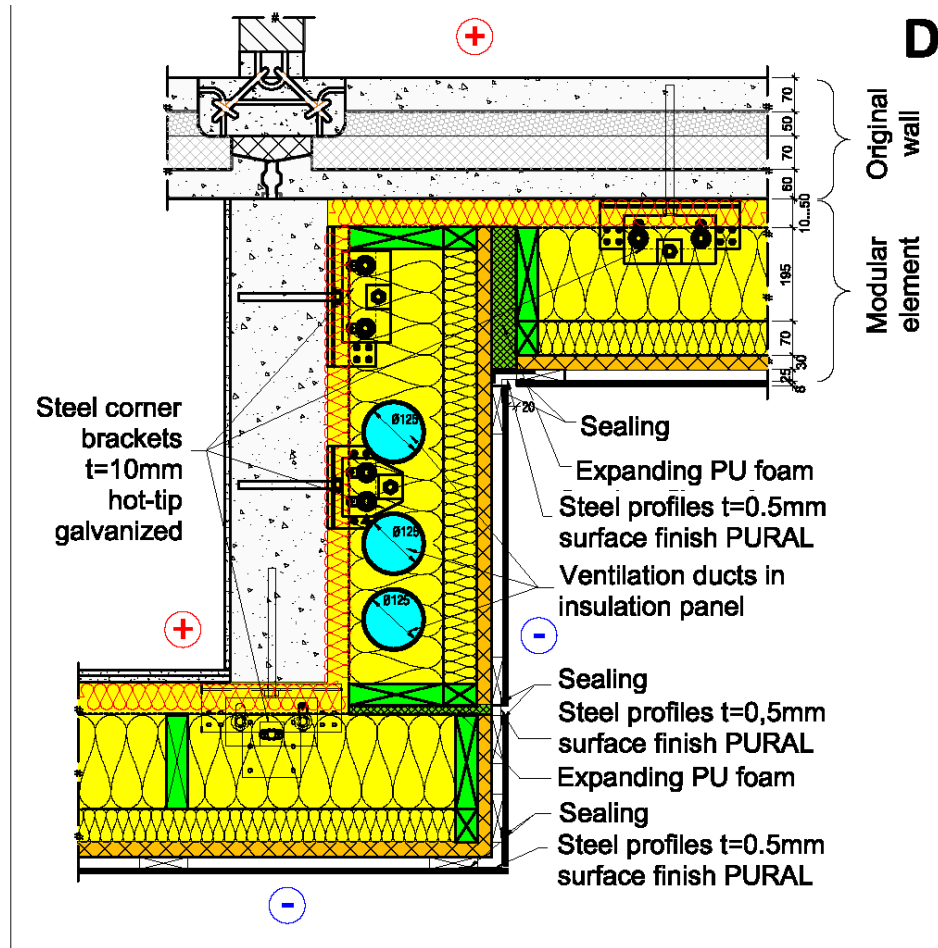


1. 2xSBS roof membrane	8mm
2. Waterproof plywood boards	20mm
3. Ventilated airgap	95mm
4. Water vapour permeable roof membrane $S_d \geq 0.02m$	
5. Timber frame 45x145mm cc.600mm / mineral wool (A1; $\lambda_D=0.035 W/(mK)$)	145mm
6. Timber frame 45x195mm cc.600mm / mineral wool (A1; $\lambda_D=0.035 W/(mK)$)	195mm
7. Vapour barrier: PE foil	0.2mm
8. OSB-board	12mm
9. Supporting timber frame (beams)	150mm
10. Supporting timber frame (columns)	>400mm



A B

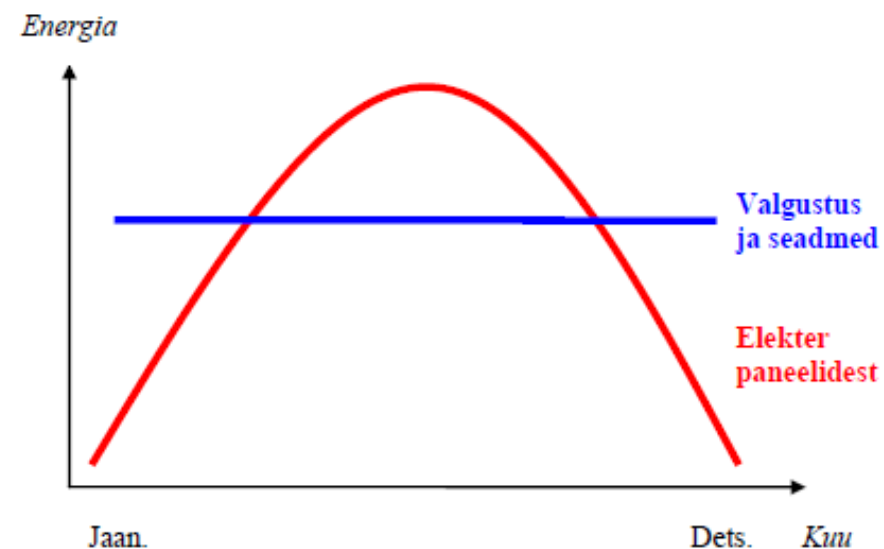
VENTILATSIOONITORUSTIK



TAASTUVENERGIA

Päikeseenergia süsteemid:

