

Für Mensch & Umwelt

Umwelt   
Bundesamt

Conférence en ligne „sur les centrales PV en fin de contrat d'achat“

# Ensuring the continued operation of photovoltaic projects after the end of their funding period

Unit V 1.3 – Renewable Energies  
Matthias Futterlieb

## Agenda

- The Federal Environment Agency
- Installed capacity and electricity generation of PV projects after the end of their funding period (2021-2026)
- Small PV projects under the current legal framework – during and after their funding period
- Continuing PV plant operation under the current regulation:
  - Revenues from market value
  - Costs of direct marketing and continued operation
- Proposal for a simplified scheme to pass-through the market value
- Conclusions

# The Federal Environment Agency

Scientific work

Development of solutions

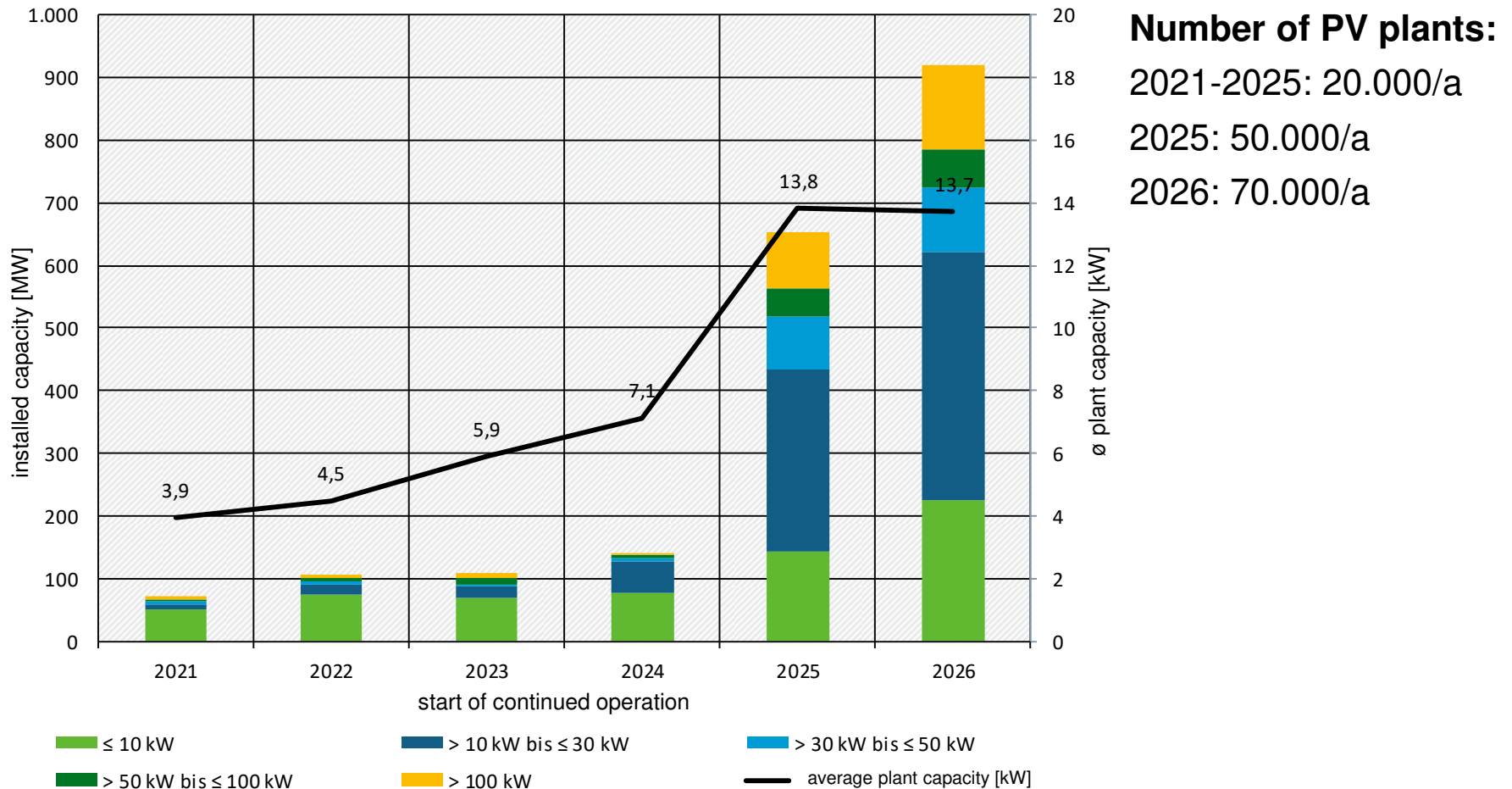
Basis for political decisions of the Ministry for the Environment and other ministries



