

Päikeseelektrisüsteemide toodangu arvutamine

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Roofit.solar
Photovoltaic metal roofs

Päikesepaneelide nominaalsed parameetrid



**Standard Test Conditions:
1000 W/m², 25°C, 1.5 AM**

Photowatt
TECHNOLOGIES

MODULE TYPE : PW 1650

NOMINAL VOLTAGE	:	24 V
TYPICAL PEAK POWER (Pmax)	:	165 W
VOLTAGE @ PEAK POWER (Vmp)	:	34.4 V
CURRENT @ PEAK POWER (Imp)	:	4.8 A
SHORT CIRCUIT CURRENT (Isc)	:	5.1 A
OPEN CIRCUIT VOLTAGE (Voc)	:	43.2 V
MINIMUM POWER (Pmin)	:	160.0 W

(Above specifications @ STC: Insol. 1000W/m², AM 1.5, Cell T 25°C)

MAXIMUM SYSTEM VOLTAGE	:	770 V
MINIMUM BYPASS DIODE	:	6 A
SERIES FUSE	:	8 A

COPPER FIELD WIRING 1.5 - 4 mm²/AWG 11 - 16
INSULATED FOR MINIMUM 75°C

 PV Quality Mark®
No. 001-B-02-1002

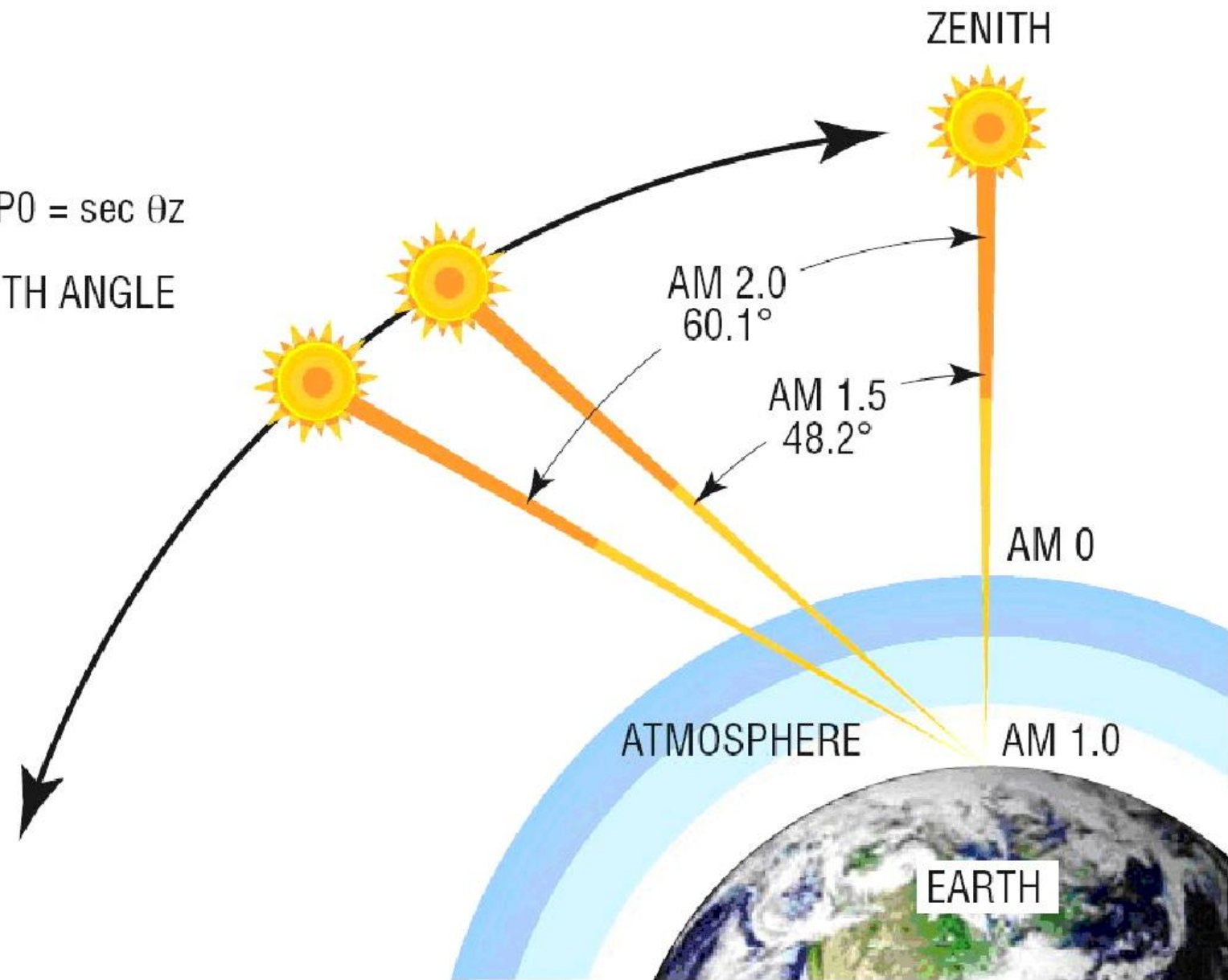
CE Made in France

Q4-06

Õhumassi indeks

$$AM \approx P/P_0 = \sec \theta_z$$

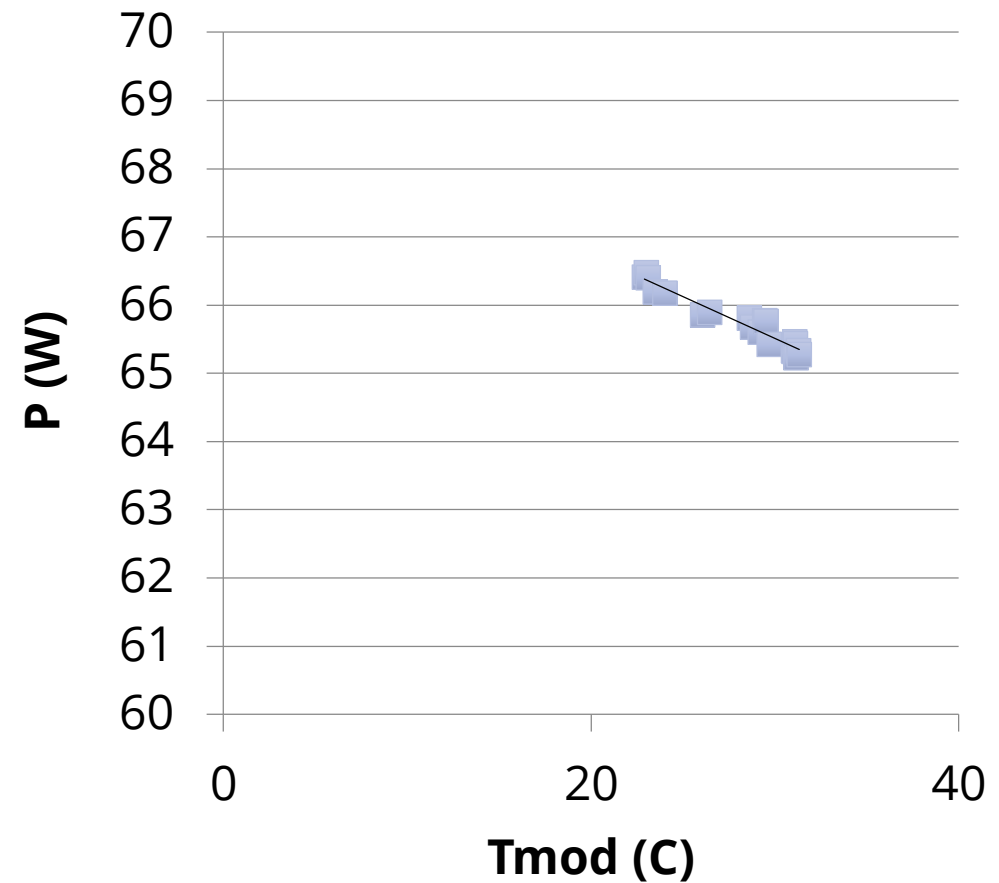
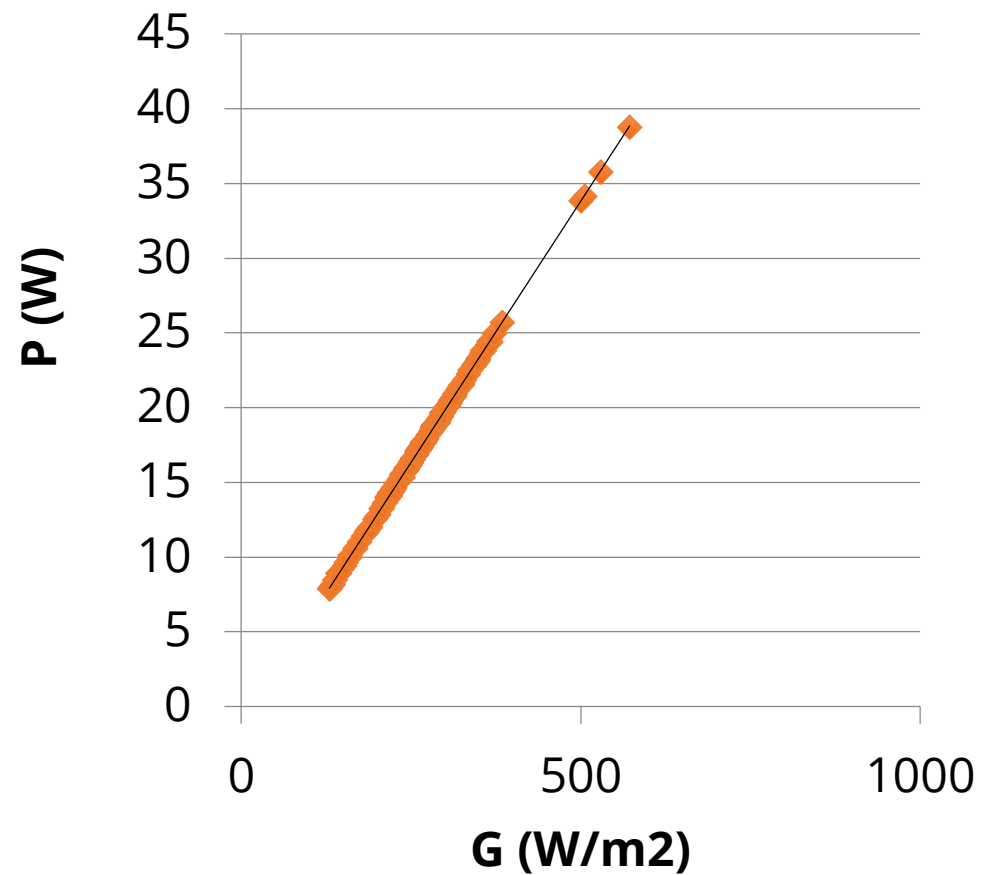
θ_z - ZENITH ANGLE



