Fotovoltaika v električnih vozilih

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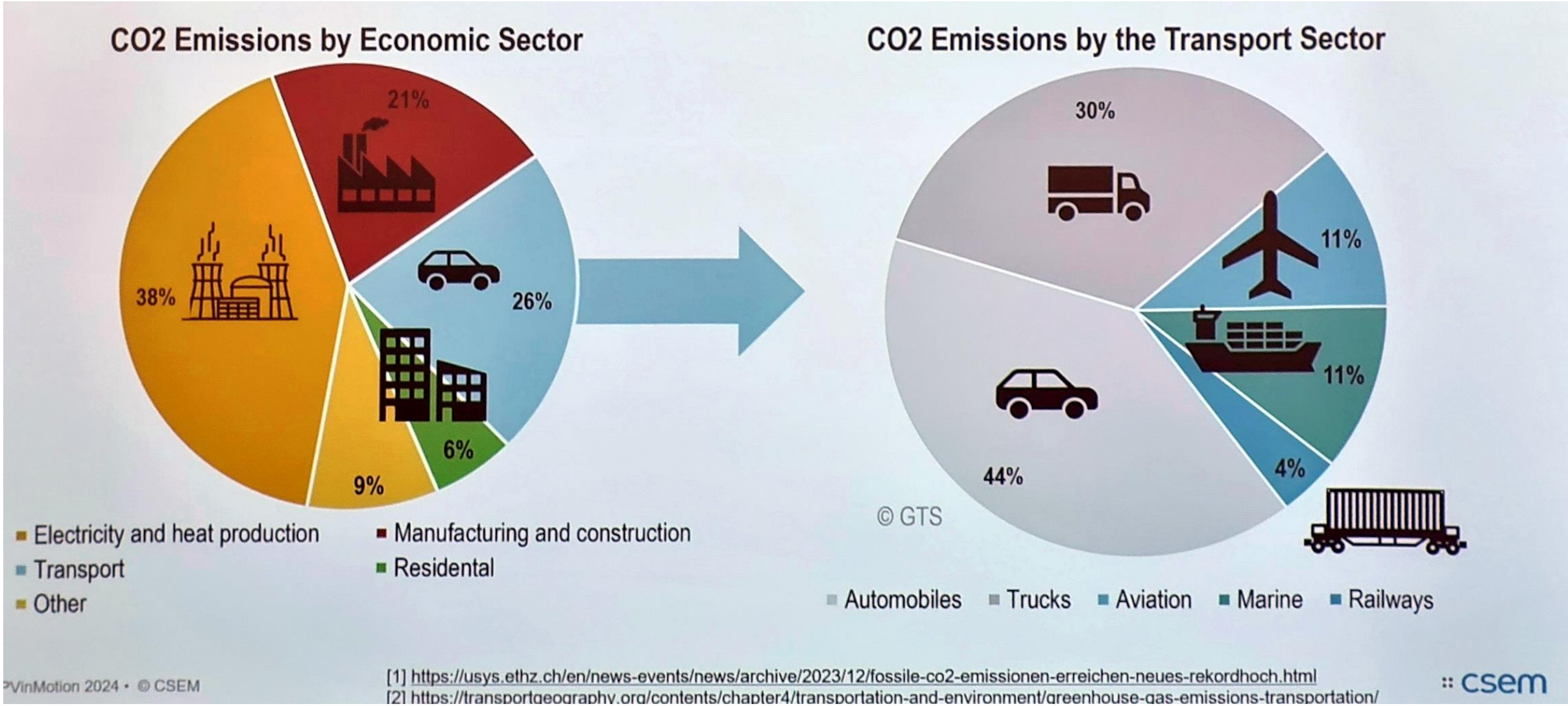
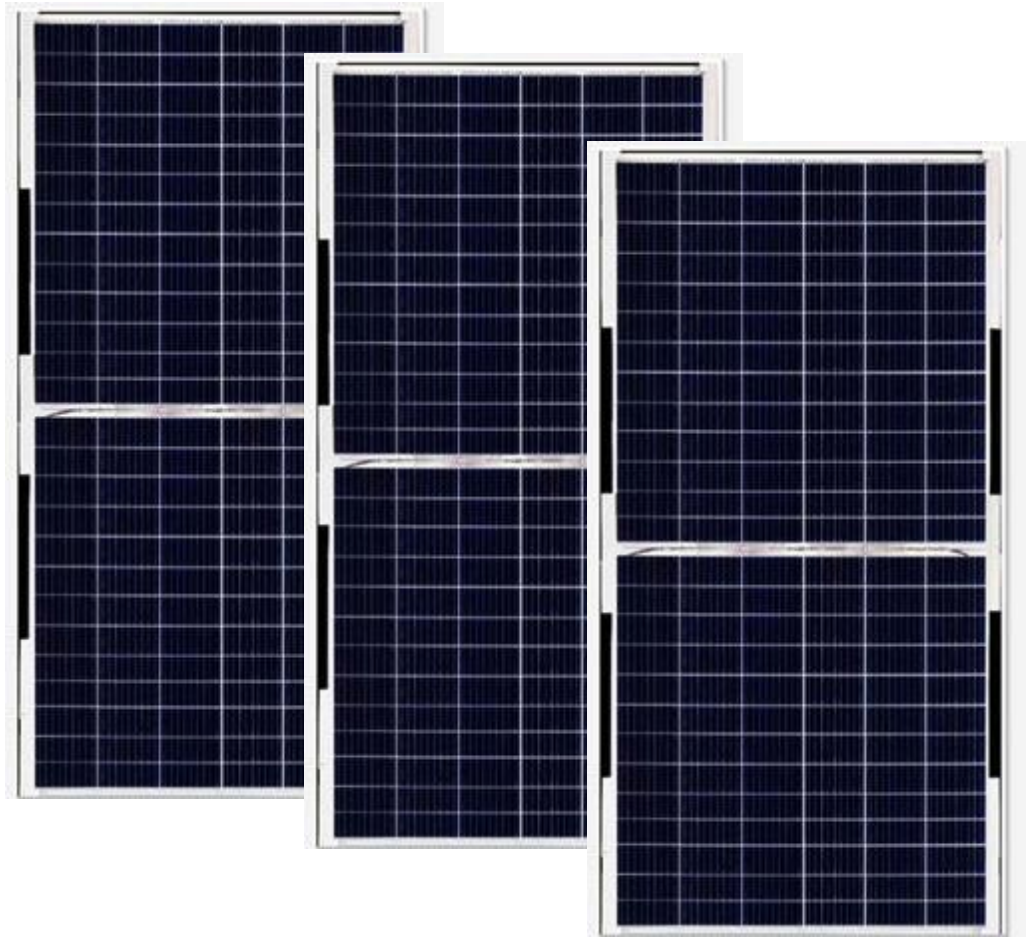
$C0_2$ emisije


CO2 Emissions by Economic Sector
21%
26%
6%
9%
38%
Electricity and heat production
Manufacturing and construction
Transport
Residental
Other
CO2 Emissions by the Transport Sector
30%
11%
11%
4%
44%
© GTS
Automobiles
Trucks
Aviation
Marine
Railways
PVinMotion 2024 • © CSEM
[1] https://usys.ethz.ch/en/news-events/news/archive/2023/12/fossile-co2-emissionen-erreichen-neues-rekordhoch.html
[2] https://transportgeography.org/contents/chapter4/transportation-and-environment/greenhouse-gas-emissions-transportation/
:: csem

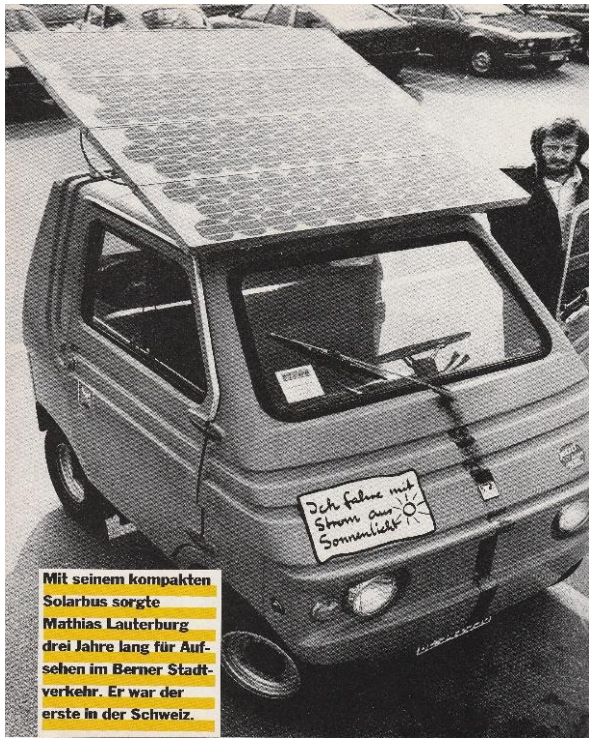
Ekvivalent letne proizvodnje energije iz PV



~1700 kWh

Začetki vgradnje fotovoltaike v vozila

Baker EV (model 1912) with solar cells from International Rectifier IR in 1960.

