

Soft Costs in Switzerland

EU PVSEC Hamburg, Monday, 14 September 2015

Soft Costs

“A cost for an item that is not considered direct construction cost.”

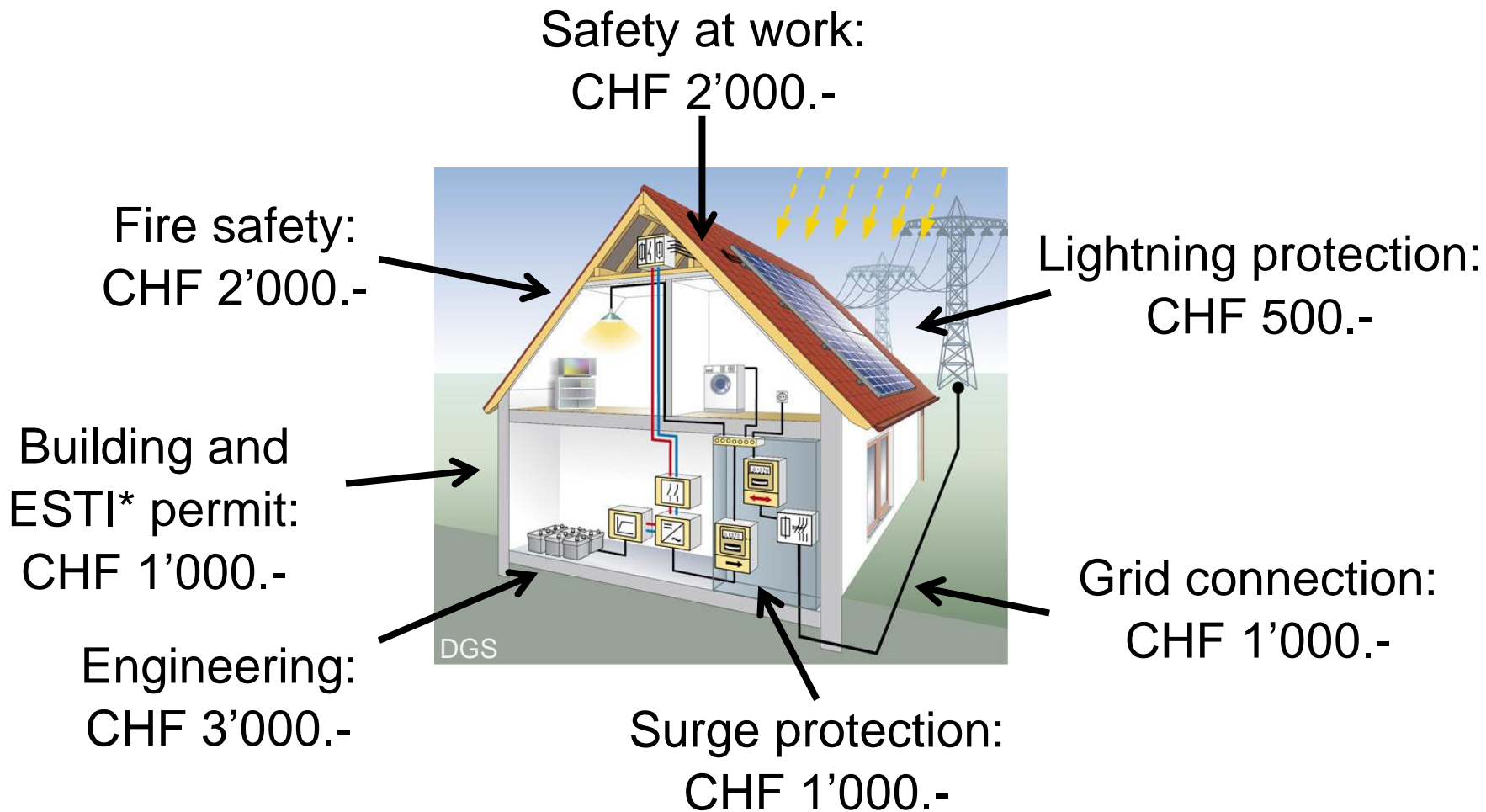
www.businessdictionary.com

Soft costs in this presentation

- _ Indirect installation costs
- _ Costs for operation and maintenance (O&M)

Note: 1 EUR ~ 1.1 CHF = 110 Rp.

