



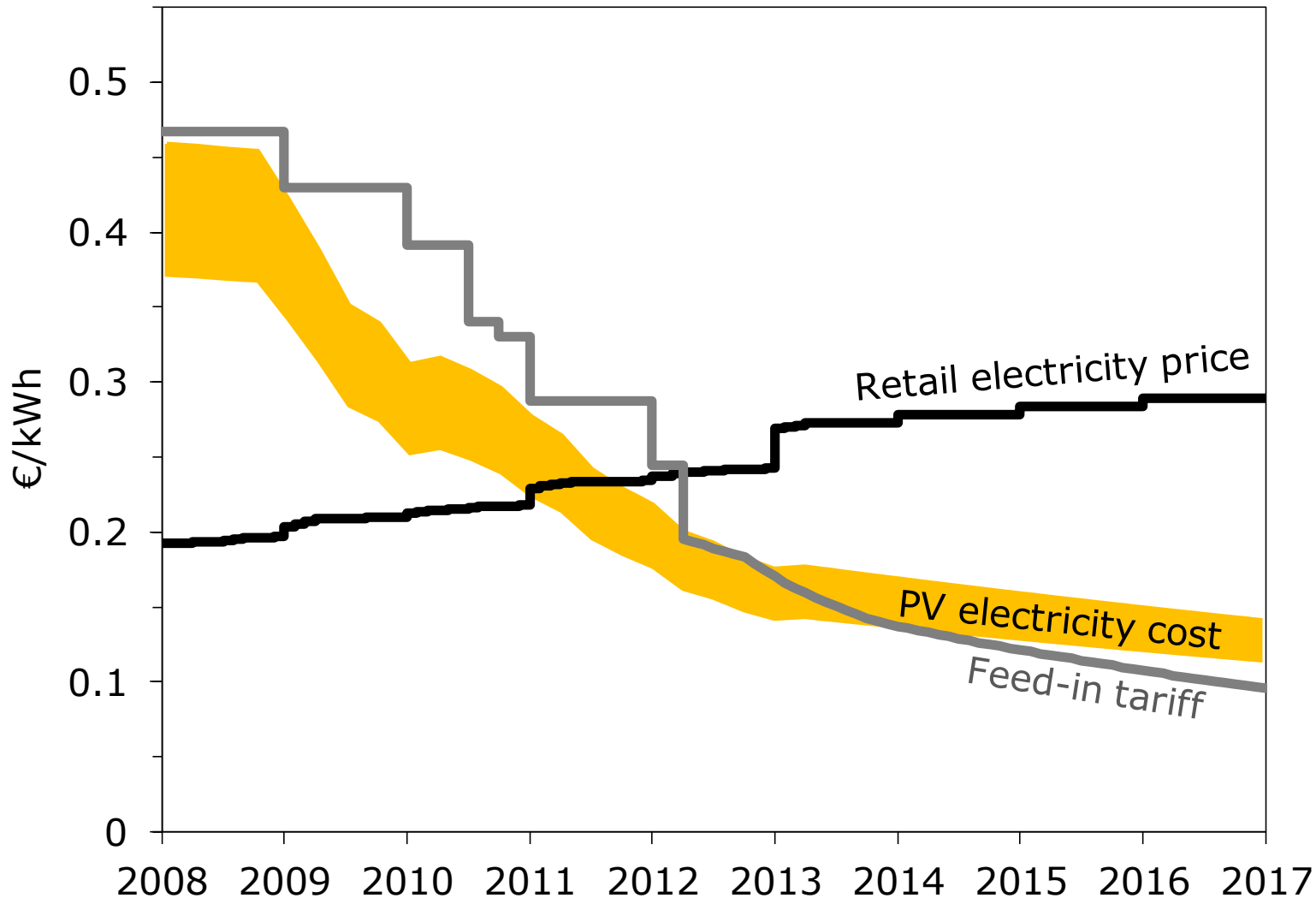
Economics of Residential PV Battery Systems in the Self-Consumption Age