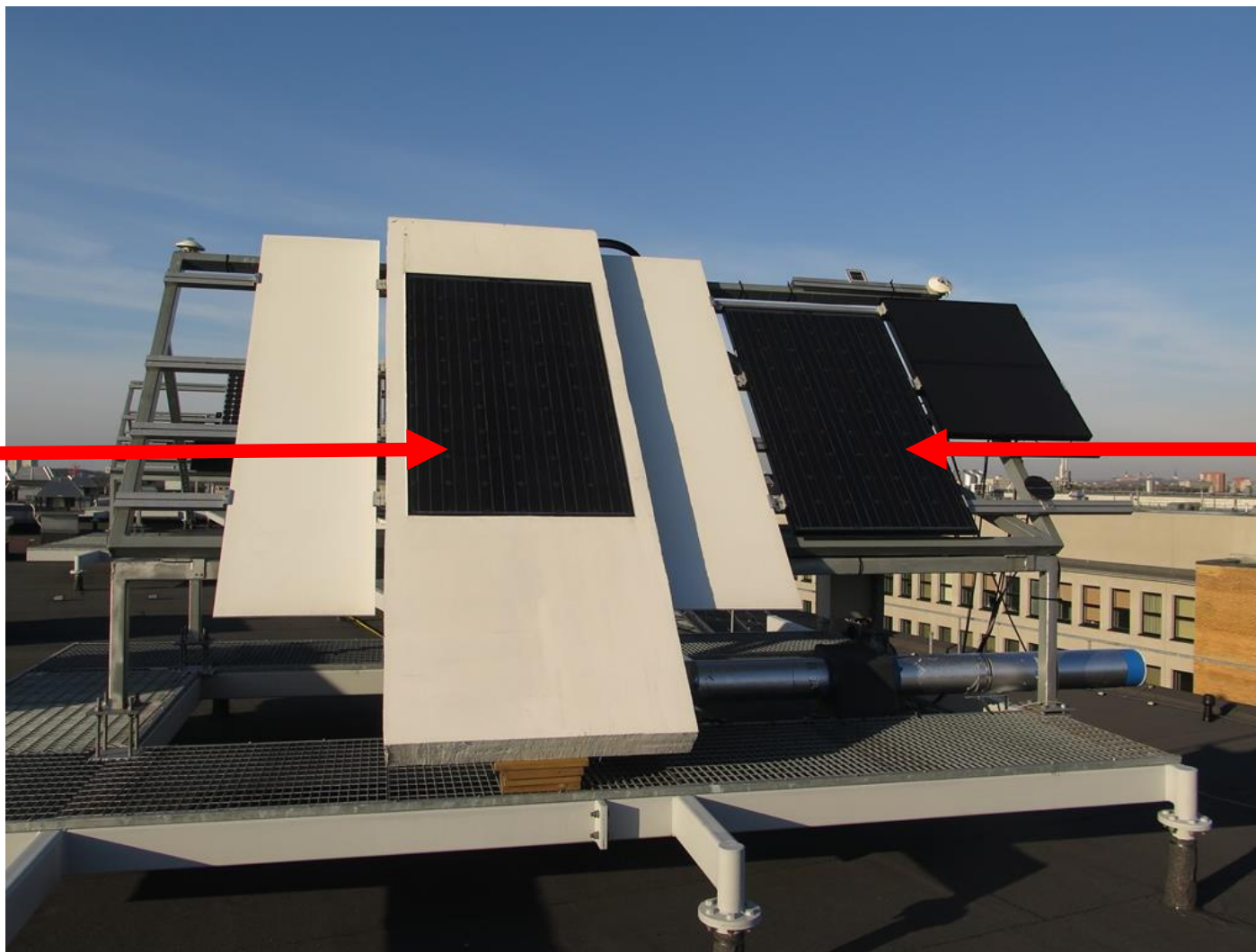
Päikesepaneelide tegelikud töötingimused

Parameeter	STC	Tegelikud
Kiirgushulk G	1000 W/m ²	0..1800 W/m ²
Paneeli temperatuur T_{mod}	25°C	-40°C..+100°C
Kiirguse spekter	1.5AM	1AM..25AM