Indirect Installation Costs: “Worst Case” for 10 kWp



*Federal Inspectorate for Heavy Current Installations ESTI

Indirect Installation Costs

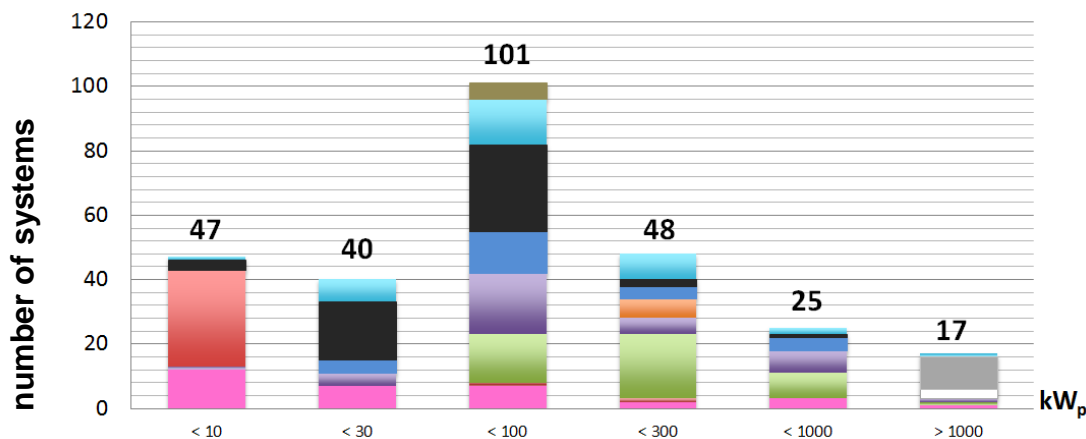
Item	Typ. Costs (CHF)	Red. Costs (CHF)	Cost reduction potential
Safety at work	2'000.-	500.-	Smarter solutions
Lightning protection	500.-	0.-	Integrated concept
Grid connection	1'000.-	500.-	Simplified administration, no extra production meter
Surge protection	1'000.-	500.-	Newer cheaper devices
Engineering	3'000.-	500.-	Not necessary, part of installer
Building and ESTI permit	1'000.-	0.-	Not necessary anymore
Fire safety	2'000.-	500.-	Smarter concepts
<i>Metering (>30 kVA)</i>	<i><2000.- p.a.</i>	<i><600.- p.a.</i>	<i>defined by Swiss regulator ELCOM; metering and monitoring in 1 device</i>
TOTAL	10'500.-	2'500.-	

Maintenance Costs

- _ Maintenance, repairs, replacement of components
- _ Fees for metering, grid connection, certificate of origin
- _ Cleaning
- _ Periodical checks
- _ Monitoring
- _ Insurances
- _ Administration
- _ Various (VAT, hiring fees, maintenance, proof of originin)

PV Maintenance Costs Study in Switzerland

- _ In 2007 a study in Switzerland estimated the O&M costs to be approx. 5 to 10 Rp. per kWh
- _ In 2014, this study was recompiled
- _ 278 power plants of 31 operators were investigated (47.8 MWp)