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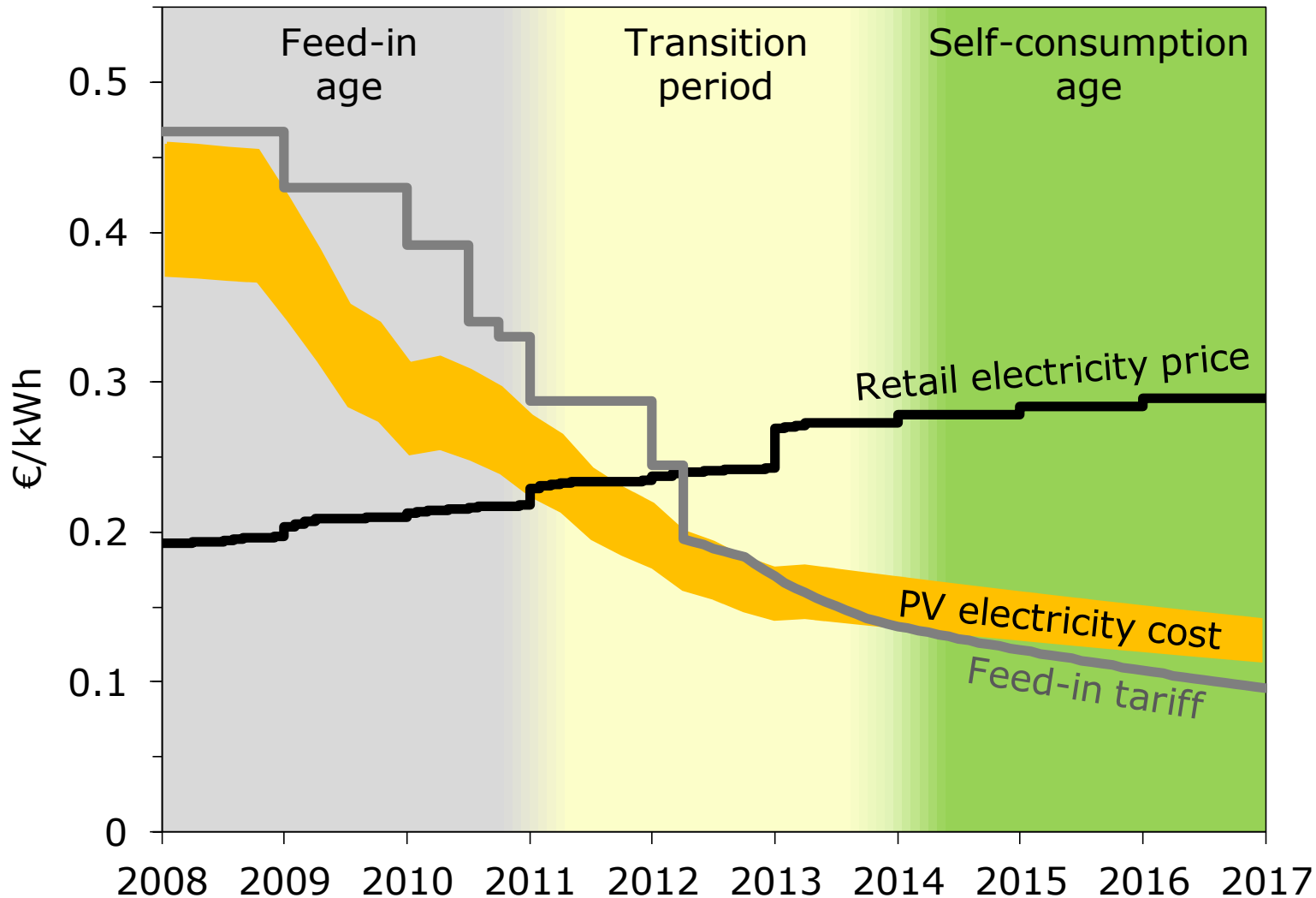
Transition from the feed-in into the self-consumption age