The Federal Environment Agency primarily supports the Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

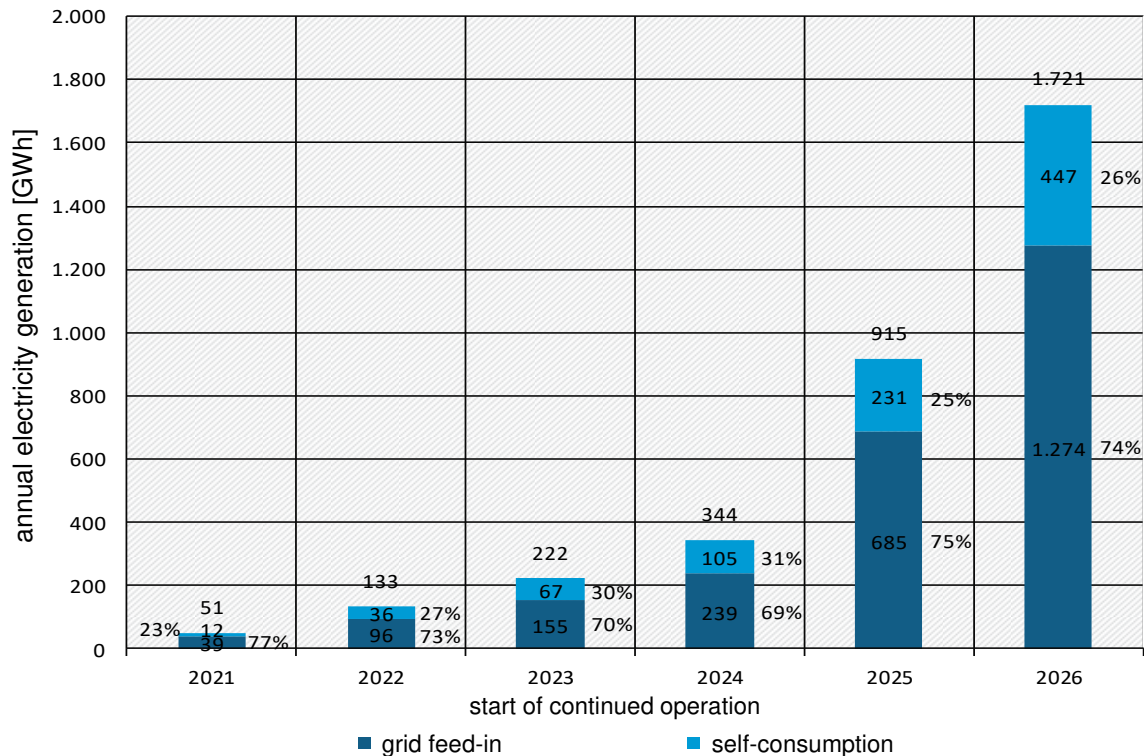
Since 2014, UBA is also supporting the Federal Ministry of Economy and Energy (BMWi) for example on renewable energies and energy efficiency

# Installed capacity of PV projects at the end of their funding period (2021-2026)



- Average plant size in 2021 is below 4 kWp, highest amount is ≤ 10 kWp.
- From 2025, number and capacity of PV plants at the end of funding period will quickly rise.