Võimsuse sõltuvus kiirguse intensiivsusest ja temperatuurist



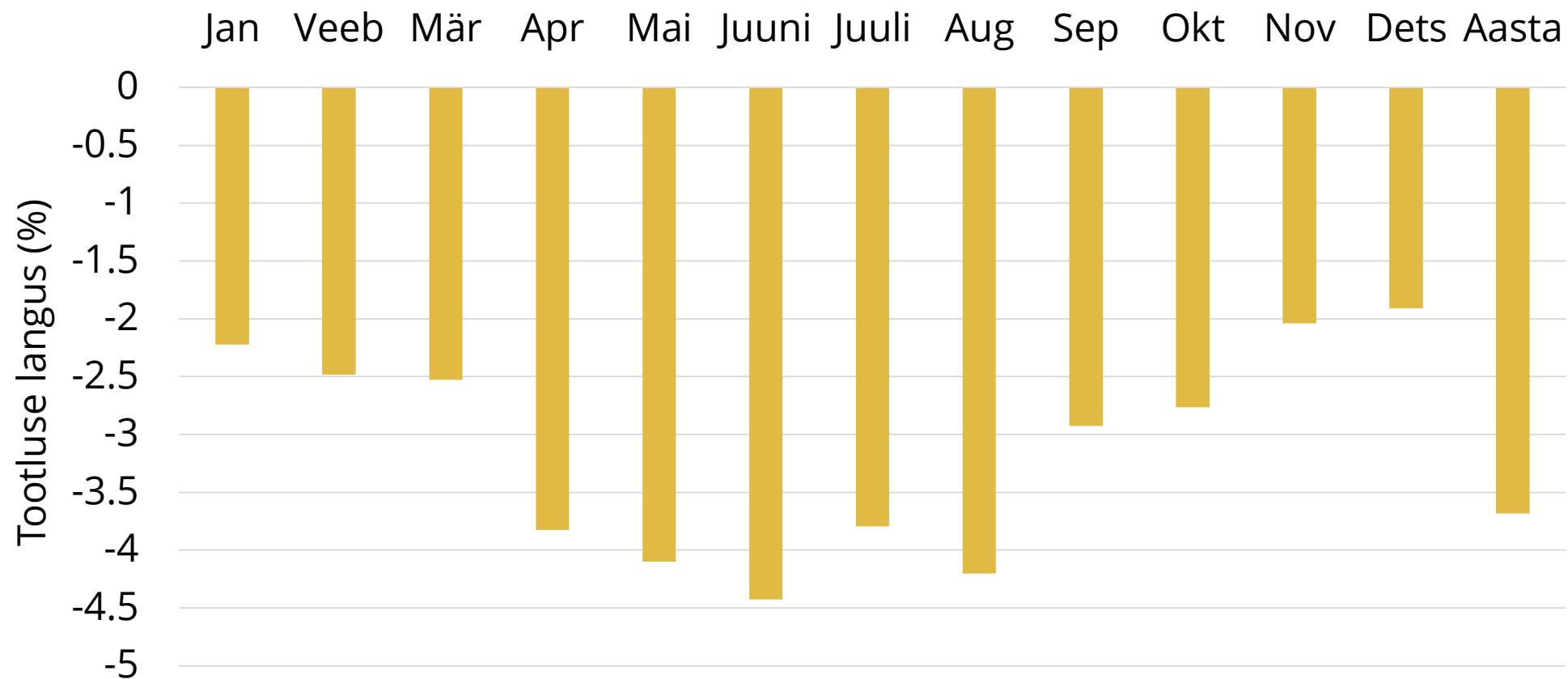
Ehitisintegreeritud päikesepaneelid



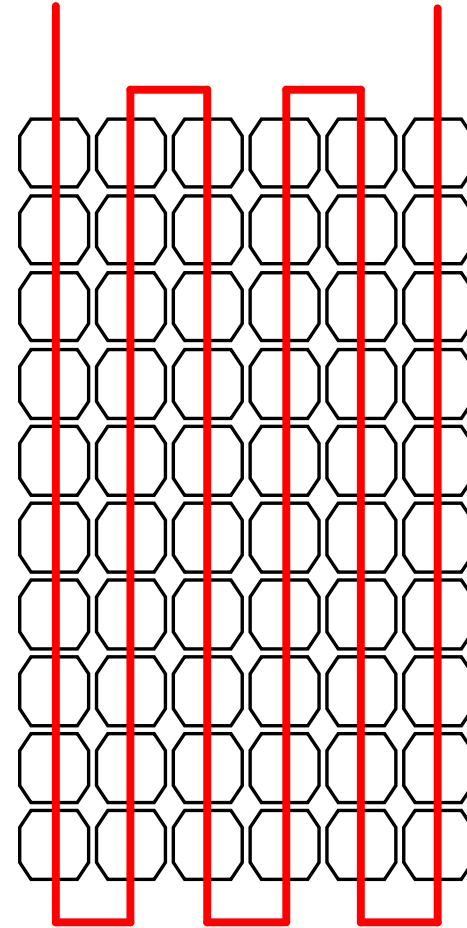
M36 (BIPV)
Ehitisintegreeritud

M35 (PV)
Tavaline

Ehitisintegreeritud päikesepaneelide tootluse langus temperatuuri tõusu tõttu



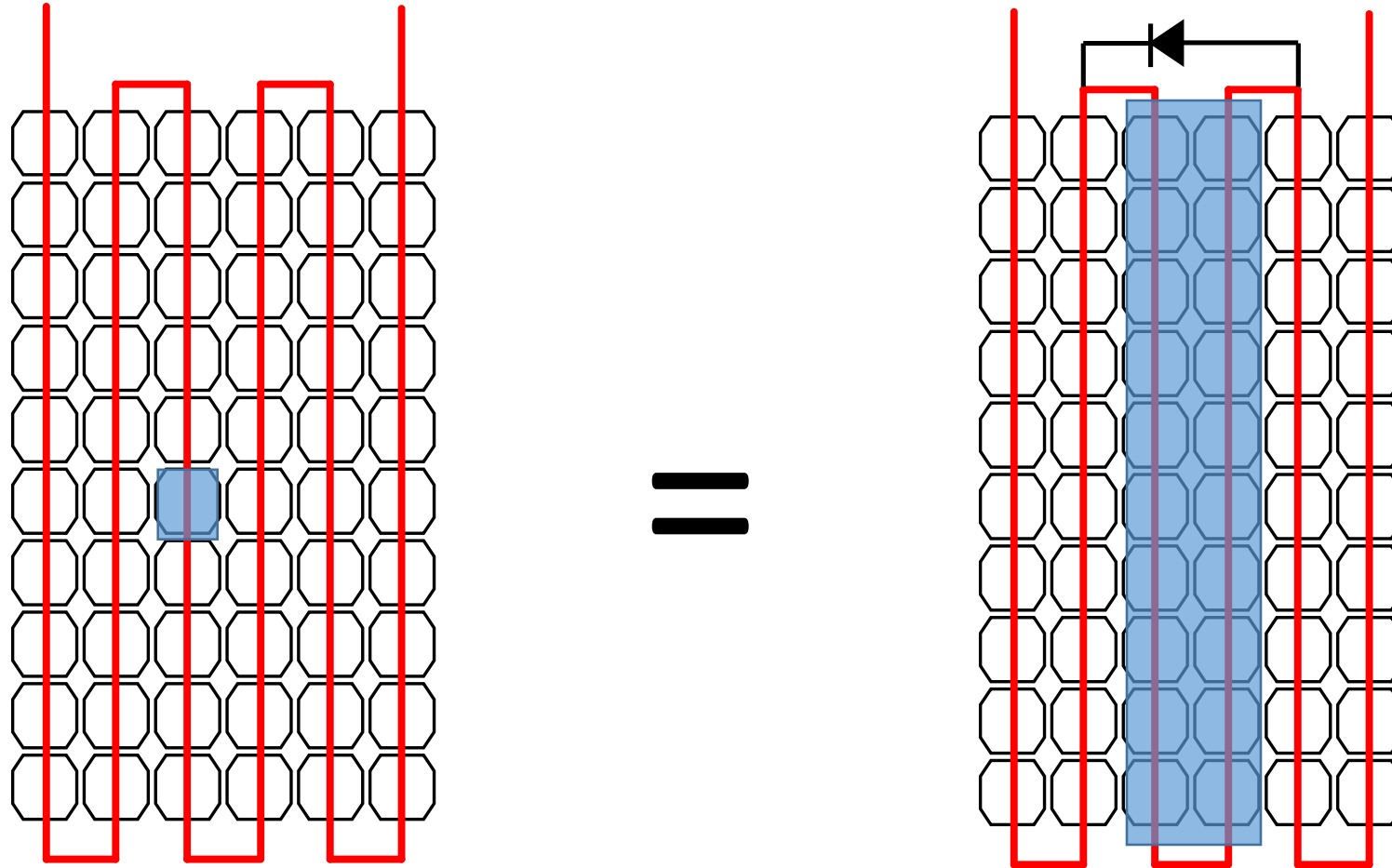
Varjude mõju päikesepaneelide tootlusele