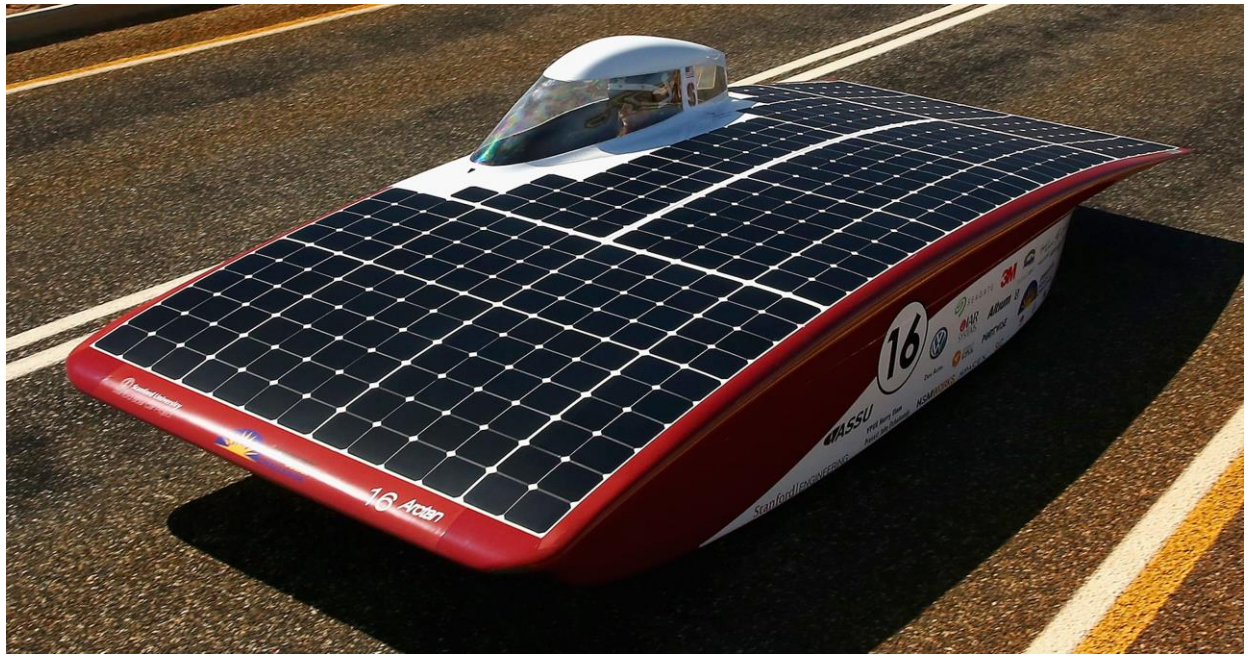


Swiss Matthias Lauterburgwith his ZeleZagato with 4 Arco So lar (132 Wp) in Berne (1982)

Swiss Gernot Schneider with his “Solar-FahrradSOFA 1” (1983)

Tekmovalna solarna vozila

Nuon Solar Car (Photo Credit: ddream.tudelft.nl)



Arctan of Stanford Solar Car Project USA

Pionirski projekti

Pionirski projekti

SOLARSTRATOS TO THE EDGE OF SPACE | csem

planetsolar foundation

Fotovoltaika v običajnih vozilih

Luna (USA)

Lightyear Two (Netherland)

Hanergy Solar R (China)

Toyota Prius

Sion (Germany)

Toyota bZ4X (Japan)

VISION EQXX (Germany)

Hyundai Ioniq 5

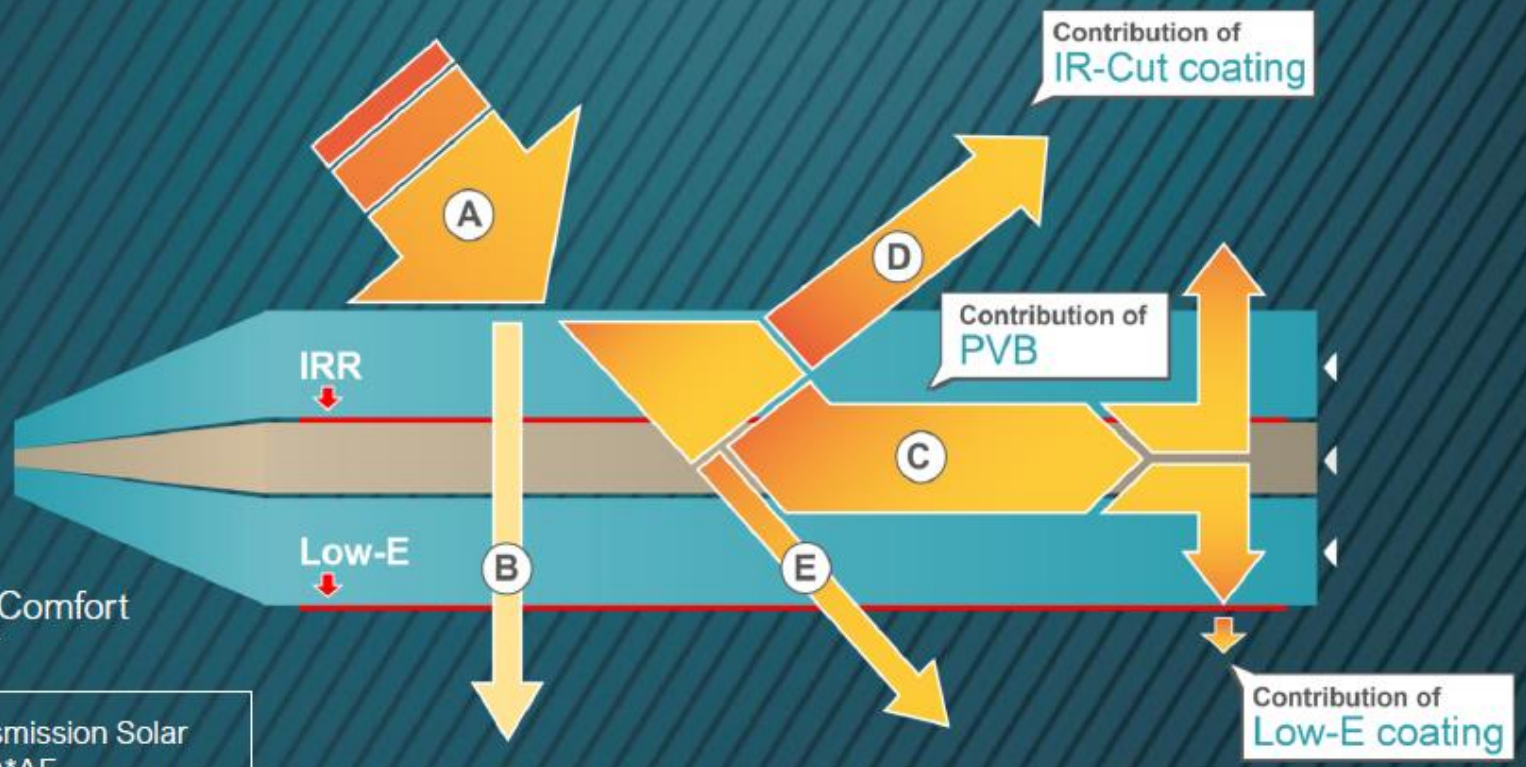
Steklene strehe

Tesla model S

Škoda Fabia

AGC offers a combination of the best technologies

Thermal comfort roof with IR-Cut coating + superior Low-E coating



Contribution of IR-Cut coating

Contribution of PVB

Contribution of Low-E coating

Ⓐ **Sunlight**

Ⓑ **Visible** Transmission Light

Ⓒ **Absorption** Energy (AE)

Ⓓ **Reflection** Energy (RE)

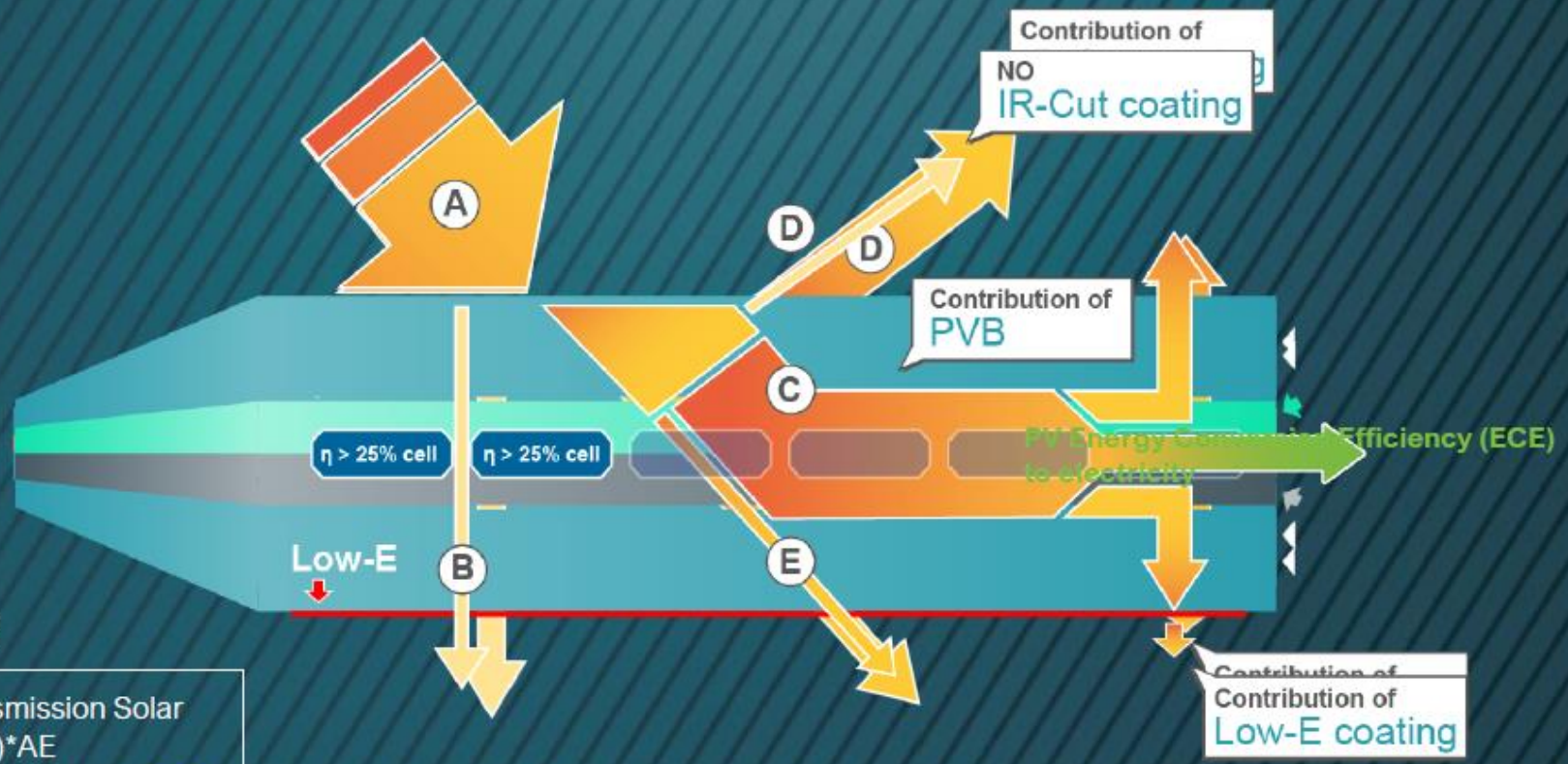
Ⓔ **Transmission** Energy (TE)