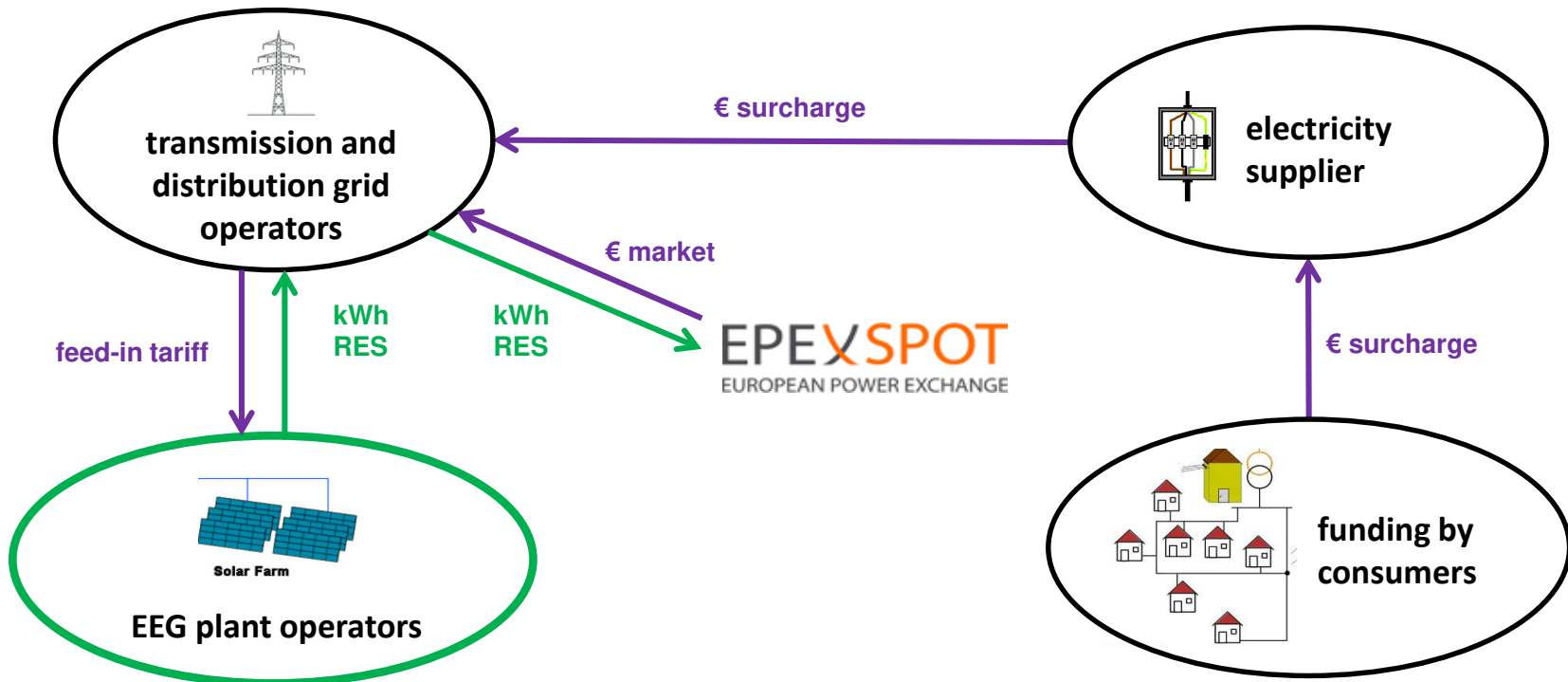
## Electricity generation and self-consumption of PV projects after the end of their funding period (2021-2016, accumulated)



- Assumption in study: natural self-consumption of 25 % for plants  $\leq 10$  kWp
- Assumption in study: self-consumption with battery storage: 55 % for plants  $\leq 10$  kWp
- Result: largest share of electricity generated from PV plants after the end of their funding period would continue to be fed into the grid → who takes up the feed-in of this electricity?

# Small PV projects under the current legal framework – during their funding period

- The Renewable Energy Sources Act (EEG, since April 2000) ensures
  - priority connection to the electricity grid
  - priority dispatch (feed-in priority)
  - purchase and marketing of electricity by grid operators (remuneration)



## Small PV projects under the current legal framework – after their funding period has ended

- The Renewable Energy Sources Act (EEG, since April 2000) ensures
  - priority connection to the electricity grid
  - priority dispatch (feed-in priority)
  - purchase ~~and~~ marketing of electricity by grid operators (remuneration)  
starting 01.01.2021 for the first cohort of PV plants whose funding period has ended
- EEG regulations non-related to remuneration continue to apply.
- „unregulated feed-in“ might cause legal problems for the PV plant operator.
- plants after the end of their funding period are obliged to allocate their electricity feed-in to a form of sale (§ 21b (1) EEG 2017) → this does not happen automatically.
- As the funding period has ended, the only form of sale that can be chosen is the „other direct marketing“ option → this entails new (technical) requirements with additional costs.