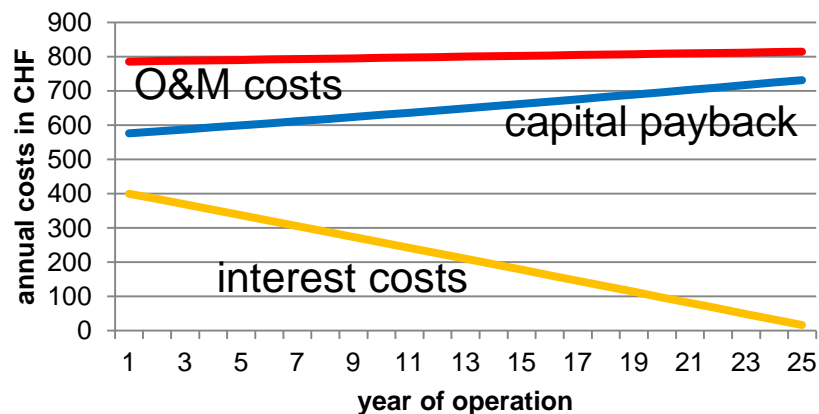


Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

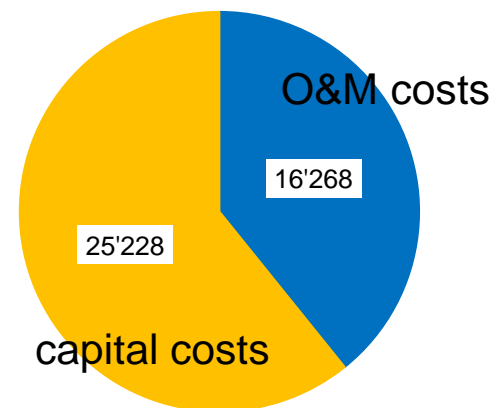
Swiss Federal Office of Energy SFOE

Example Single Family Home, 10 kWp

- Net costs (subsidies subtracted): CHF 20'000.-
- Interest: 2 % per annum; payback period: 25 years
- Operation costs: 6 Rp./kWh plus 1% inflation per year, LCOE: 0.1835 CHF/kWh