AGC's Thermal Comfort Panoramic Roof

TTS = Total Transmission Solar
= TE + f(Em)*AE
= TE + f(Em)*(1-TE-RE)

AGC offers a combination of the best technologies

Panoramic solar roof with high-efficiency PV cells + superior Low-E coating



Ⓐ **Sunlight**

Ⓑ **Visible** Transmission Light

Ⓒ **Absorption** Energy (AE)

Ⓓ **Reflection** Energy (RE)

Ⓔ **Transmission** Energy (TE)

AGC's Solar
Panoramic Roof

TTS = Total Transmission Solar
= TE + f(Em)*AE
= TE + f(Em)*(1-TE-RE-**ECE**)

This is what it will look like

Realistic renderings with AGC / Eclat Digital

Panoramic roof without solar cells	With HJT or TOPCon solar cells	With back contact (xBC) solar cells
		
		

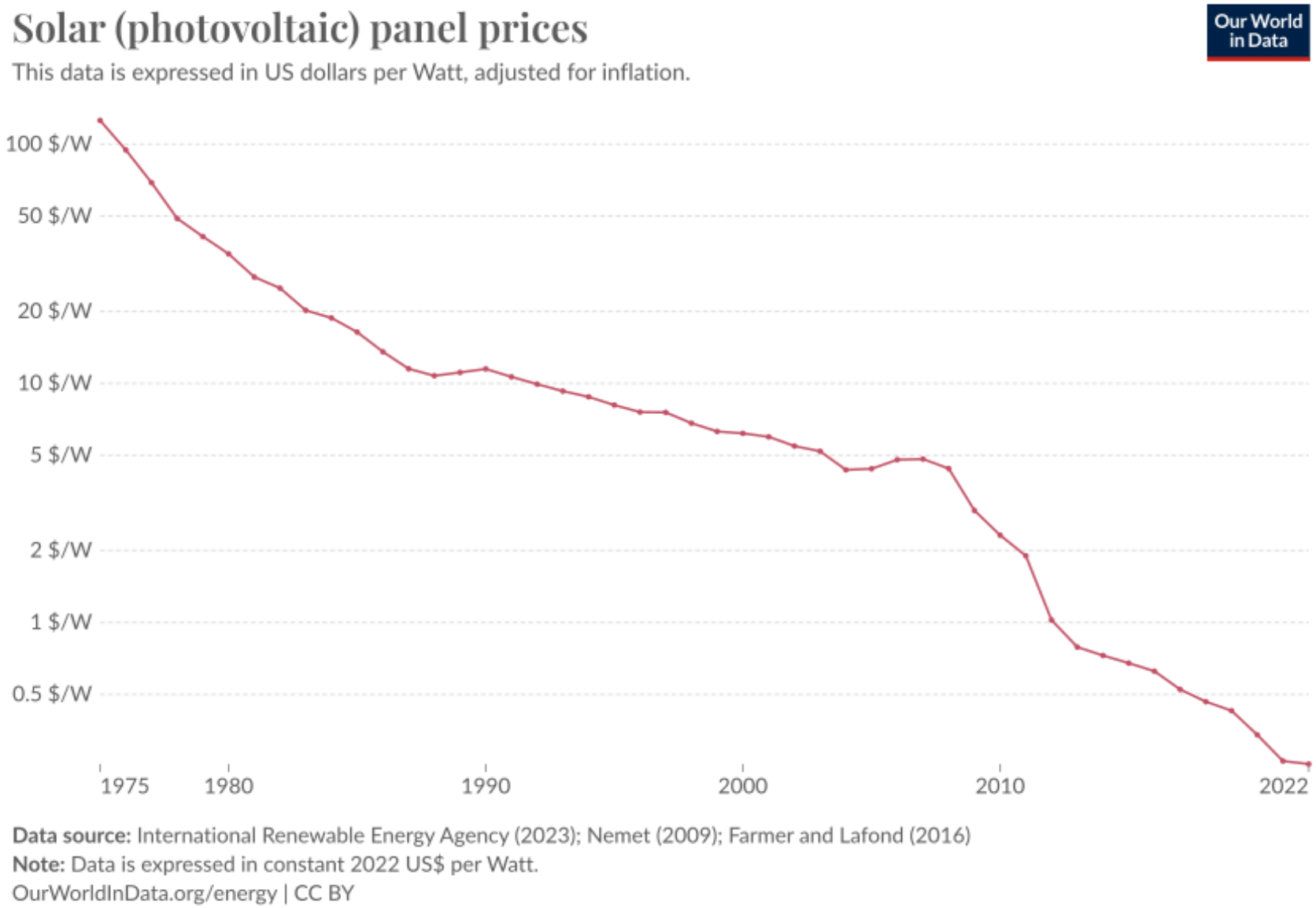
AGC value proposition: Improved comfort and eco-design

What you get	Plug-free charging	All year thermal comfort	No roller blind required	Maximum CO_2 credits	SDGs marketing opportunity
With solar roof output of 170 to 380 Wp	Up to 3000 km/y range extension*	Improved comfort in summer and winter Use power from the sun for cabin pre-ventilation	Gain in headspace Weight, CO_2, and costs savings	6-16 g/mi** (US EPA) Up to 7 g/km (EU ECO innovation)	Clean energy Climate action Innovation
Additional benefits with AGC	**Selection of best PV technologies**	**Superior Low-E coating (ε< 0.2, Rin <2%)**	**Combination with ambient lighting**	**Local supply chain**	**Responsibly made product**

* Depending on reference case, PV roof size, car location, and driving profile

** 2024 values

Cene PV modulov



Evropska PV industrija

OPES SOLAR MOBILITY

- Site opening February 2024
- 12,0000 m2 production site in Zwenkau, Germany

Prvi produkti v segmentu kamperjev

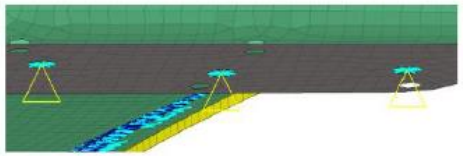
OPES SOLAR MOBILITY

Razširitev na avtobuse in tovornjake

OPES SOLAR MOBILITY

PVAB - PhotoVoltaic Automotive Body

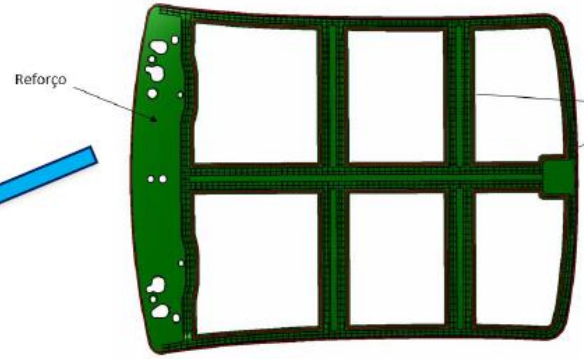
PVAB
PhotoVoltaic Automotive Body

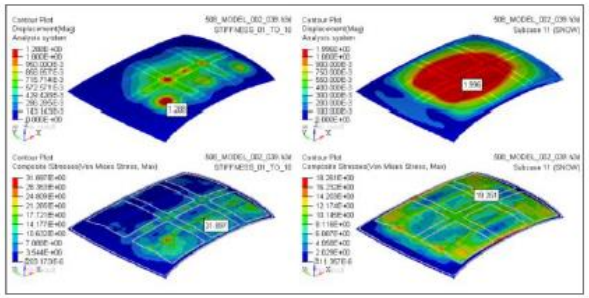


Hinges (All DOFs)

Seal (All DOFs)

Prop rod connection points
(All DOFs)