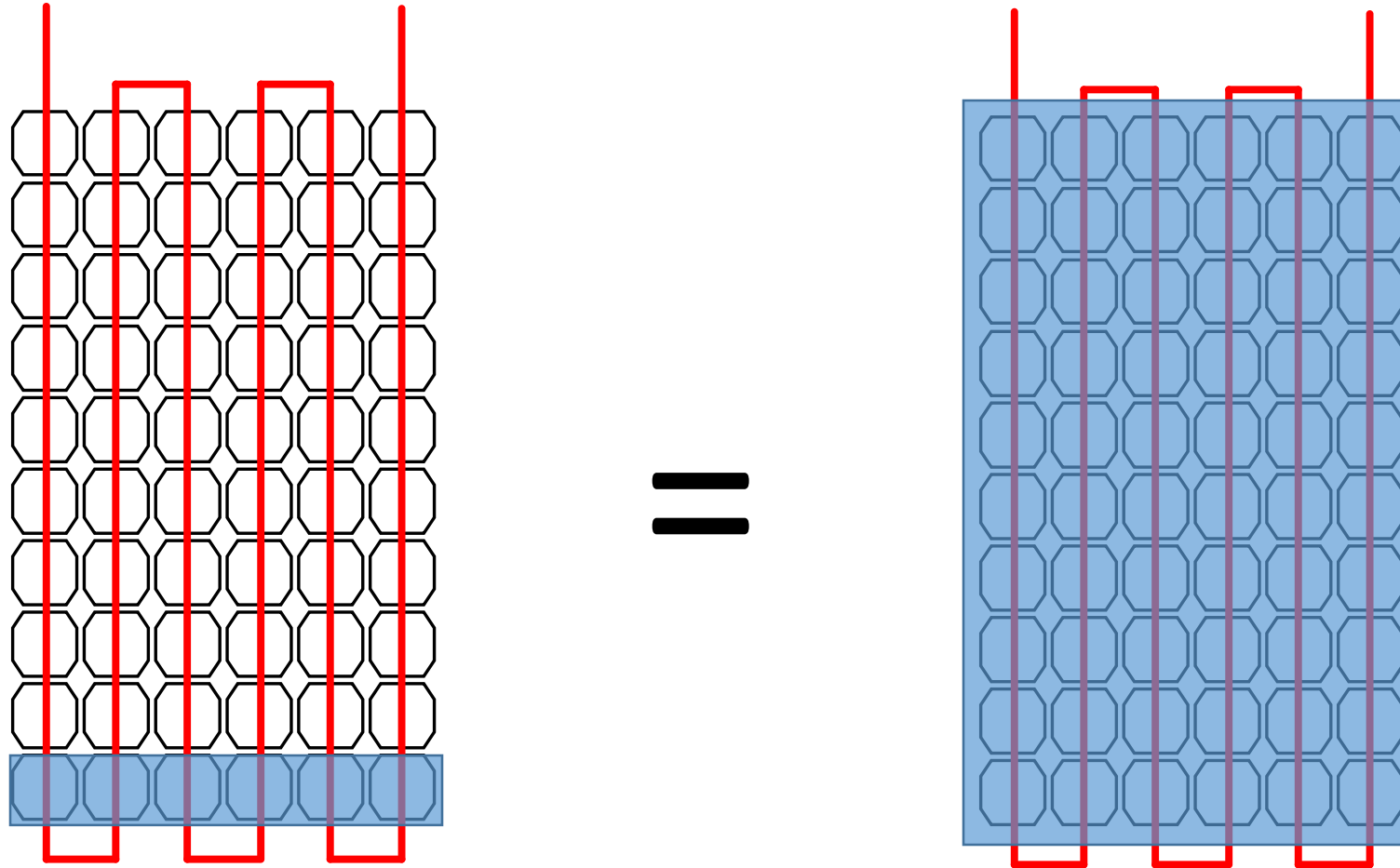
Varjude mõju päikesepaneelide tootlusele



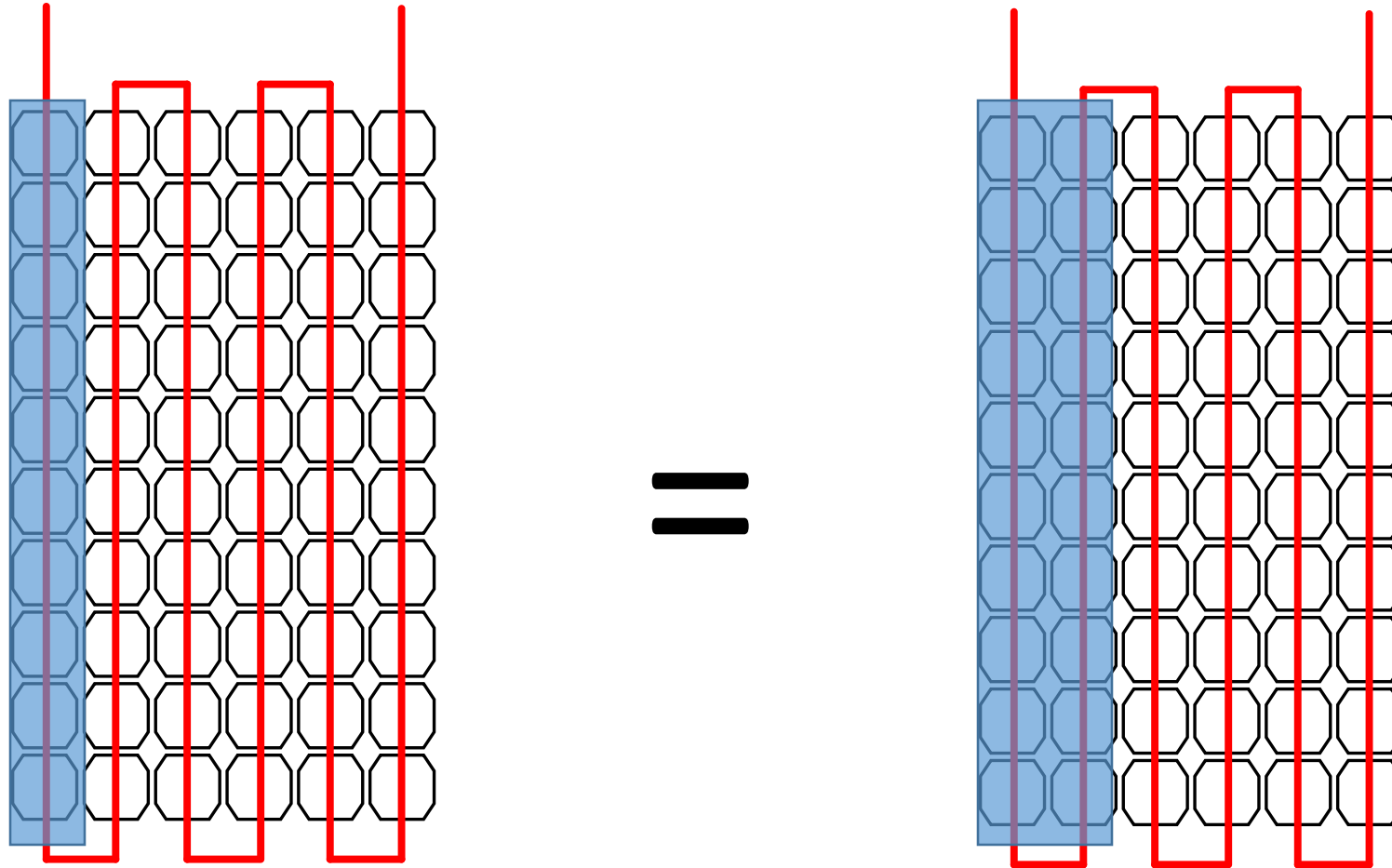
Varjude mõju päikesepaneelide tootlusele