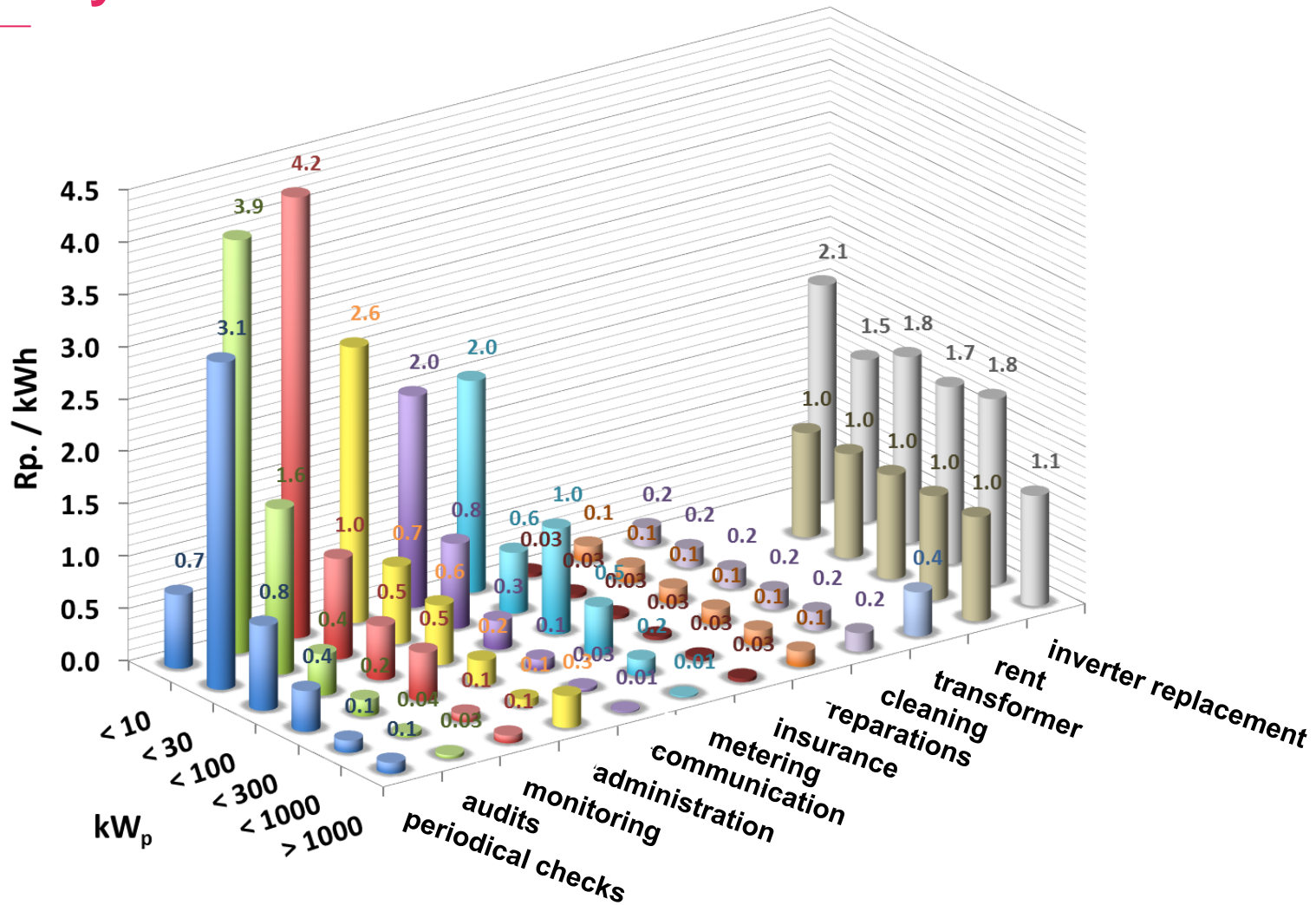


Yearly costs in CHF

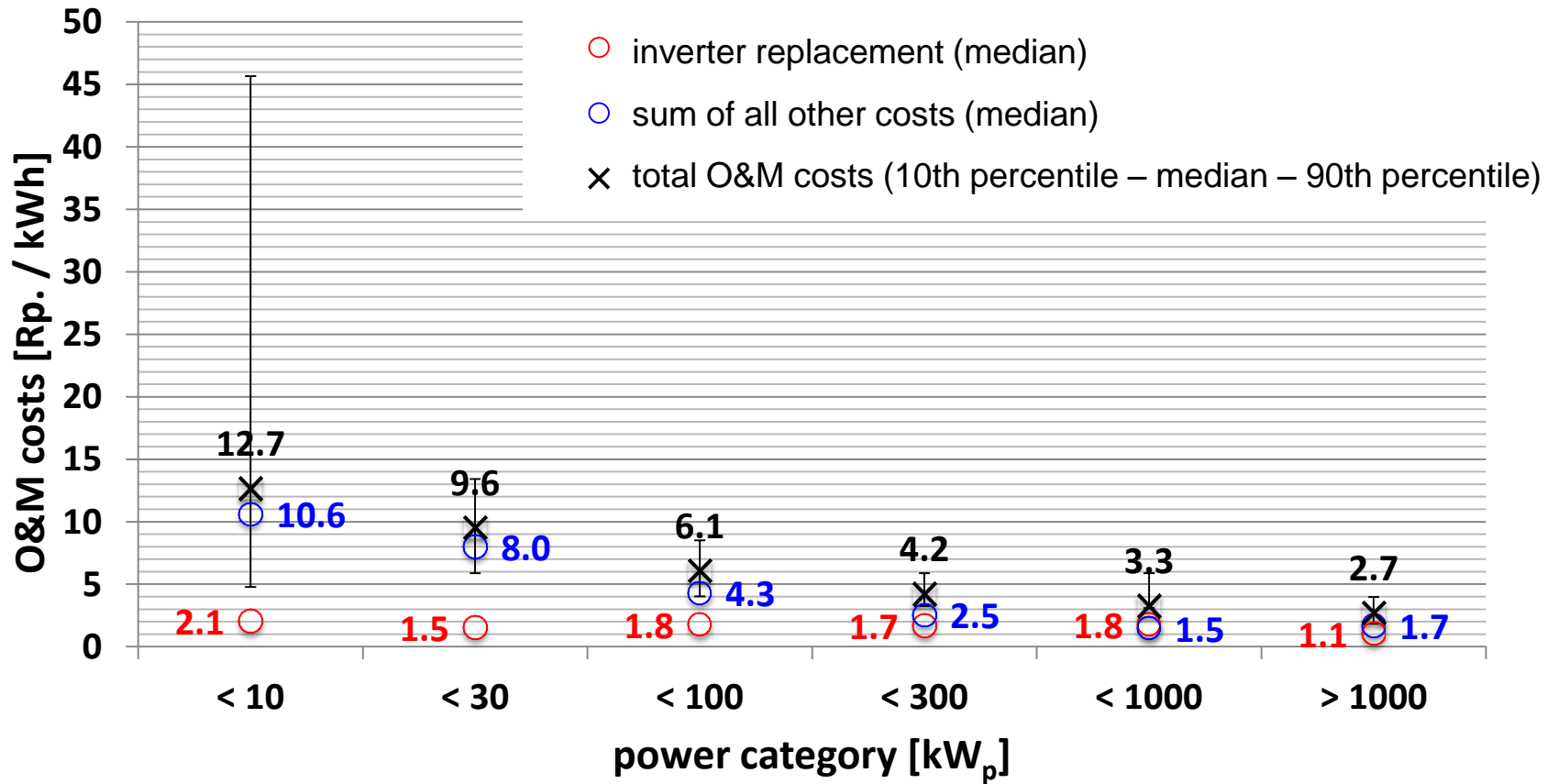


Sum of all costs over 25 years in CHF

Study Results: Item Overview






Study Results: Summary



Cases for the Study

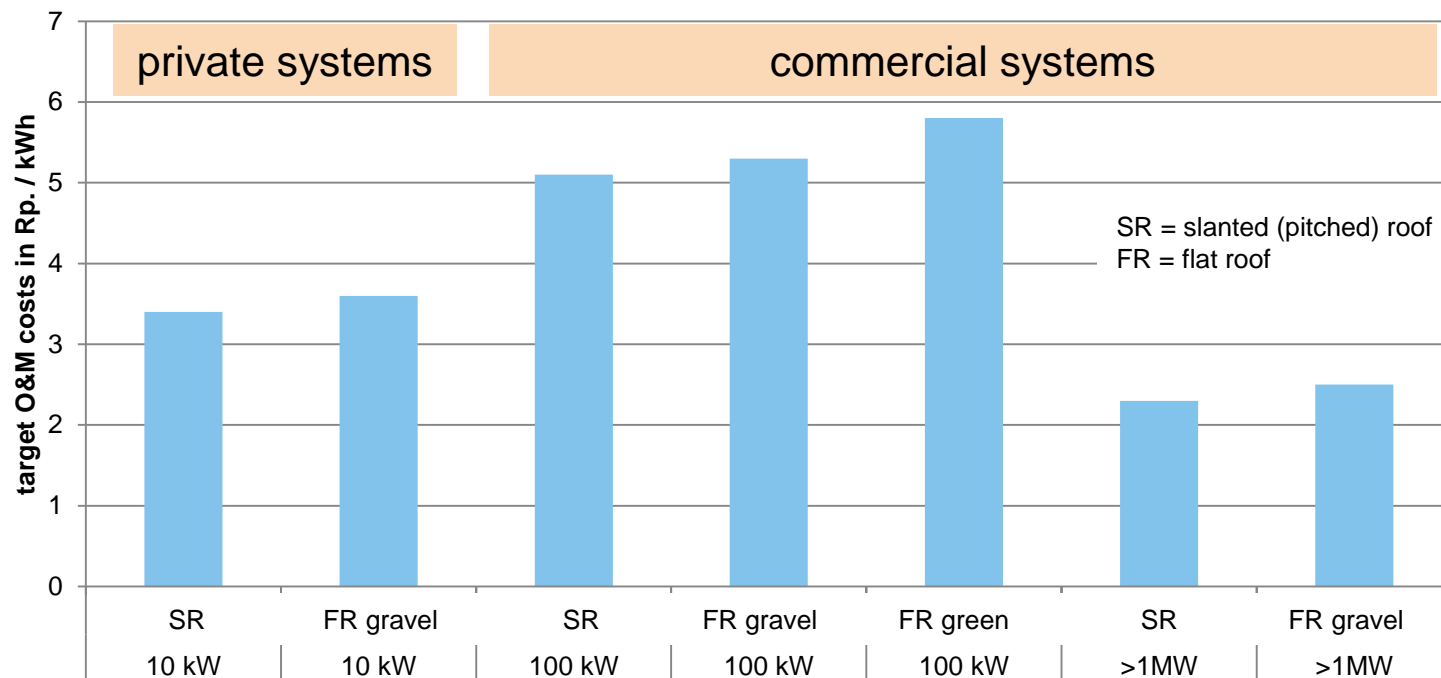
	Power	10 kW	10 kW	100 kW	100 kW	100 kW	>1MW	>1MW
Type of roof		SR	FR gravel	SR	FR gravel	FR green	SR	FR gravel
Inverter maintenance		Green	Green	Green	Green	Green	Green	Green
Cleaning, roof maintenance		Red	Green	Red	Green	Green	Red	Green
Service, checks		Red	Hatched	Hatched	Hatched	Hatched	Hatched	Hatched
Repairs, replacement of inverter		Green	Green	Green	Green	Green	Green	Green
Automatic monitoring		Red	Red	Green	Green	Green	Green	Green
Metering		Red	Red	Green	Green	Green	Green	Green
Insurance		Green	Green	Green	Green	Green	Green	Green
Administration		Hatched	Hatched	Green	Green	Green	Green	Green
Various (roof rental, MV transformer)		Red	Red	Red	Red	Red	Green	Green