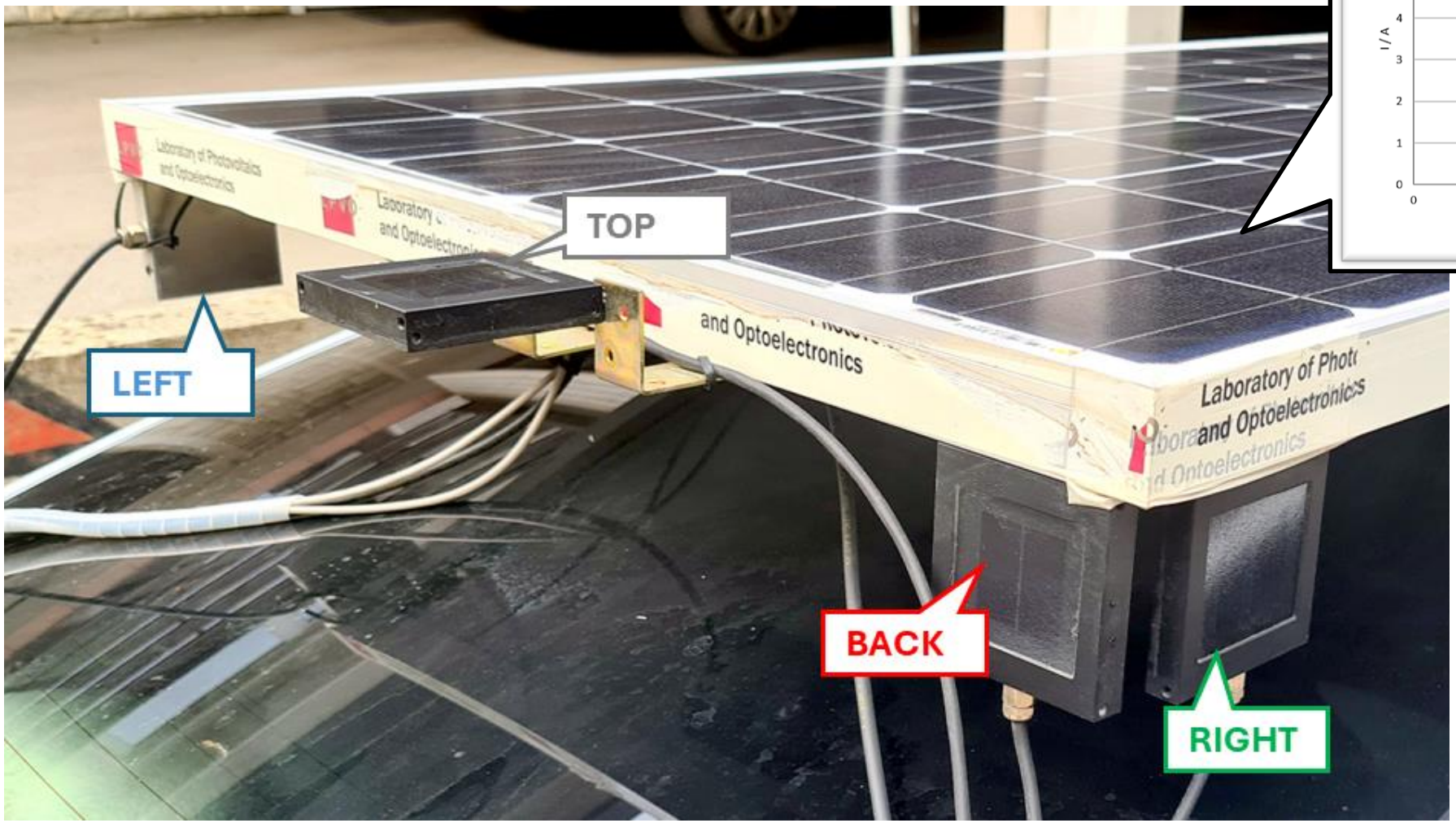


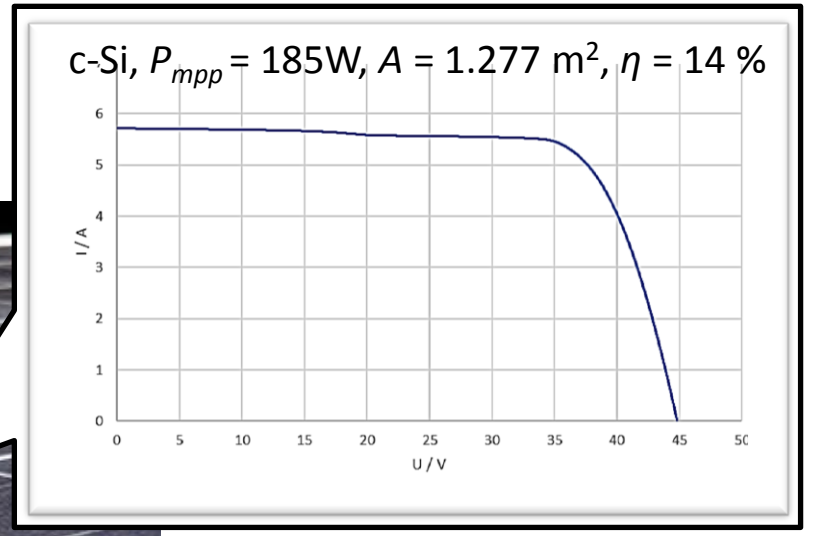


Laboratory of Photovoltaics and Optoelectronics

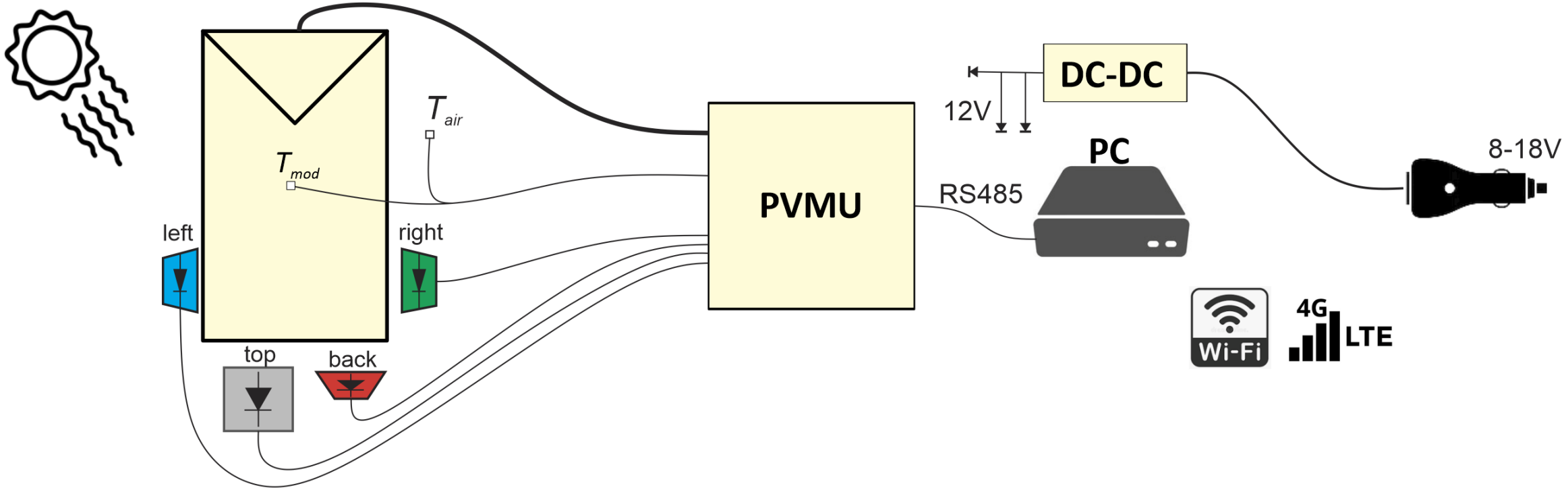
Mobile PV monitoring system

Mobile PV monitoring system





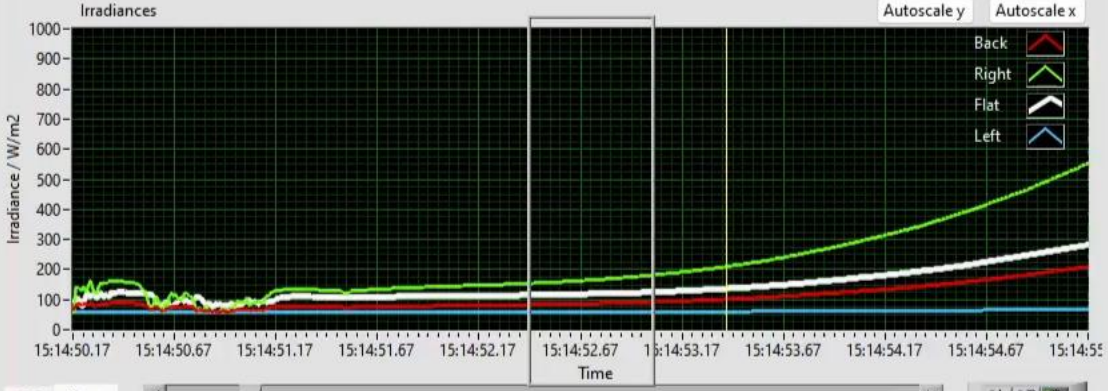
Mobile PV monitoring system



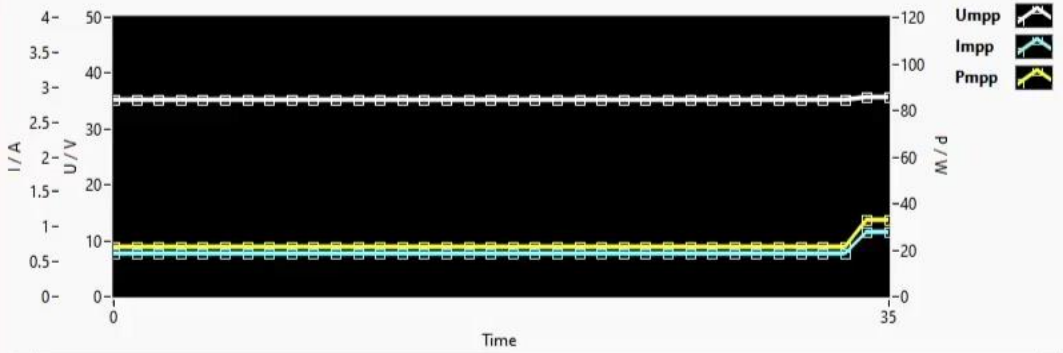
File Database

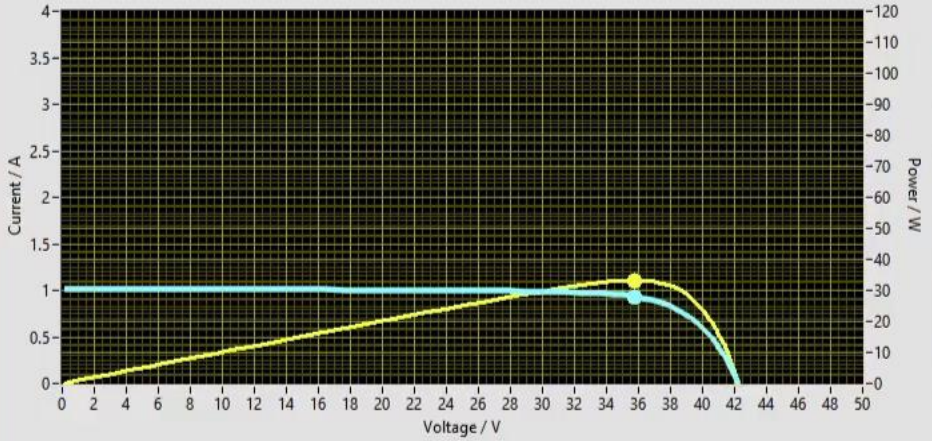
Irradiances

Autoscale y Autoscale x



FFT Time





Autoscale

IV parameters

Uoc	42.2
Isc	1.02
Pmpp	33.3
Umpp	35.6
Impp	936m
FF	77.6
Tmodule	19.3
Tair	16.3

2024-03-13_15-14-46-front.mp4

Camera View

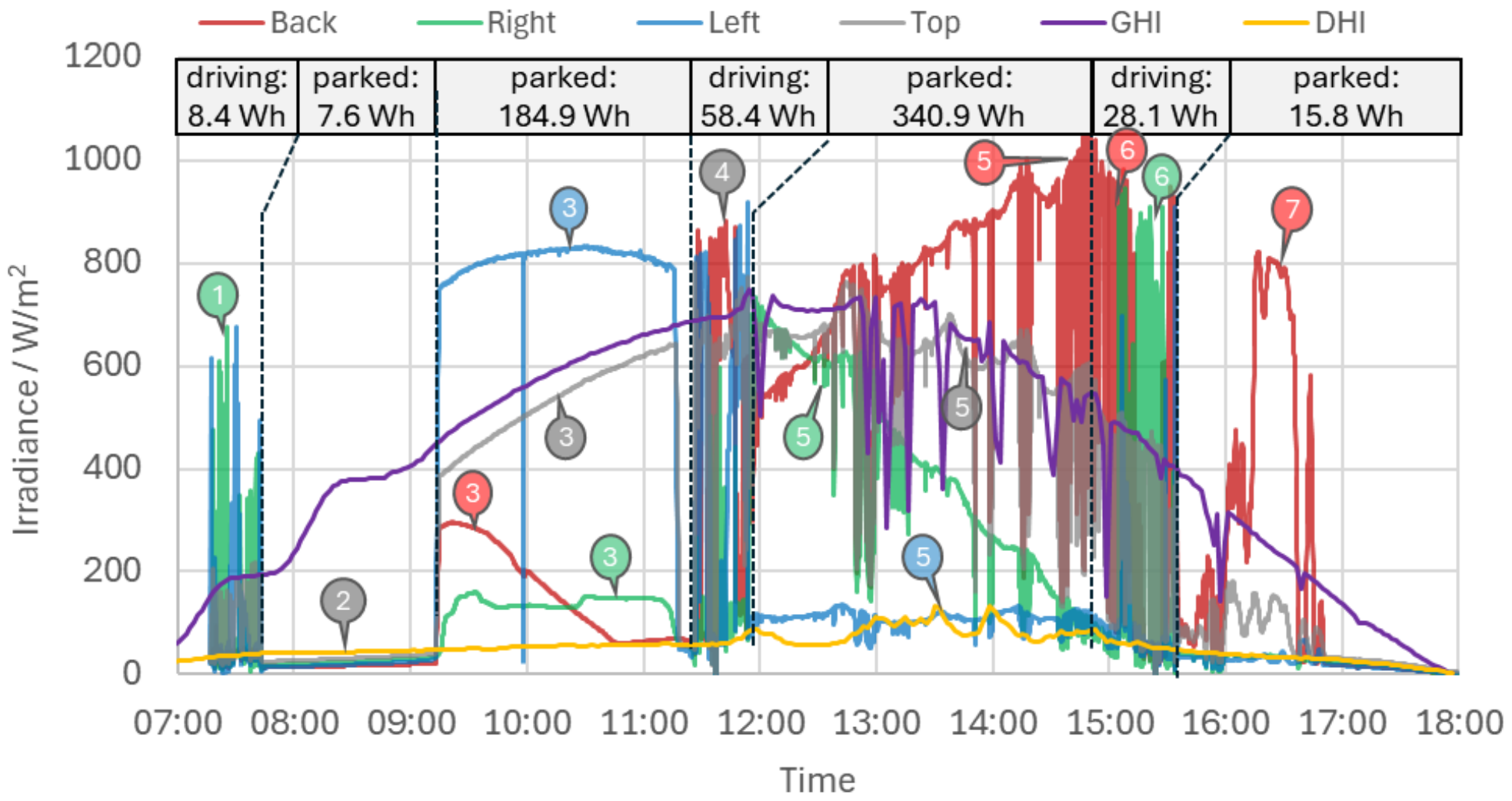