→ Can electricity market revenues cover additional costs of „other direct marketing“?

## Market value of electricity fed into the grid (status quo and forecast)

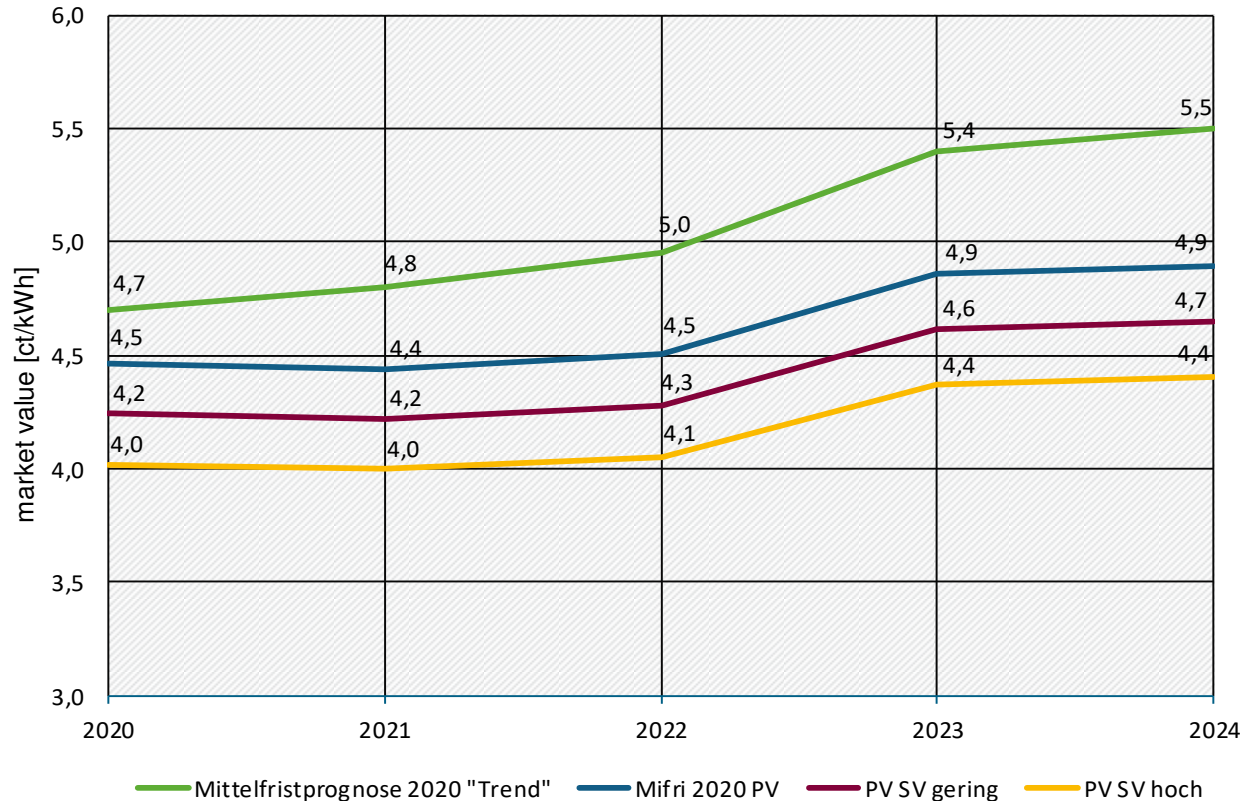
### Annual market value PV:

2017: 3,47 ct/kWh

2018: 4,52 ct/kWh

2019: 3,77 ct/kWh

2020 (Jan-May): 2,01 ct/kWh



Source: Medium-term forecast for the calendar years 2020-2024 (Enervis 2019)

- Expectation in study: market value of 4,0 ct/kWh to 4,5 ct/kWh in 2021.
- Revenues of a 4 kWp plant (funding period ended in 2021, full feed-in):  
 $4 \text{ kWp} * 840 \text{ kWh/kWp} * 0,04 \text{ Euro/kWh} = 134,40 \text{ Euro/a}$