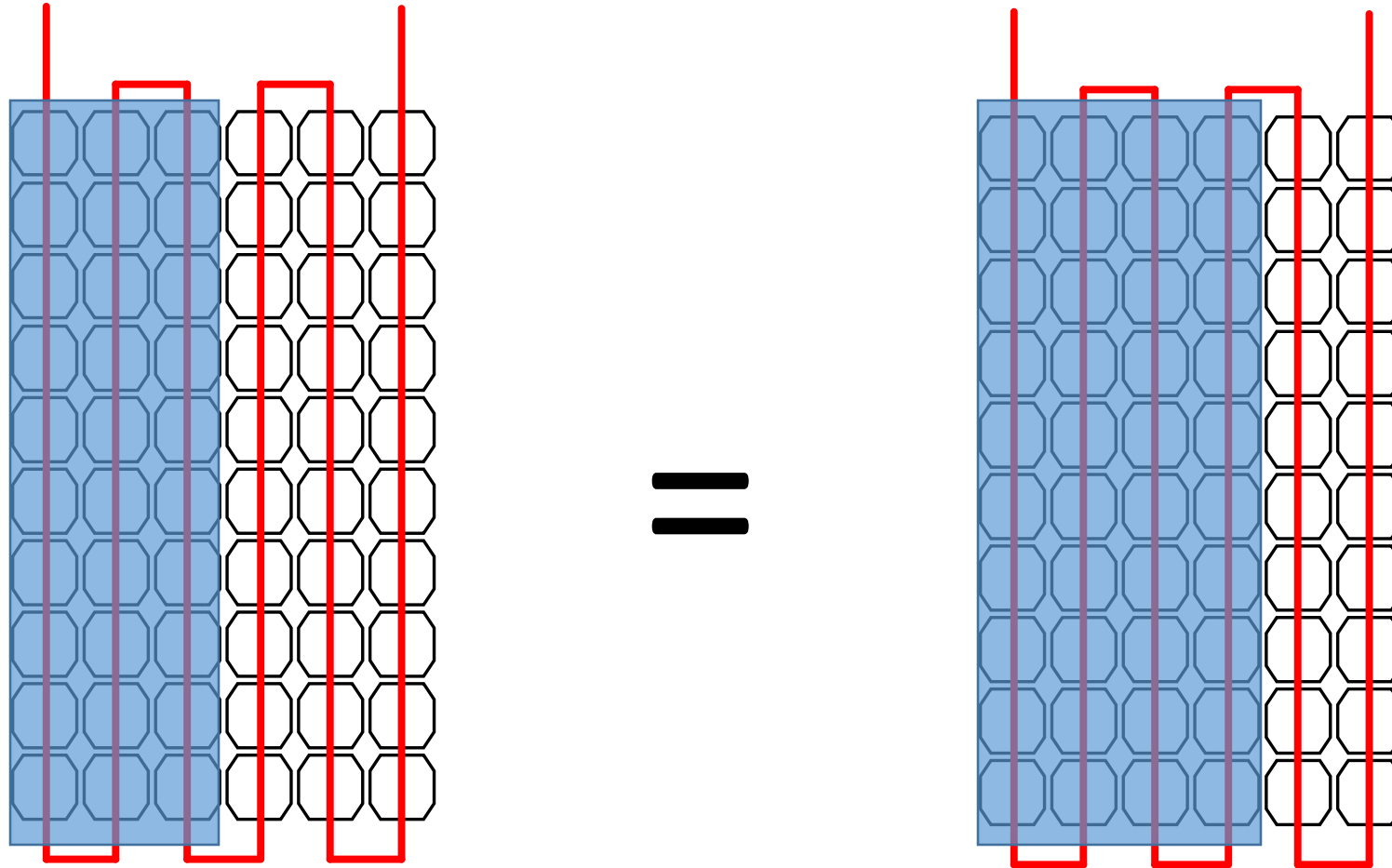
Varjude mõju päikesepaneelide tootlusele



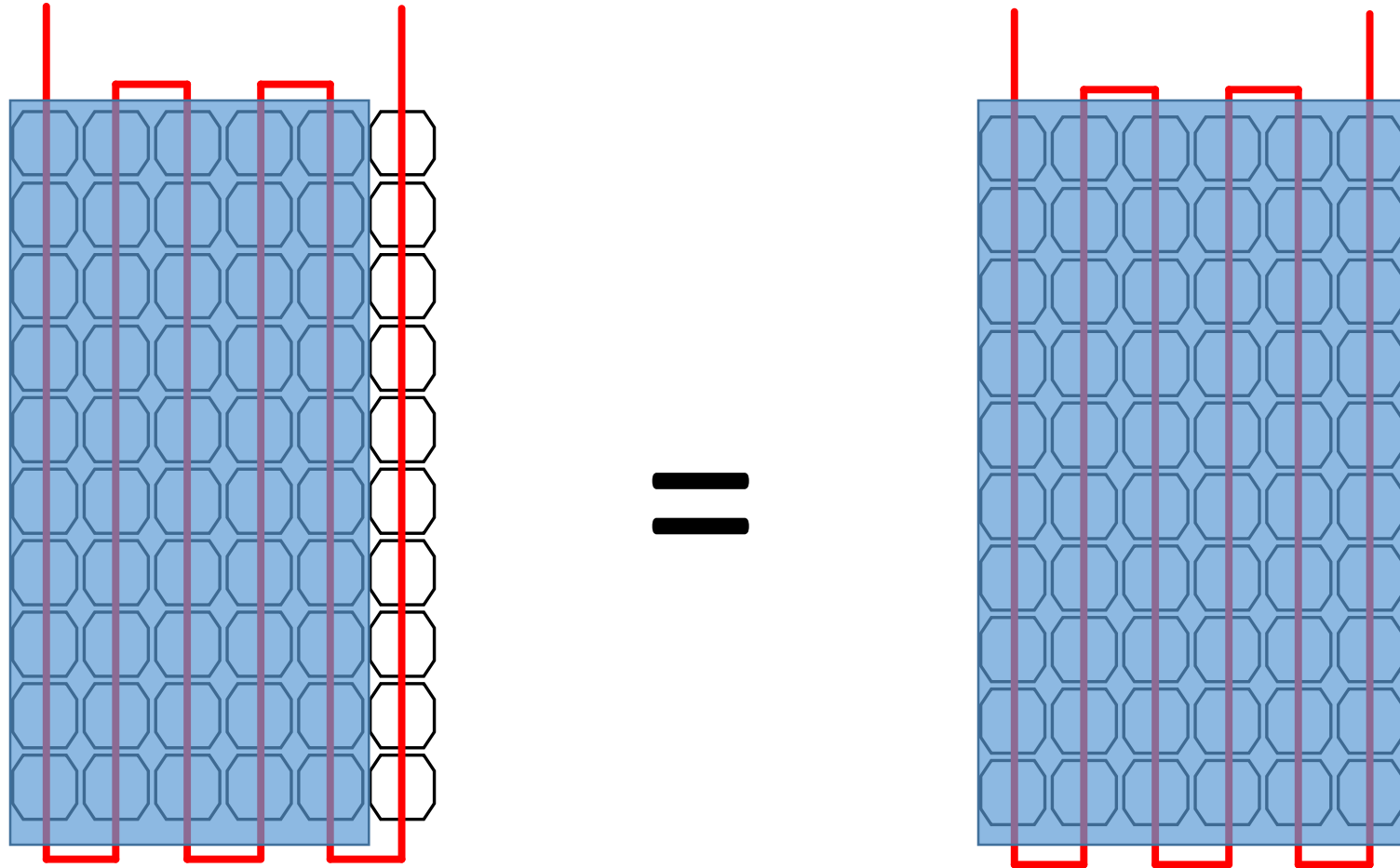
Varjude mõju päikesepaneelide tootlusele