Evolution of the cost situation in Germany

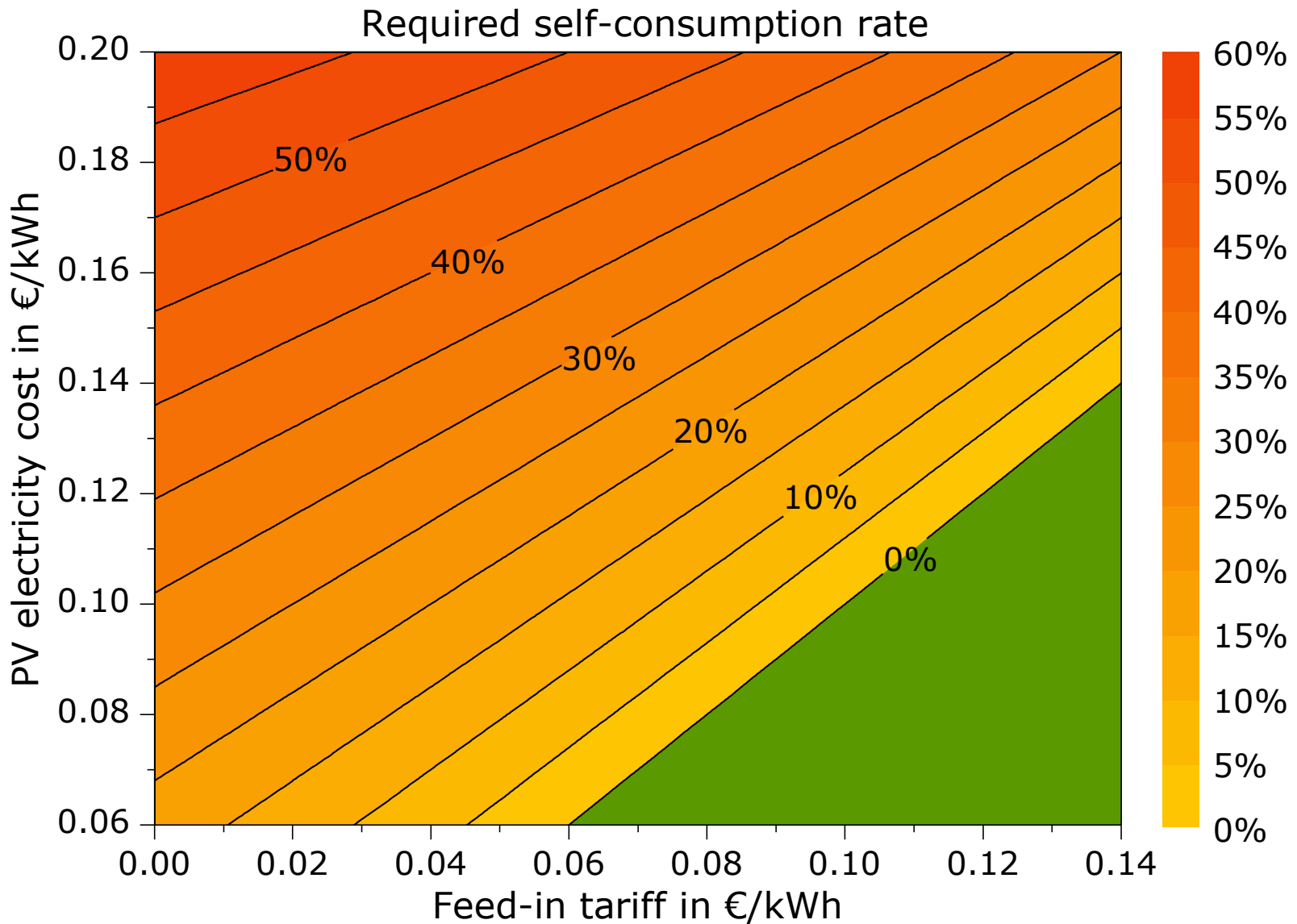


Transition from the feed-in into the self-consumption age

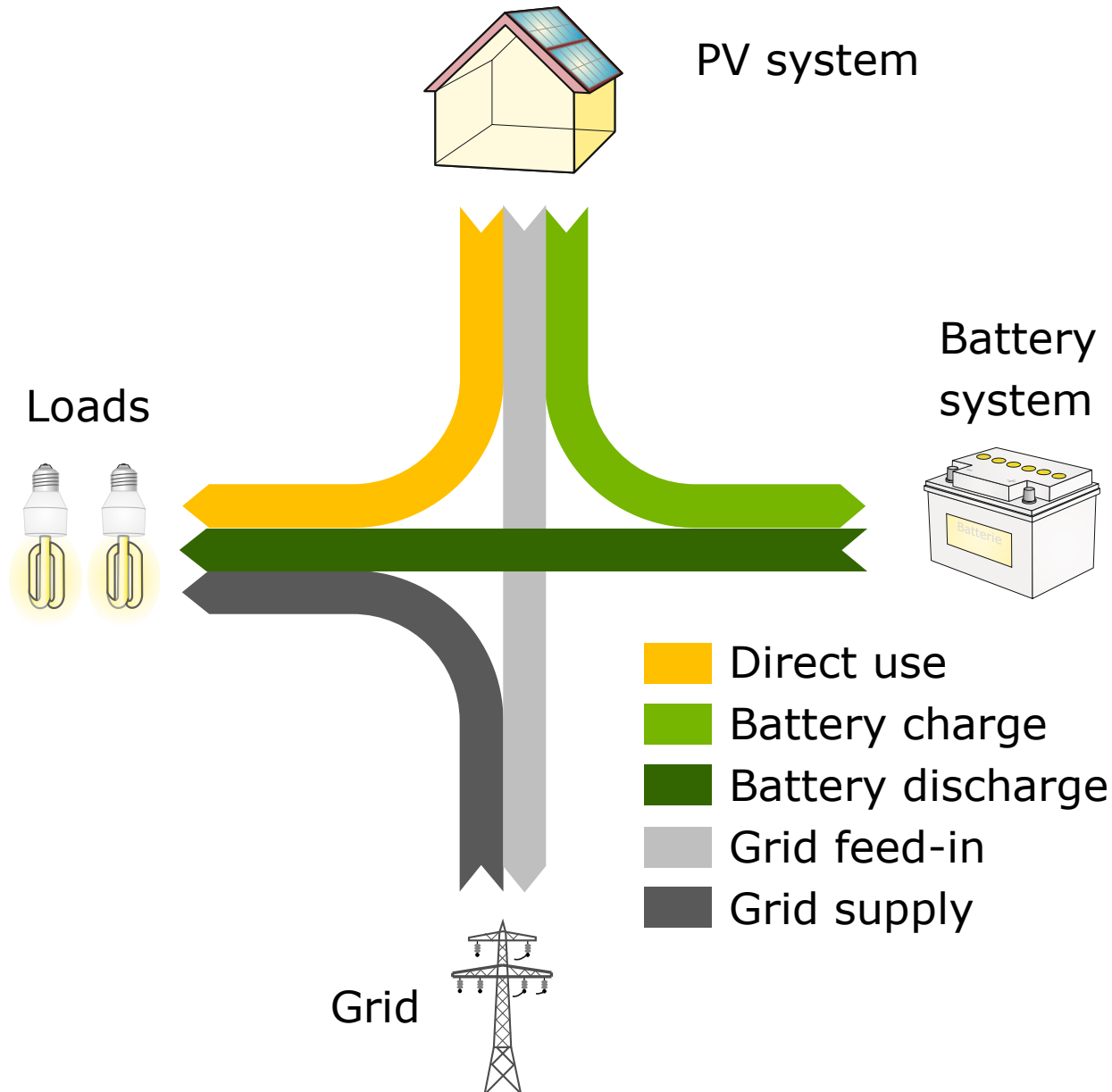
Evolution of the cost situation in Germany



Required self-consumption rate to preserve profitability



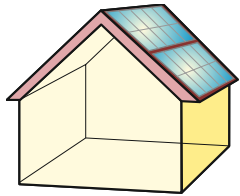
Energy flows of homes equipped with PV battery systems



Cash flows of homes equipped with PV battery systems

PV system

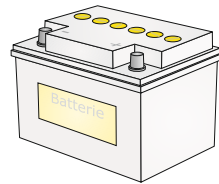
- Investment cost
- Operational cost
- Cost of financing



+

Battery system

- Investment cost
- Operational cost
- Cost of financing



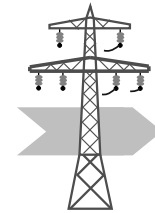
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Expenses for the grid supply