## Costs of direct marketing and continued operation (1/2)

Share of self-consumption	PV plant size [kW]	Direct marketing costs [ct/kWh <sub>net</sub> ]	
		min	max
0 %	5	4.3	8.8
	10	2.3	4.7
	20	1.4	2.8
	30	1.0	2.1
25 %	5	5.7	11.7
	10	3.0	6.3
	20	1.9	3.7
	30	1.4	2.8
65 %	5	12.3	25.1
	10	6,5	13.4
50 %	20	2.8	5.6
	30	2.0	4.1

Direct marketing costs:

- quarter-hourly metering
  - remote controllability
  - marketing costs
- largely fixed costs

The costs of direct marketing are divided by the amount of electricity fed into the grid. Therefore, they increase with higher shares of self-consumption.

Example:

- 5 kWp plant without self-consumption: 4,3 – 8,8 ct per kWh fed in
- 5 kWp plant with 25 % self-consumption: 5,7 – 11,7 ct per kWh fed in

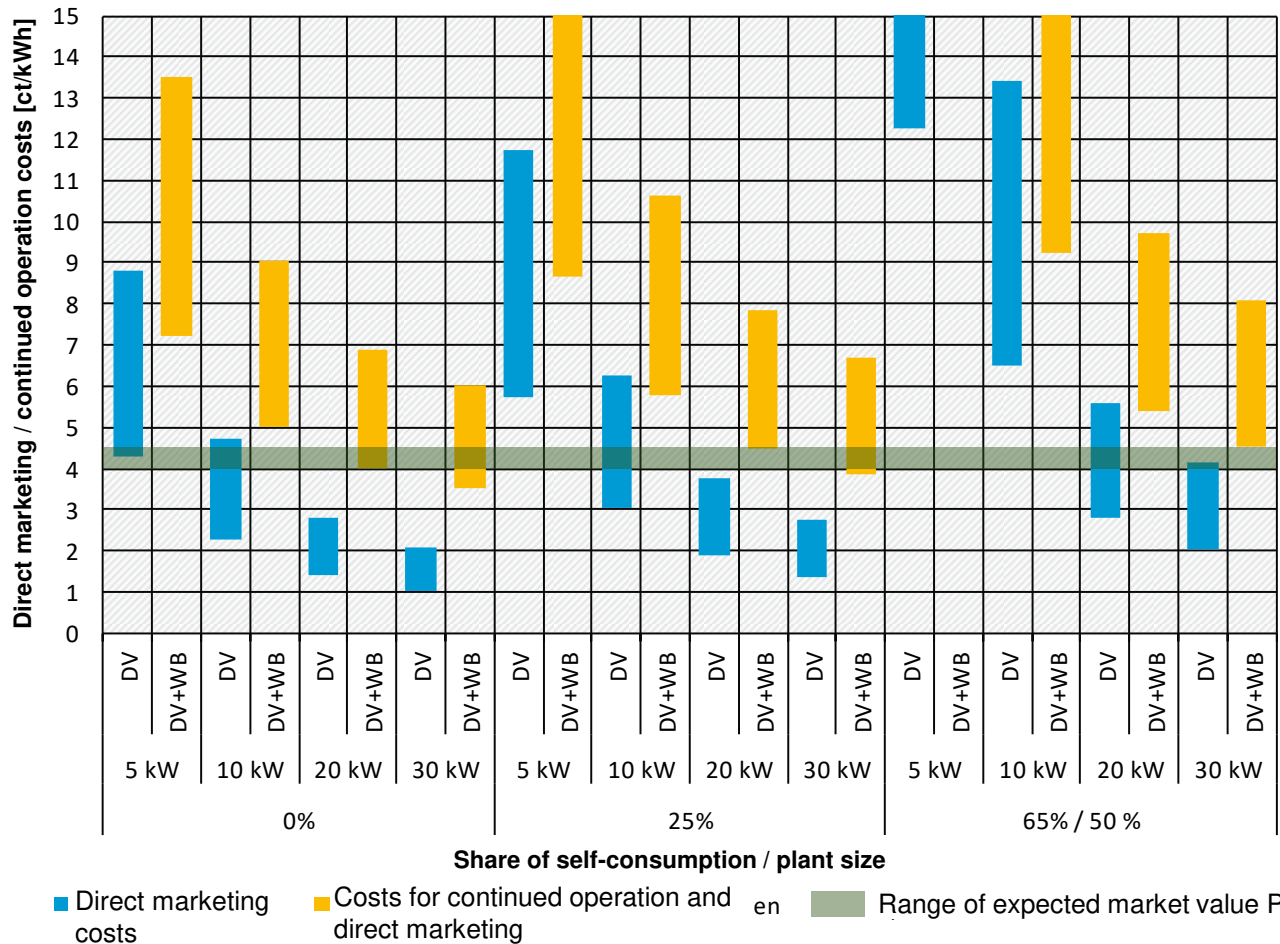
## Costs of direct marketing and continued operation (2/2)