(•) Front ( ) Back ( ) Left ( ) Right

Frame- Pause Reset Frame+ Replay speed x 1 Graph span 60 s Set span 6.67345

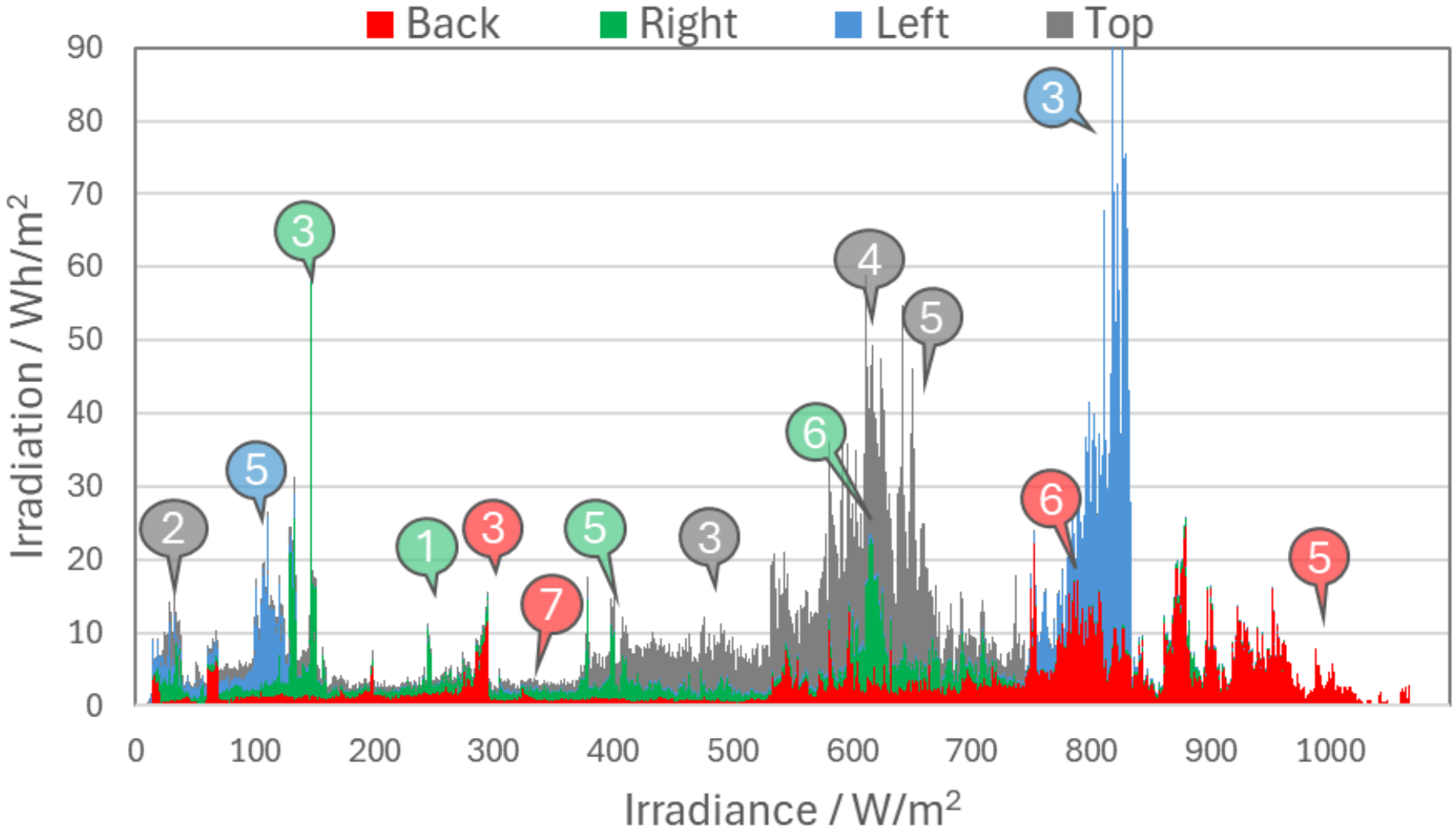
IU Offset 0

Sync video Take from file 15:14:46.000 13/03/2024 Sync Save to file

Irradiances on a typical driving day



Irradiances on a typical driving day



Parking

Single video waveform player.vi

File Database

Irradiances

Autoscale y Autoscale x

Back
Right
Flat
Left

Irradiance / W/m2

946.2 800 700 600 500 400 300 200 100 -53.81

13:49:04.85 13:52:04.85 13:55:04.85 13:58:04.85 14:01:04.85 14:04:04.85 14:07:04.85 14:10:04.85 14:13:04.85 14:17:14