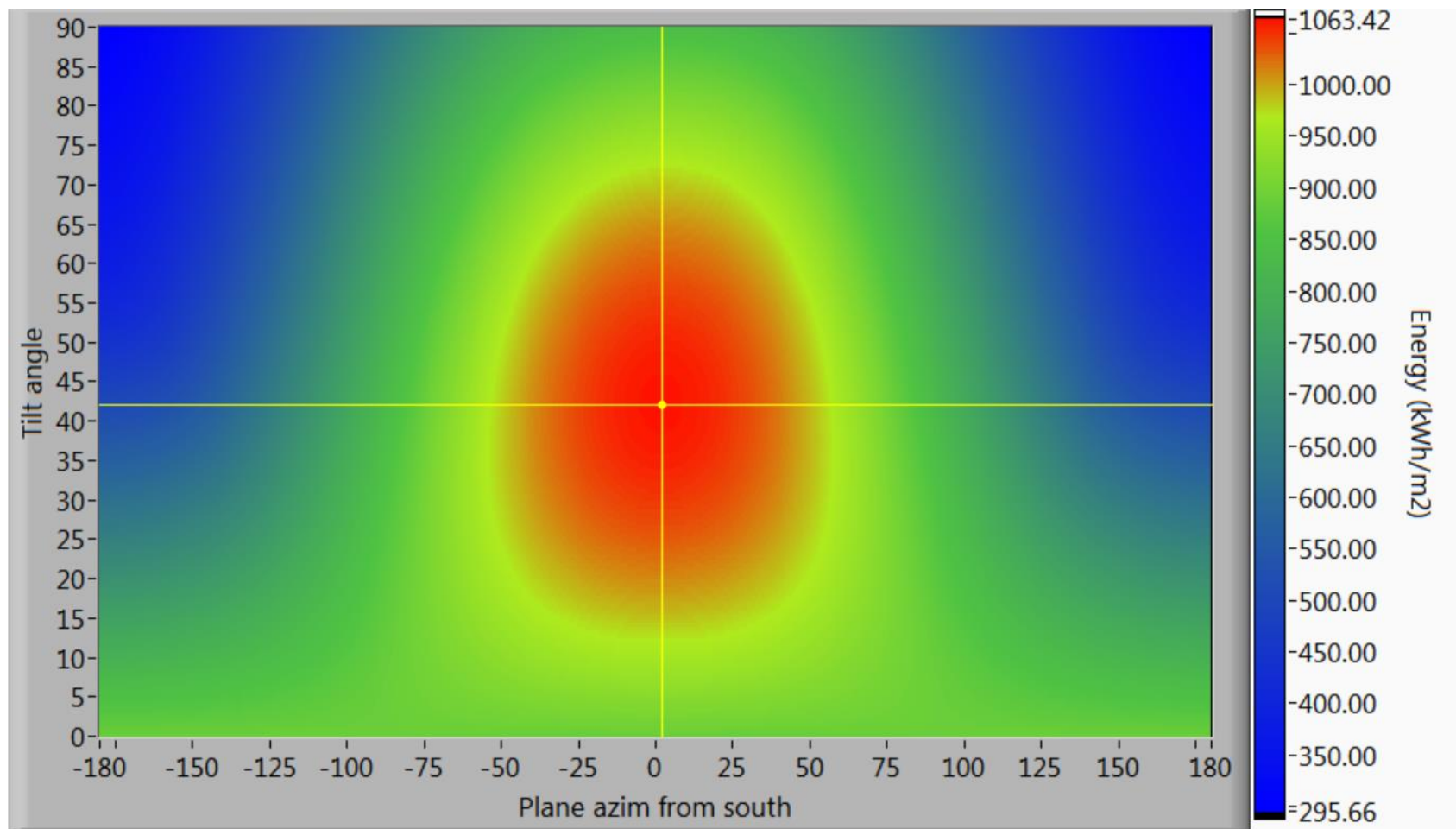
Varjude mõju päikesepaneelide tootlusele