legend  Not necessary
 Necessary
 Only partly necessary

SR = slanted (pitched) roof
 FR = flat roof

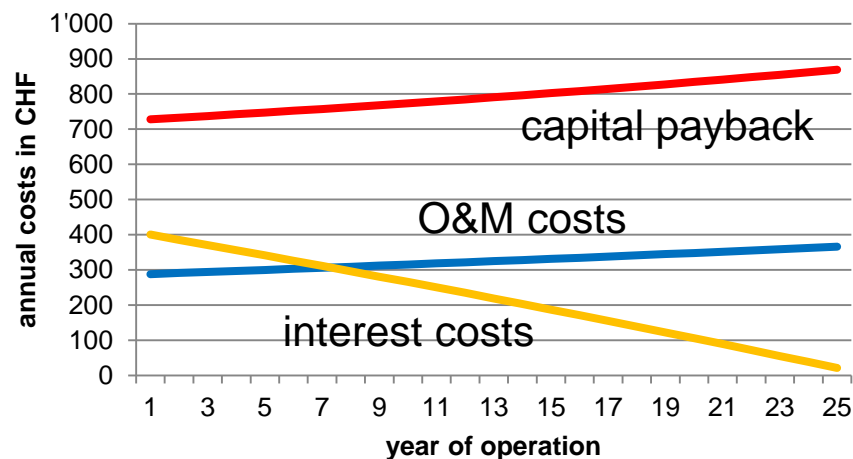
Estimated O&M Costs for Future Reference Cases

Assumptions: System built after 2015. Not all O&M services are needed. No professional O&M for small scale systems.

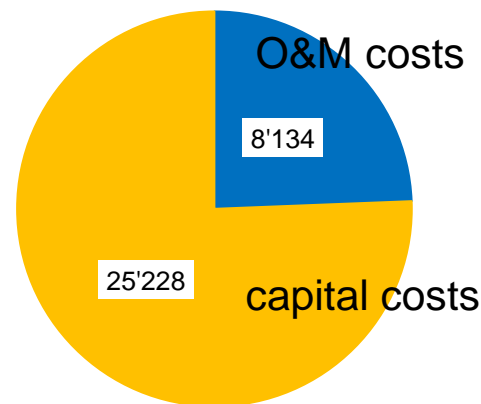


Example Future Costs Single Family Home, 10 kWp

- Net costs (subsidies subtracted): CHF 20'000.-
- Interest: 2 % per annum; payback period: 25 years
- Operation costs: 3 Rp./kWh plus 1% inflation per year, LCOE: 0.1475 CHF/kWh



Yearly costs in CHF



Sum of all costs over 25 years in CHF

Potential for O&M Cost Reduction

- _ Only one system for Monitoring and Metering; no dedicated remote monitoring system for small scale PV
- _ Optimised cleaning (means normally reduced cleaning)
- _ No fees for use of roofs
- _ Optimisation of insurances
- _ No green roofs with intensive vegetation
- _ Low AC/DC ratio (1.2 ... 1.4) → inverter must be paid twice
- _ Smart placement of inverter
- _ Integration into O&M procedure of the building

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Thank you for your attention!

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