Time

FFT Time

Umpp
Impp
Pmpp

I / A U / V P / W

Time

I
P

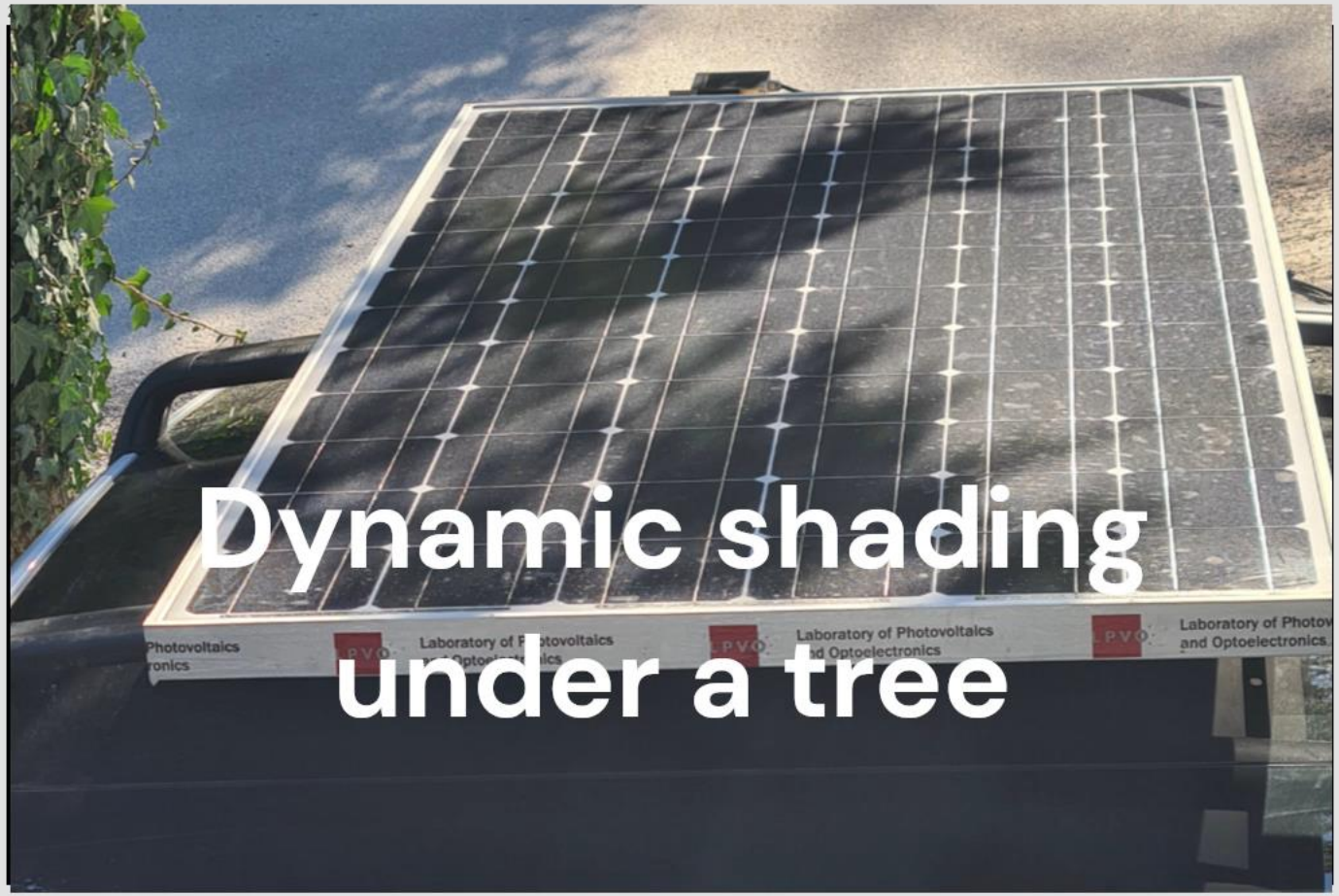
Autoscale

Current / A Power / W

Voltage / V

IV parameters

Uoc	42.6
Isc	650m
Pmpp	12.7
Umpp	38.9
Impp	325m
FF	45.7
Tmodule	18.6
Tair	14.6



Sync video Take from file 00:00:00.000 DD/MM/YYYY Sync Save to file

-1

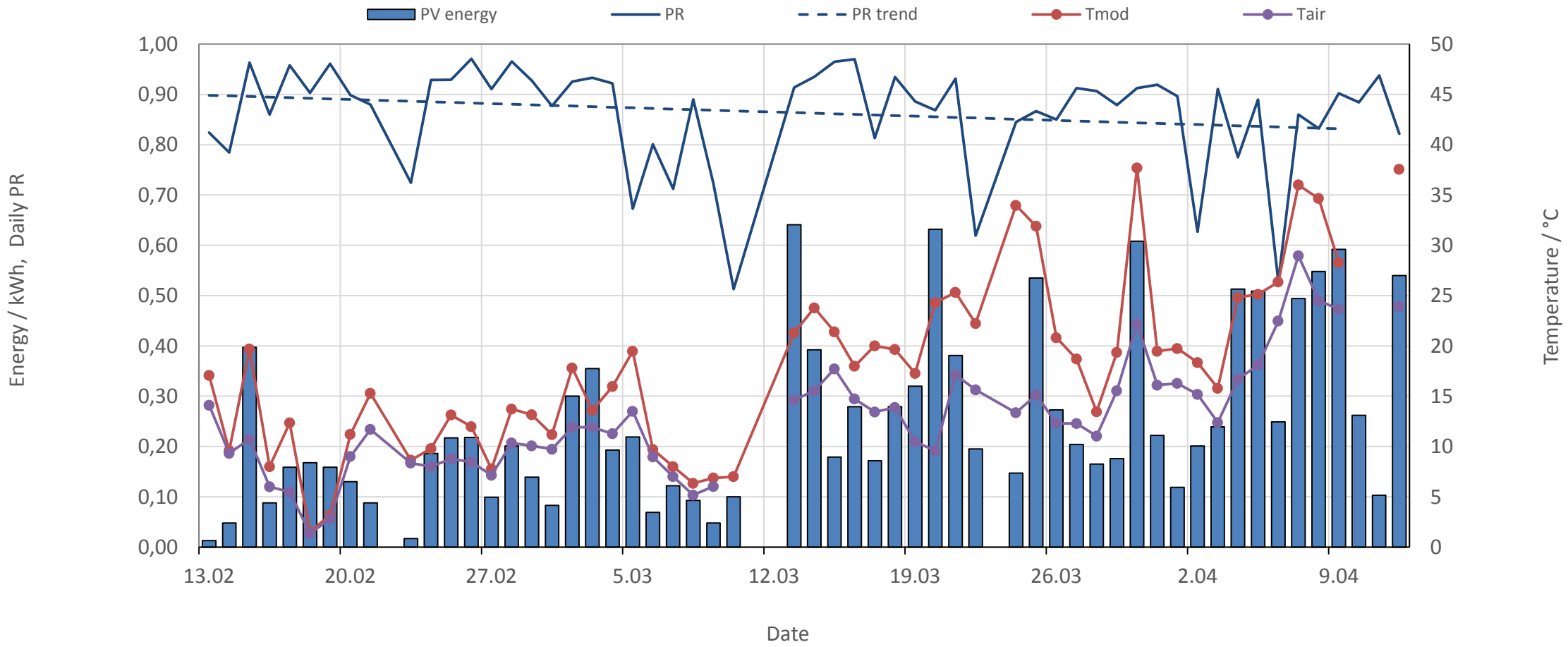
Frame- Play Reset Frame+ Replay speed x 50 Graph span 5 s