Varjude mõju päikesepaneelide tootlusele



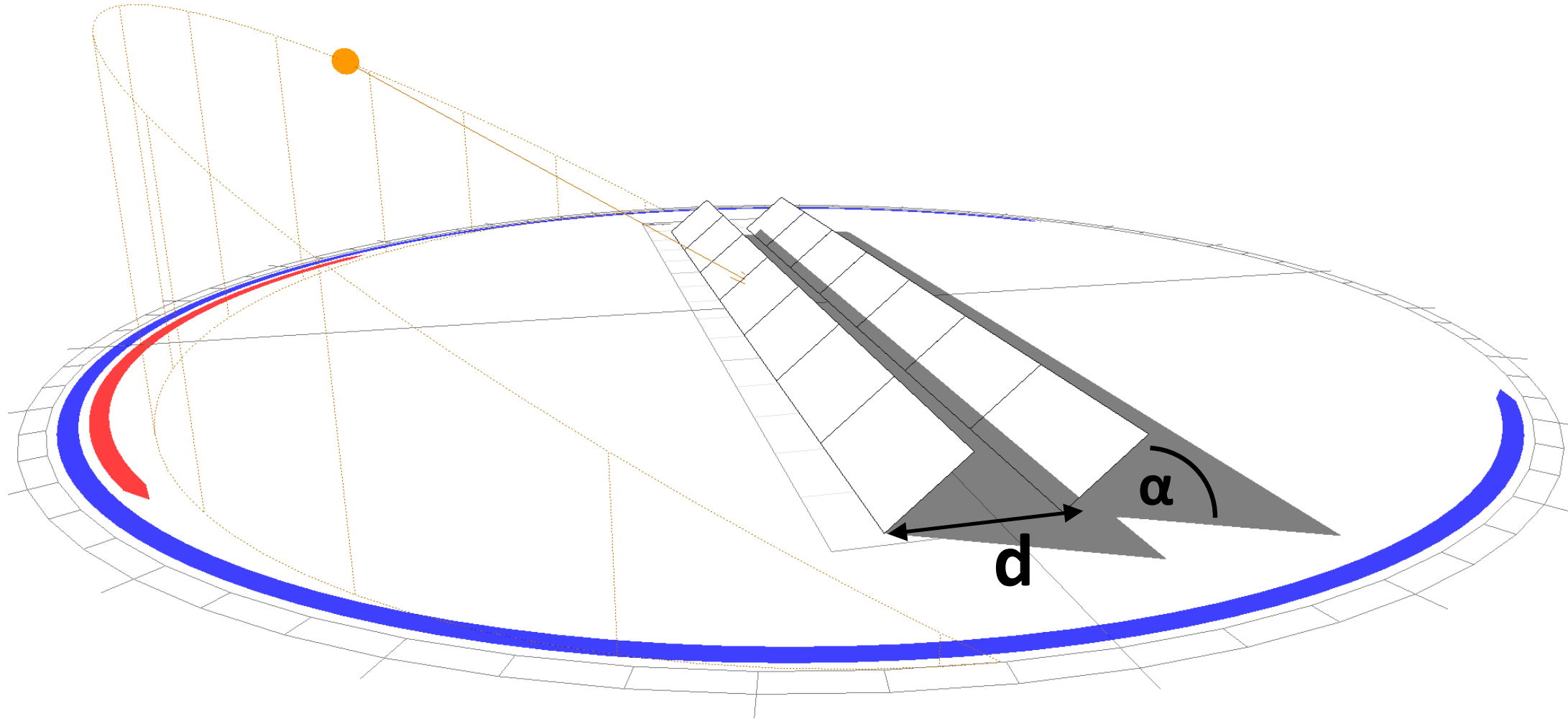
Optimaalne kaldenurk Eestis viilkatusel

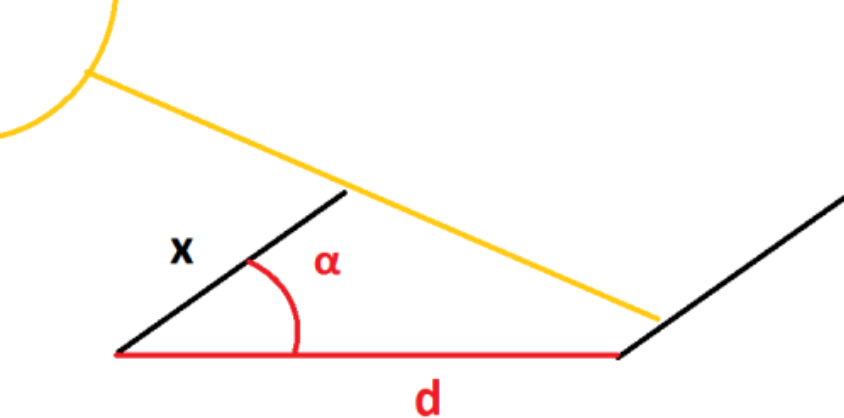


Lamekatus



Päikesepaneelide paigutuse optimeerimine lamekatusel





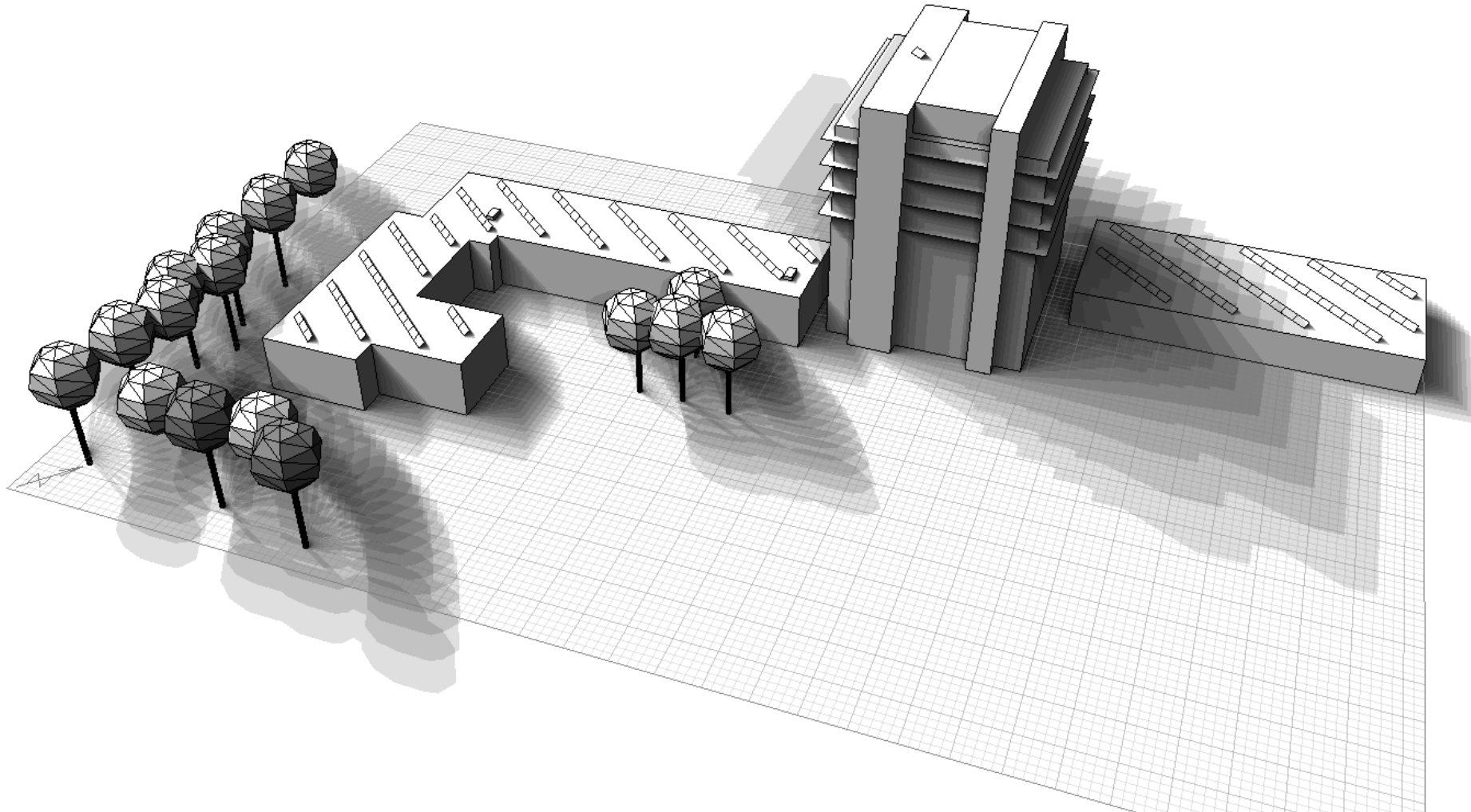
Pindala % -
 mitu protsenti moodustab paneelide
 pindala katuse pindalast
 ehk $(x/d) \cdot 100\%$

Nurk α -
 paneelide kaldenurk
 horisontaali suhtes

Tabeli väärtused -
 Tootluse kadu võrreldes
 varjudeta süsteemiga (%)

pindala%	83	71	63	56	50	45	42	38	36	33	31	29	25	20
Nurk α	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
5	13.5	13.3	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
7	13.0	12.4	12.3	12.3	12.3	12.3	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.2
8	12.5	11.7	11.5	11.4	11.4	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
10	12.2	11.0	10.7	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.4	10.4	10.4	10.4
11	11.9	10.5	10.1	9.9	9.8	9.7	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.5
13	11.8	10.0	9.5	9.3	9.1	9.0	9.0	8.9	8.9	8.9	8.8	8.8	8.8	8.7
14	12.0	9.7	9.1	8.7	8.5	8.4	8.3	8.2	8.2	8.2	8.1	8.1	8.0	8.0
15	12.2	9.6	8.7	8.2	8.0	7.8	7.7	7.6	7.5	7.5	7.4	7.4	7.3	7.2
17	12.5	9.5	8.4	7.8	7.5	7.3	7.1	7.0	7.0	6.9	6.8	6.8	6.7	6.6
18	12.9	9.5	8.2	7.5	7.1	6.8	6.6	6.5	6.4	6.3	6.3	6.2	6.1	6.0
20	13.4	9.5	8.1	7.2	6.7	6.4	6.2	6.0	5.9	5.8	5.7	5.7	5.5	5.4
21	13.9	9.7	8.0	7.0	6.4	6.1	5.8	5.6	5.5	5.4	5.3	5.2	5.0	4.9
23	14.4	9.8	7.9	6.9	6.2	5.8	5.5	5.3	5.1	5.0	4.9	4.8	4.6	4.4
24	15.0	10.1	8.0	6.8	6.1	5.6	5.2	5.0	4.8	4.7	4.5	4.4	4.2	4.0
25	15.6	10.3	8.1	6.8	6.0	5.4	5.0	4.8	4.6	4.4	4.2	4.1	3.9	3.6
27	16.2	10.6	8.2	6.8	6.0	5.4	4.9	4.6	4.4	4.1	4.0	3.9	3.6	3.3
28	16.8	11.0	8.4	6.9	6.0	5.3	4.8	4.5	4.2	4.0	3.8	3.7	3.4	3.0
30	17.5	11.4	8.7	7.1	6.1	5.4	4.8	4.5	4.1	3.8	3.7	3.5	3.2	2.8
31	18.1	11.9	9.0	7.3	6.3	5.5	4.9	4.5	4.1	3.8	3.6	3.4	3.0	2.6
33	18.7	12.4	9.4	7.5	6.4	5.6	5.0	4.5	4.1	3.8	3.6	3.4	3.0	2.5
34	19.4	12.9	9.9	7.8	6.7	5.8	5.1	4.6	4.2	3.9	3.7	3.4	2.9	2.4
35	20.0	13.4	10.3	8.2	6.9	6.1	5.3	4.8	4.4	4.0	3.8	3.5	3.0	2.4
37	20.7	14.0	10.8	8.6	7.2	6.4	5.6	4.9	4.5	4.2	3.9	3.6	3.0	2.5
38	21.3	14.6	11.4	9.0	7.6	6.7	5.9	5.2	4.8	4.4	4.1	3.8	3.2	2.6
40	21.9	15.2	11.9	9.5	8.0	7.1	6.2	5.5	5.0	4.7	4.3	4.0	3.3	2.7
41	22.5	15.8	12.5	10.0	8.4	7.5	6.6	5.9	5.3	5.0	4.6	4.3	3.6	2.9
43	23.1	16.4	13.1	10.6	8.8	7.9	7.0	6.3	5.7	5.3	4.9	4.6	3.8	3.1
44	23.7	17.0	13.7	11.2	9.3	8.4	7.5	6.7	6.1	5.7	5.3	5.0	4.1	3.4
45	24.3	17.6	14.3	11.8	9.9	8.9	8.0	7.2	6.6	6.1	5.7	5.4	4.5	3.7
47	24.9	18.3	15.0	12.5	10.5	9.4	8.6	7.8	7.1	6.5	6.2	5.9	4.9	4.1
48	25.5	19.0	15.7	13.2	11.1	10.0	9.1	8.3	7.6	7.0	6.7	6.4	5.4	4.5
50	26.1	19.7	16.4	13.9	11.8	10.6	9.7	8.9	8.2	7.6	7.2	6.9	5.9	5.0