- Costs for continued operation refer to the PV plant itself. They include the installation of a new inverter (per ten years) and the annual metering costs.
- These costs are only relevant for PV projects with full feed-in; in case of self-consumption, they are expected to be covered by avoided expenses for electricity.

PV plant size [kW]	Continued operation costs [ct/kWh <sub>net</sub> ]	
	min	max
5	3.0	4.7
10	2.7	4.4
20	2.6	4.1
30	2.5	3.9

- There may be additional costs not included in the continued operation costs above:
  - new meter cabinet (due to conversion to self-consumption, meter exchange)
  - additional maintenance, etc.

## Costs of direct marketing and continued operation vs. market value



For PV plants  $\leq 10$  kWp, the market value does not cover the costs of direct marketing and continued operation.

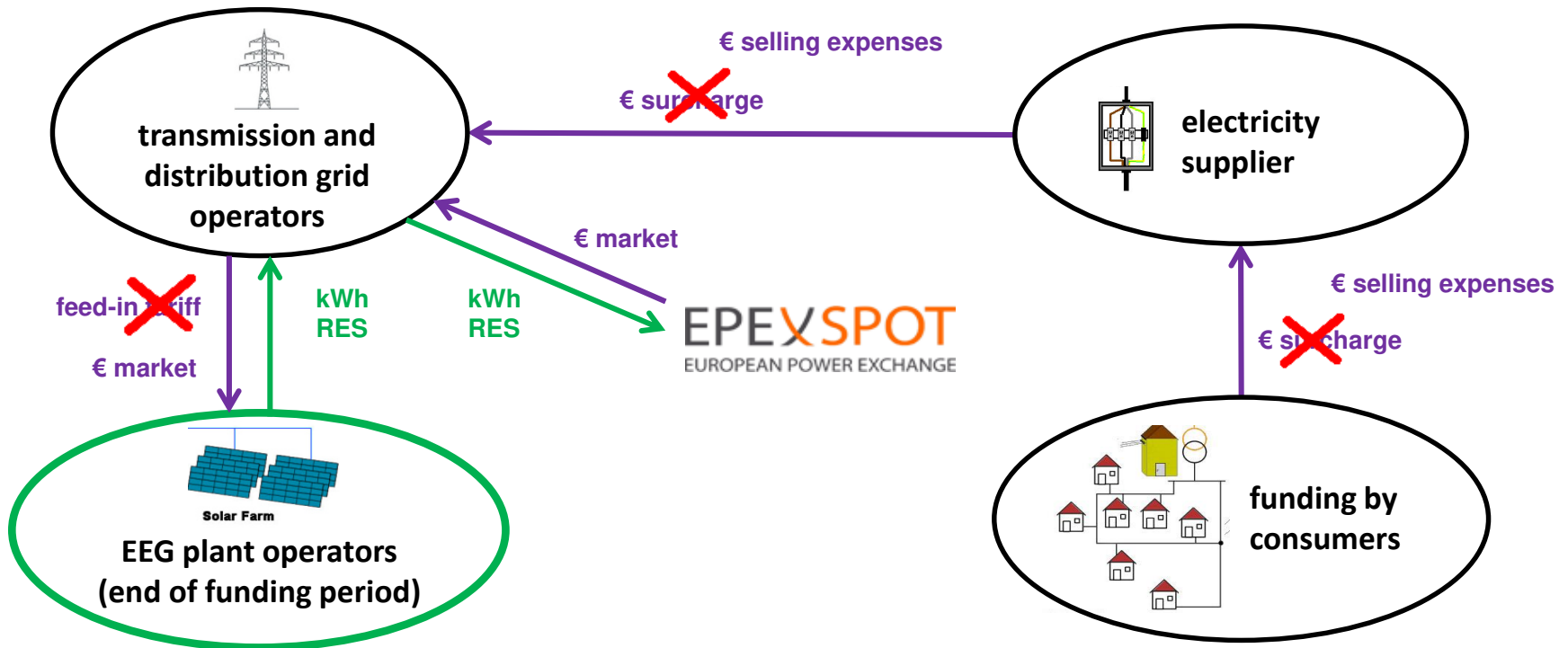
Direct marketing costs: based on the amount of electricity fed in.