0

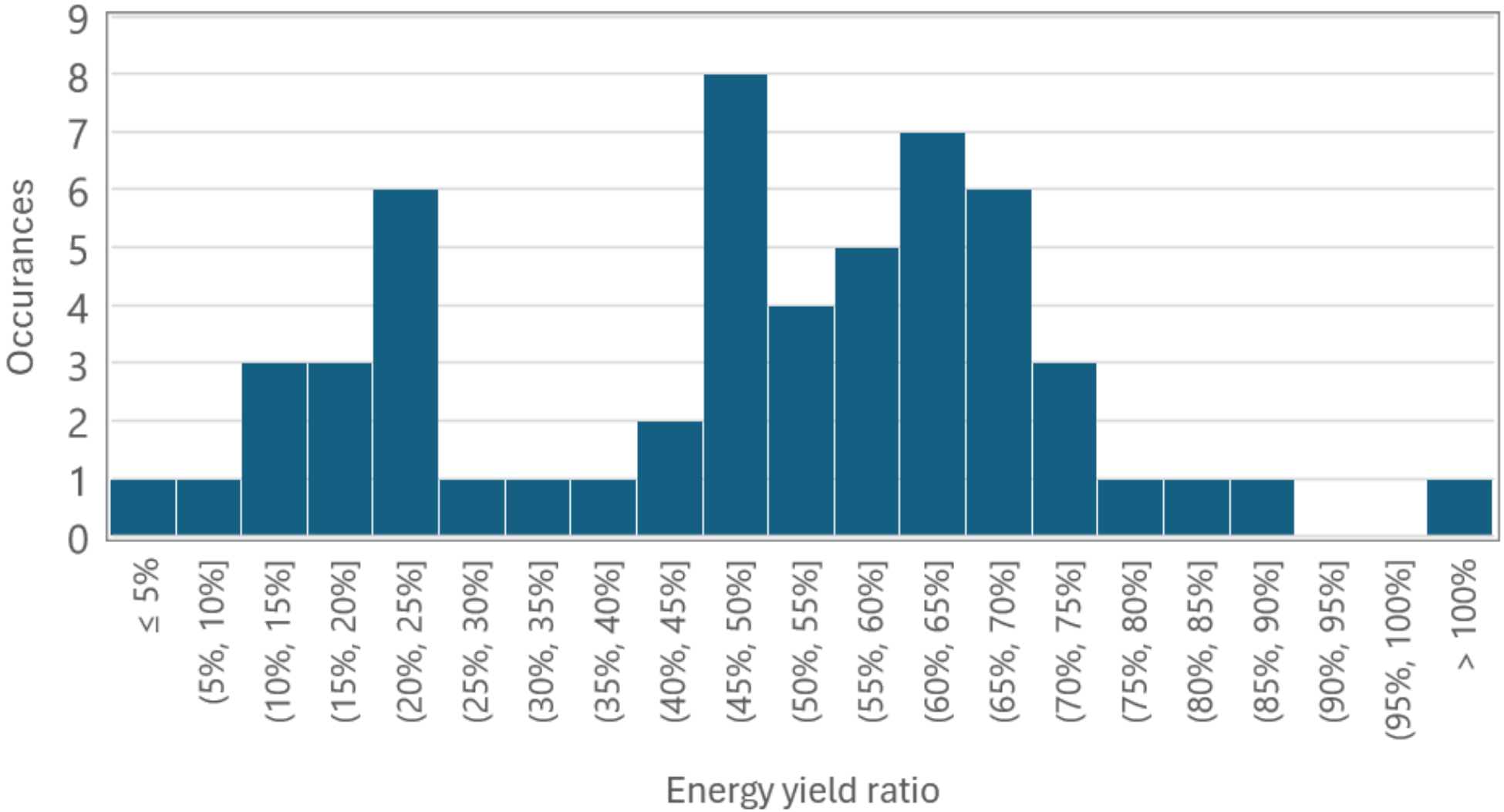
Search

SLV 11:52 27. 02. 2024

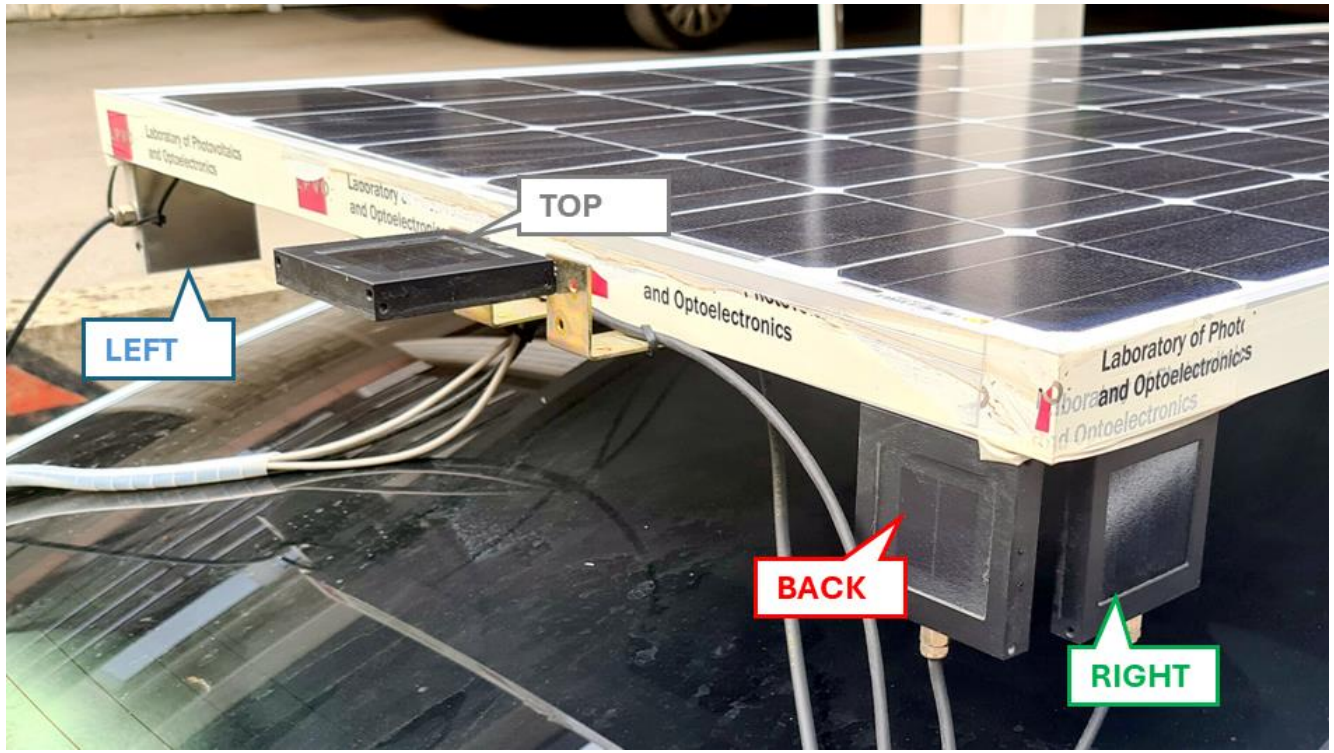
Daily PV energy, PR and temperature



Comparison with fixed, ideally oriented PV module



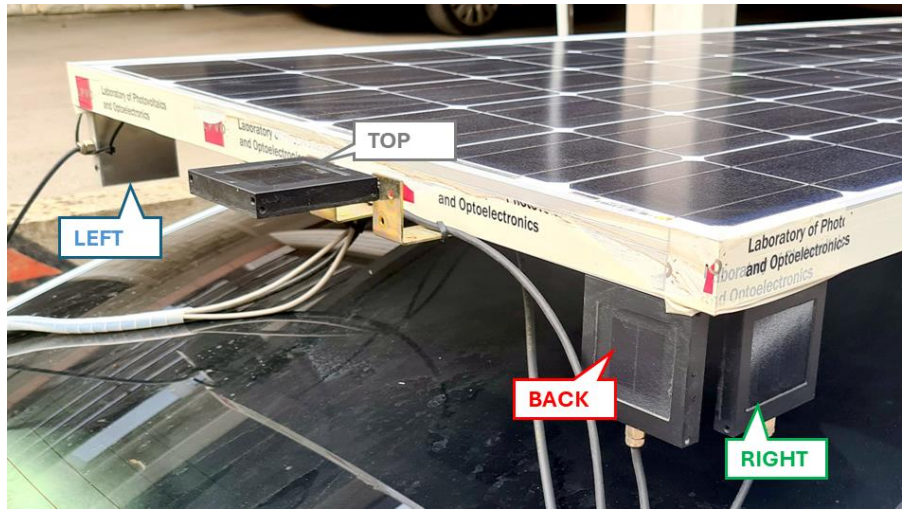
Range extension (2 months – 15.2-15.4)



14.0 kWh → 150 Wh/km → 93 km

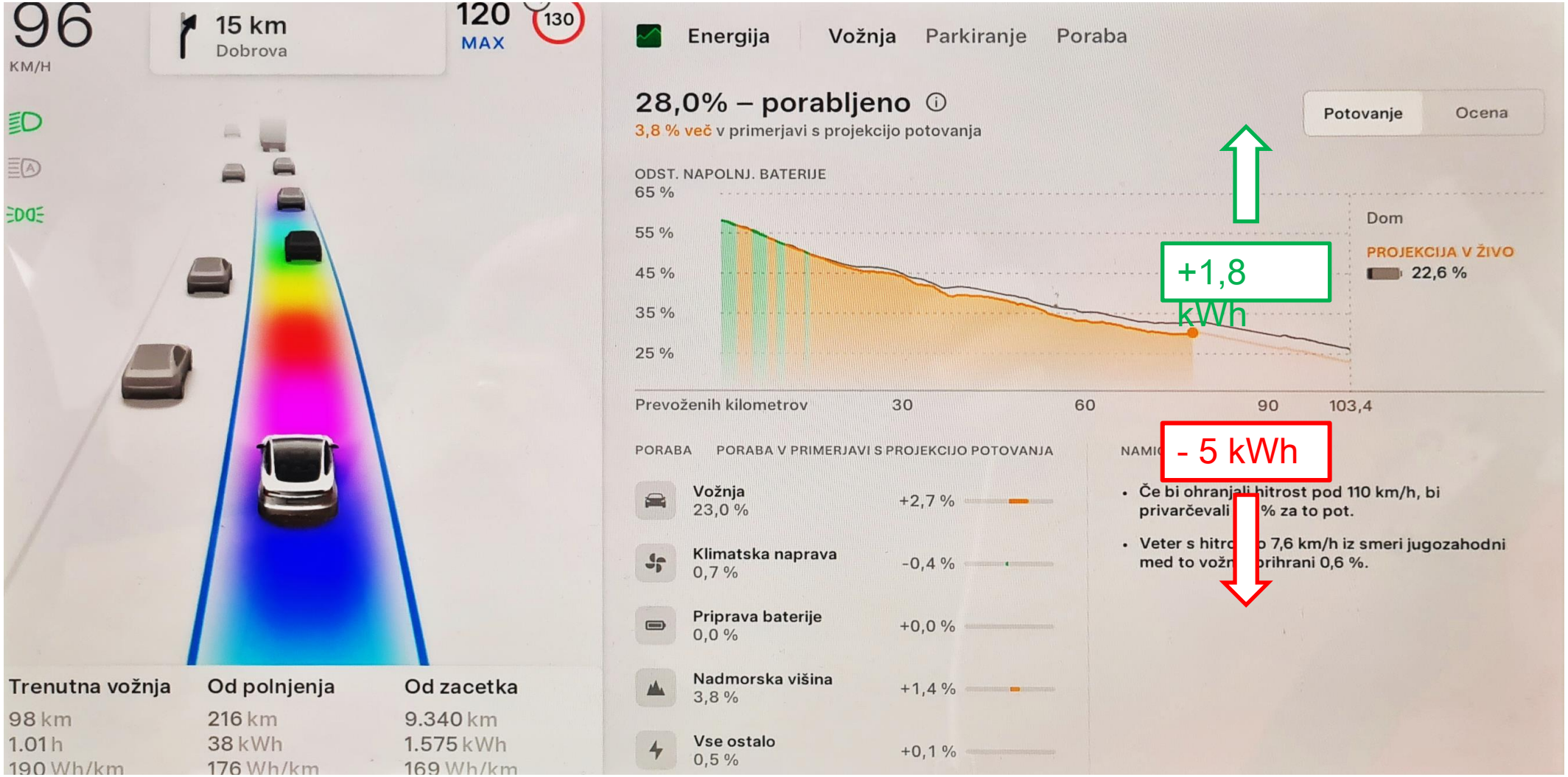
<1 km/day 5 km/day 1.6 km/day

Hypotethical range extension (2 months)