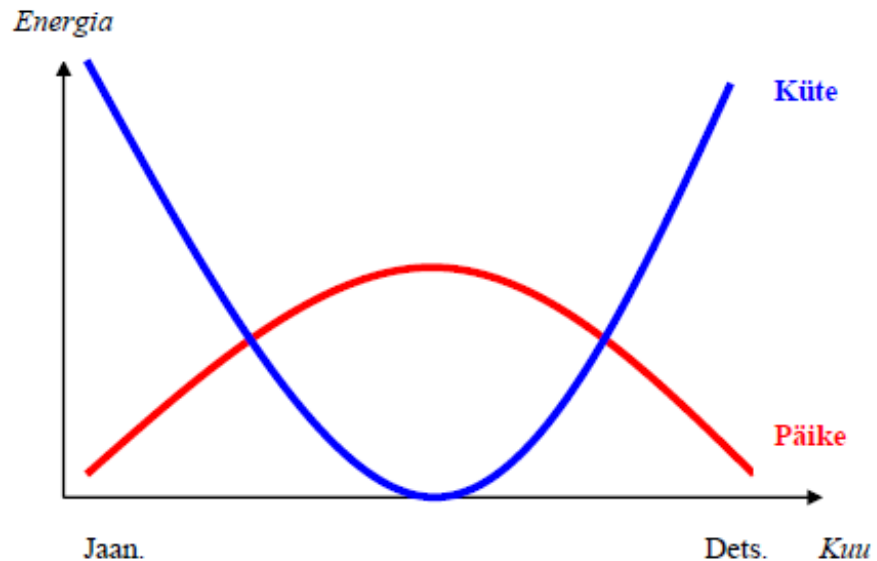
- Päikesepaneelid elektri tootmiseks (55 paneeli, kokku 14 kW)



TAASTUVENERGIA

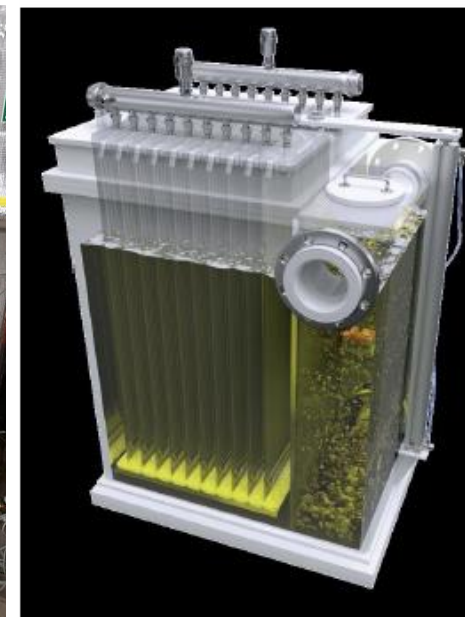
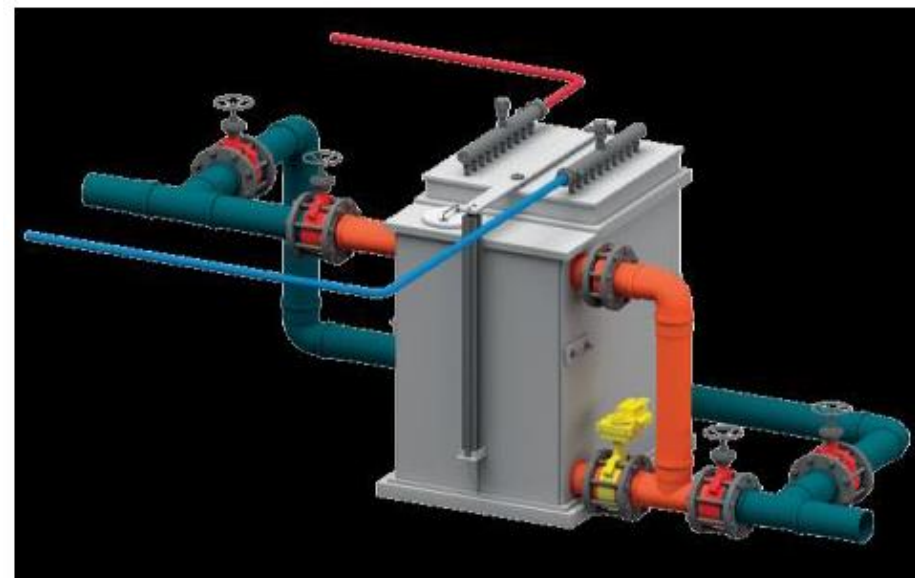
Päikeseenergia süsteemid:

- Päikesepaneelid elektri tootmiseks (55 paneeli, kokku 14 kW)
- Päikesekollektorid sooja vee tootmiseks (50 paneeli pindalaga 100 m²)



HEITVEE SOOJUSTAGASTUS

- Ühe trepikoja hallvesi (dušš ja segistid) suunatakse heitvee soojustagastisse
- Hallvee kanalisatsioon on eraldi püstikutega ja soojustaud torustikuga
- Heitvee soojusega tõstetakse hoonesse siseneva külma vee temperatuuri



ELEMENTIDE PAIGALDUS



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ARENDUSTÖÖ JÄTKUB EESMÄRK ON EELTOOTMISE KASUTUSELEVÖTT RENOVEERIMISES



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TALLINNA TEHNIKAÜLIKOO

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taltech.ee