Continued operation costs: based on the total electricity generation of the PV plant.

- Result: excess electricity to be fed into the grid is capped (i.e. only self-consumption), or the PV plant is no longer operated.

## Proposed solution “pass-through of market value” (1/2)

- Wide range of solutions conceivable (e.g. remuneration > market value, feed-in for 0 ct/kWh).
- „pass-through of market value“ incentivizes the continued operation of PV plants  $\leq 100$  kWp as well as the feed-in of their (excess) electricity.
- Only the selling expenses are covered by the final consumers, using the existing EEG mechanisms.

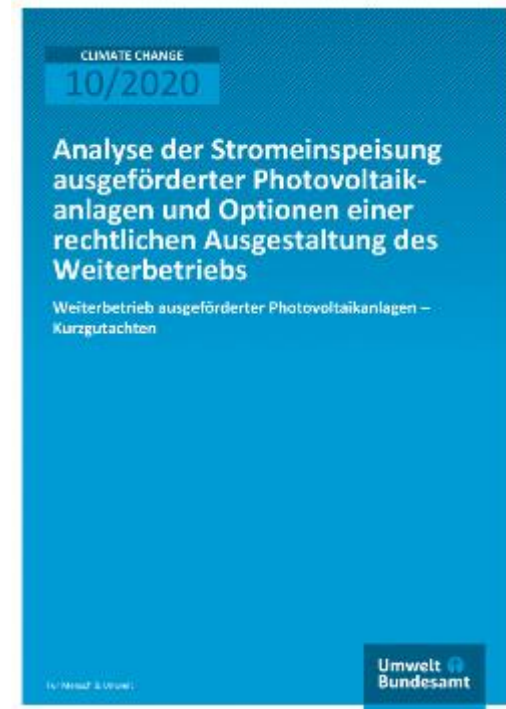


## Proposed solution “pass-through of market value” (2/2)

- Pass-through of market value ...
- ... is a very comprehensible solution, probably high acceptance;
- ... a similar regulation already exists for combined heat and power generation;
- ... is explicitly provided for in the EU Renewable Energy Directive for renewables self-consumers (Art. 21 (2) d)): Self-suppliers are entitled to receive remuneration "which reflects the market value" of the electricity that they feed into the grid "and which may take into account its long-term value to the grid, the environment and society";
- ... is compatible with the Renewable Energy Directive, the Regulation on the Internal Electricity Market and EU legislation on state aid;
- ... partially restricts the viability of market-based solutions;
- ... therefore, it is meant as a temporary solution, until market-based solutions become sufficiently attractive for the PV plant operator.

## Conclusions

- PV plants whose funding period ends from 2021 onwards are very small; the electricity market revenues will not cover the fixed costs of direct marketing.
- There is a risk that these PV plants will be decommissioned or that the excess electricity (after self-consumption) will be capped.
- To prevent this, a simplified scheme for passing through the market value should be implemented.
- Self-consumption should remain possible as a monetary incentive for the plant operator.
- The remuneration of excess electricity – without taking into account the share of self-consumption – has to be sufficiently attractive, as the PV plant operator might otherwise choose to cap the excess electricity.



<https://www.umweltbundesamt.de/publikationen/analyse-der-stromeinspeisung-ausgefoerderter>

# Thank you for your attention

**Matthias Futterlieb**

**Unit V 1.3 – Renewable Energies**

[matthias.futterlieb@uba.de](mailto:matthias.futterlieb@uba.de)