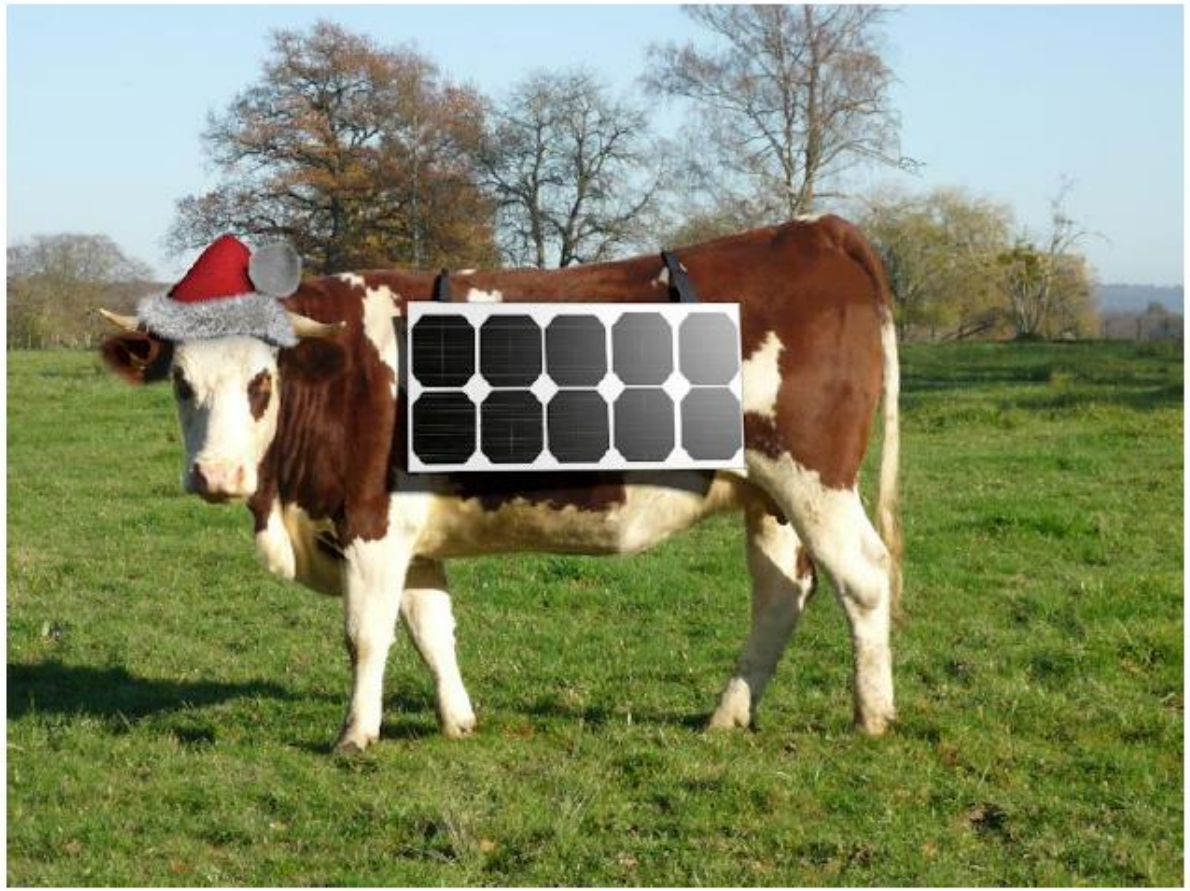


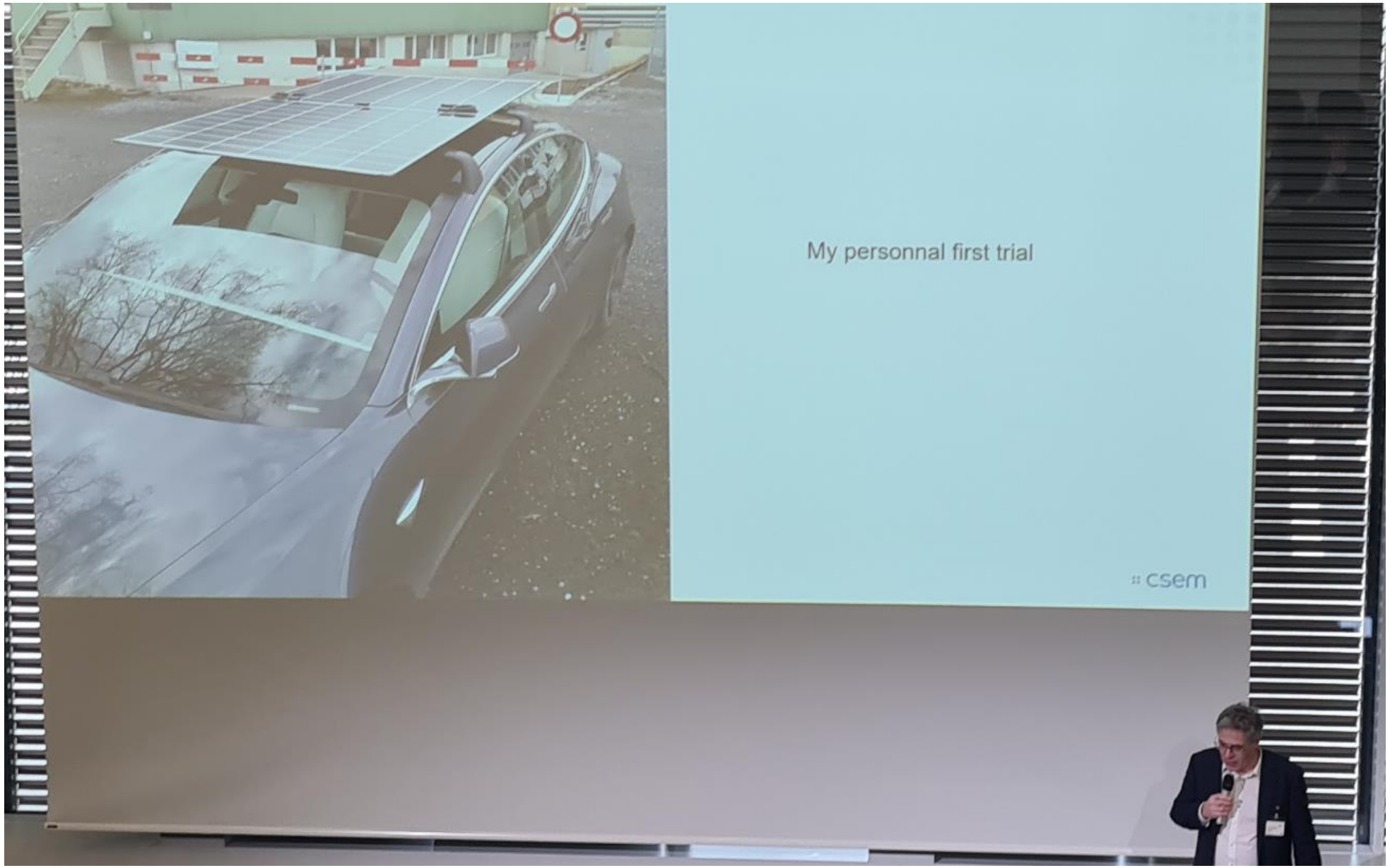
Side	Irr kWh/m²	Area m²	Energy density / kWh/m²	PV energy / kWh	Range extension km
Back	42.0	1	8.1	8.1	54
Right	30.2	1	5.8	5.8	39
Top	82.9	3	16.0	48.2	320
Left	45.5	1	8.8	8.8	58

Clear need for PV integration – 250 km road trip



Aestetics




My personnal first trial
csem

Low range

Peter Palandačič
Kolk pa prevoziš na sonce?
2 tednov Jezi me Odgovori Deli z drugimi

.... teslo s Teslo !!!

20 h Všeč mi je Odgovori

Fucked-up

Uroš Štucin
Saj ste več kot prfuknjeni!
22 h Všeč mi je Odgovori

@Jošt & @Andraž Danes sem na poti srečal ne vem kir model točno ampak je bila ena Tesla, na strehi je imel dobesedno panel prišraufan na nosilce. 😂
A je tip extremno neumen ali je na čem? 😀

Electro morons

Uroš Piskač
😂😂😂😂😂😂😂 elektro debili
1 d Všeč mi je Odgo

Pissing into the wind

Mihail Danev
Pišanje uz vetar..
15 h Všeč mi je Odgo

Harmful radiation

Darko Kalan
Se vec sevanja
1 d Všeč mi je Odgovori

Peter Celarc
3 d Všeč mi je Odgovori

Aleksander Stojan
Samo bedaki in konji 3

Only fools and horses

On drugs

Stupid

Sončne celice na Tesli

Ena stvar več k gori

Fire

A nismo dal to že čez?

Da je električn avto totalno debilstvo

Moron

Idiot

Bratina Mivec
Tale je šele idiot. Tudi na fakulteti so idioti mar ne ?
4 d Všeč mi je Odgovori Urejeno 2