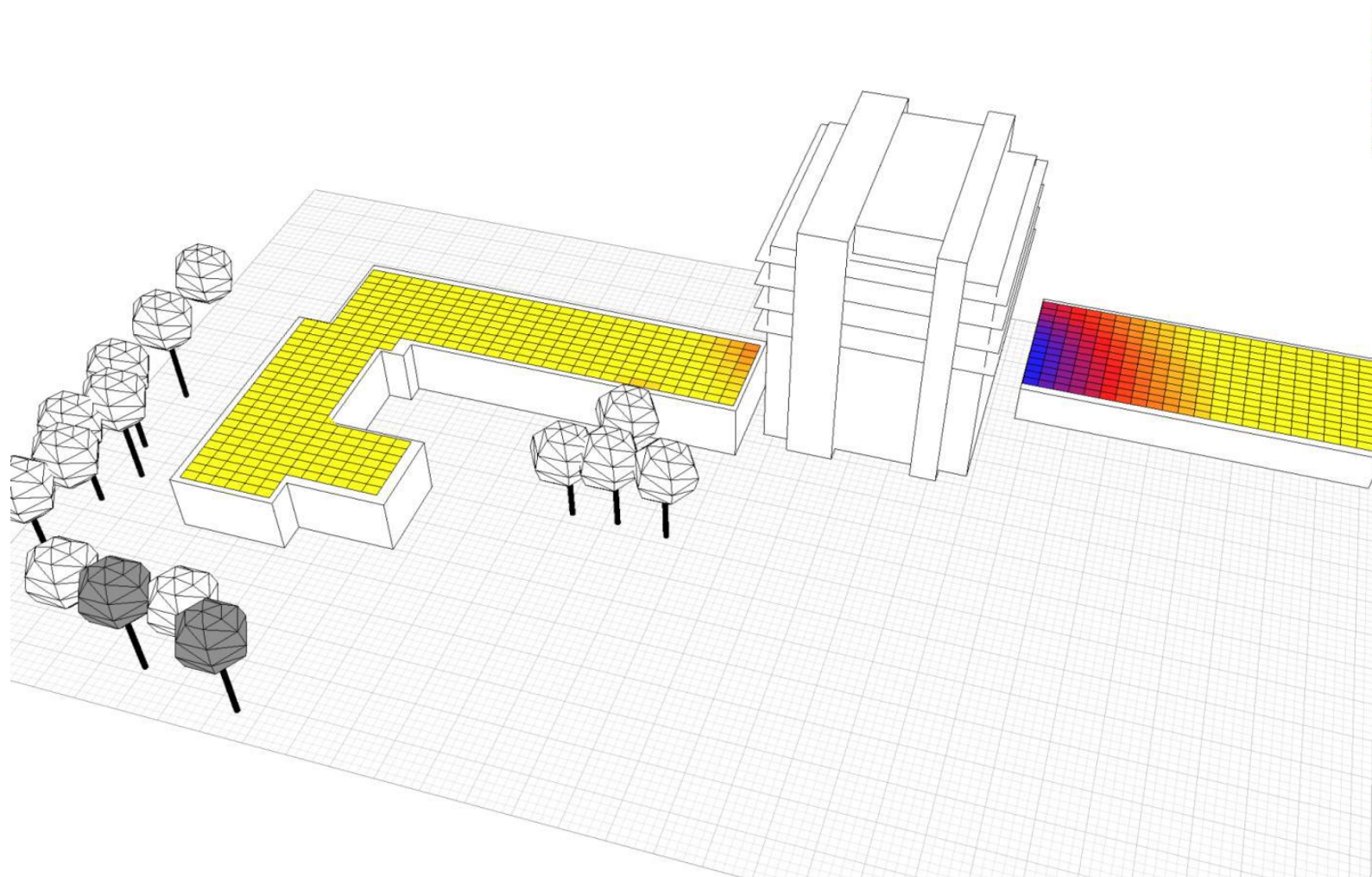
3d simulatsioon



PVSyst
PVSol
Ecotect
Vasari
Rhino
Grasshoper

...

3d simulatsioon



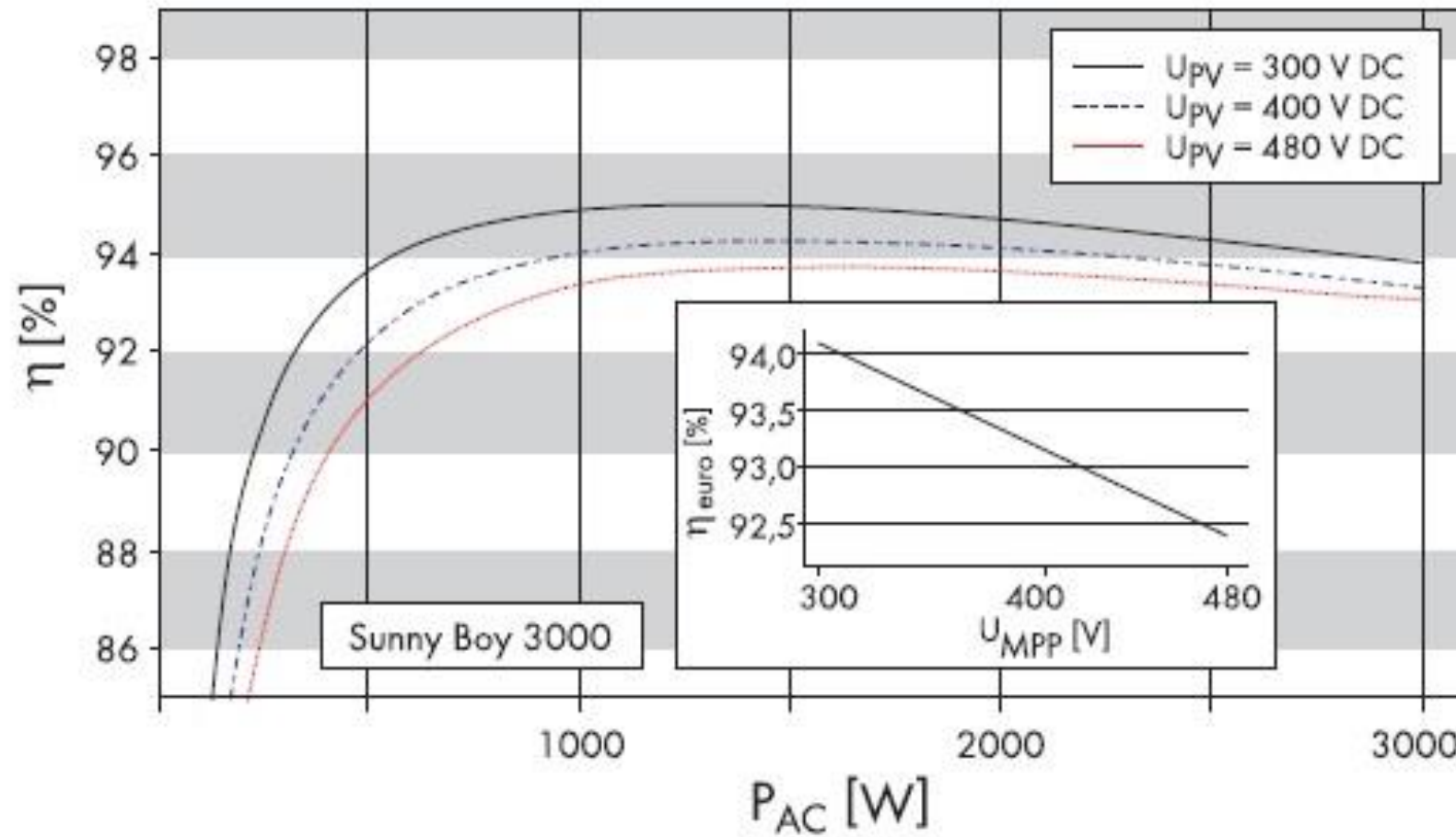
PVSyst
PVSol
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...

Süsteemi kaod

- Paneelide erinevad elektrilised parameetrid
- Inverteri kaod
- Oomilised kaod
- Süsteemi rikked
- Võrgu rikked
- Tolm, lumi, jne

Inverteri kaod

Efficiency curve



Tallinna Tehnikaülikool

Avatud ülikooli loeng

Päikeseelektrisüsteemide elektrienergia tootluse modelleerimine

Registreeru



Toimumisaeg:	15.05.2018
Eesmärk:	Koolituse eesmärk on tutvustada päikeseelektrisüsteemide elektrienergia tootluse meetoodikat
Sihtgrupp:	Kursus on mõeldud projekteerijatele, arhitektidele, elektrikutele, energeetikutele päikeseelektrist huvitatud inimestele, kes puutuvad oma töös kokku päikeseelektriga
Teemad:	Teemad: • päikesepaneelide nominaalsed parameetrid • temperatuurikoefitsiendid

Roofit.solar
elektrit tootvad metallkatused



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