-

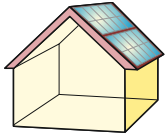
Revenues from the grid feed-in



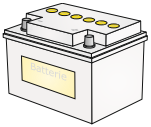
Mean electricity cost

€/kWh

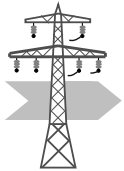
Assumptions of the economic assessment



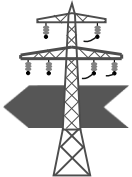
Rated PV power related to annual load demand
1 kWp/MWh



Usable battery capacity related to annual load demand
1 kWh/MWh



Feed-in tariff
0.12 €/kWh



Mean retail electricity price
0.34 €/kWh



Period of time
20 years

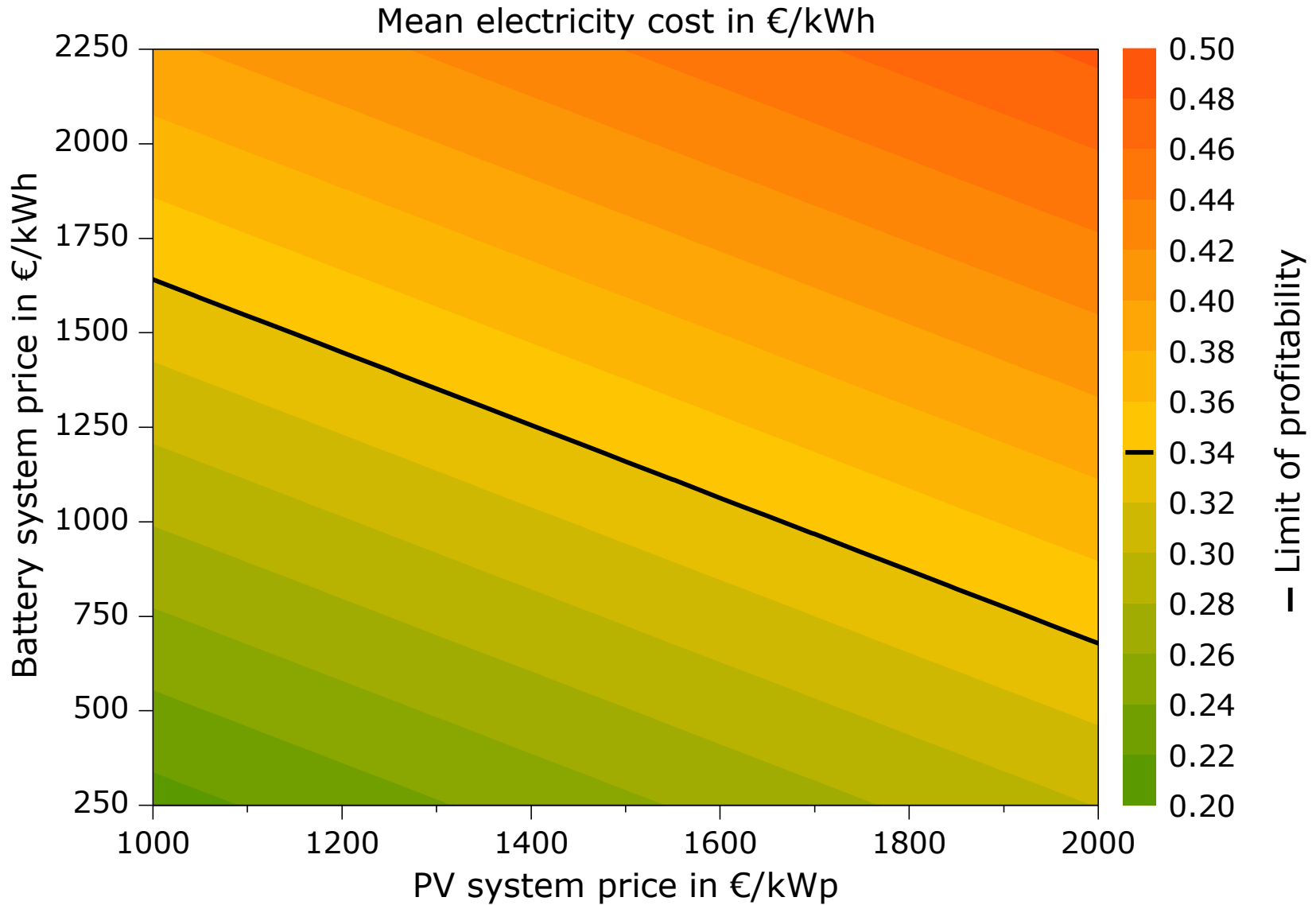


Annual operational cost
1.5%

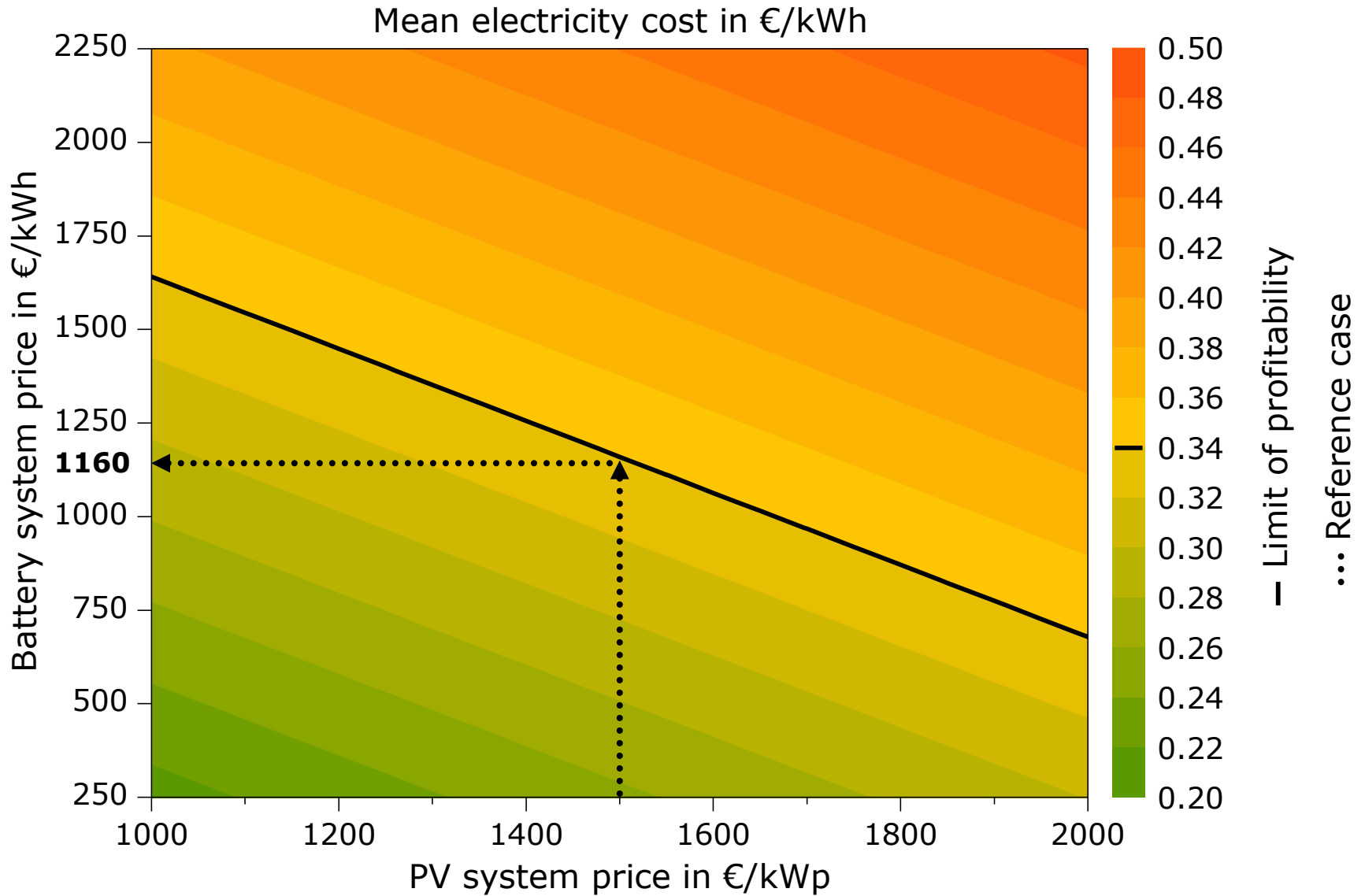


Interest rate
4%

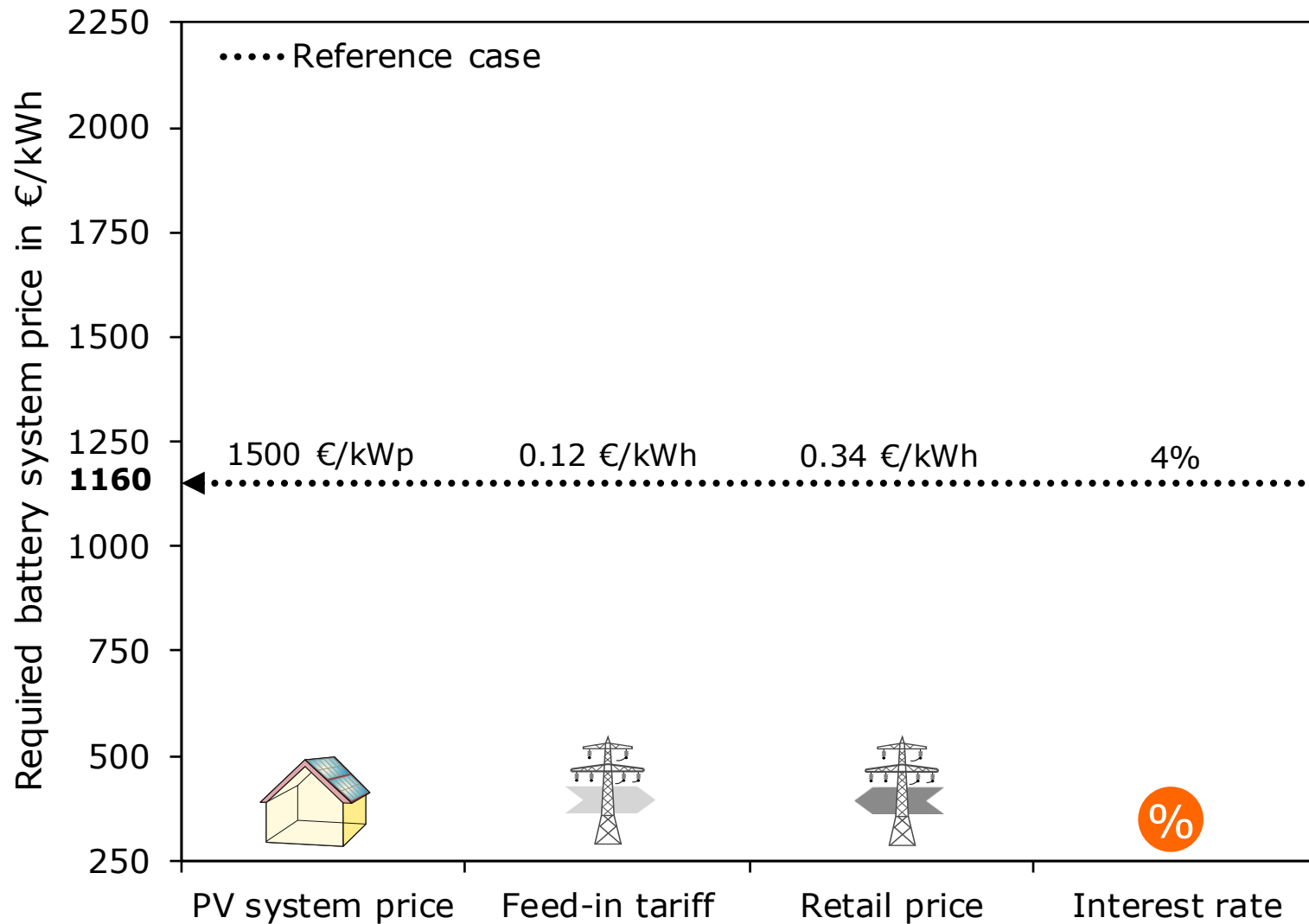
Mean electricity cost for varying system prices



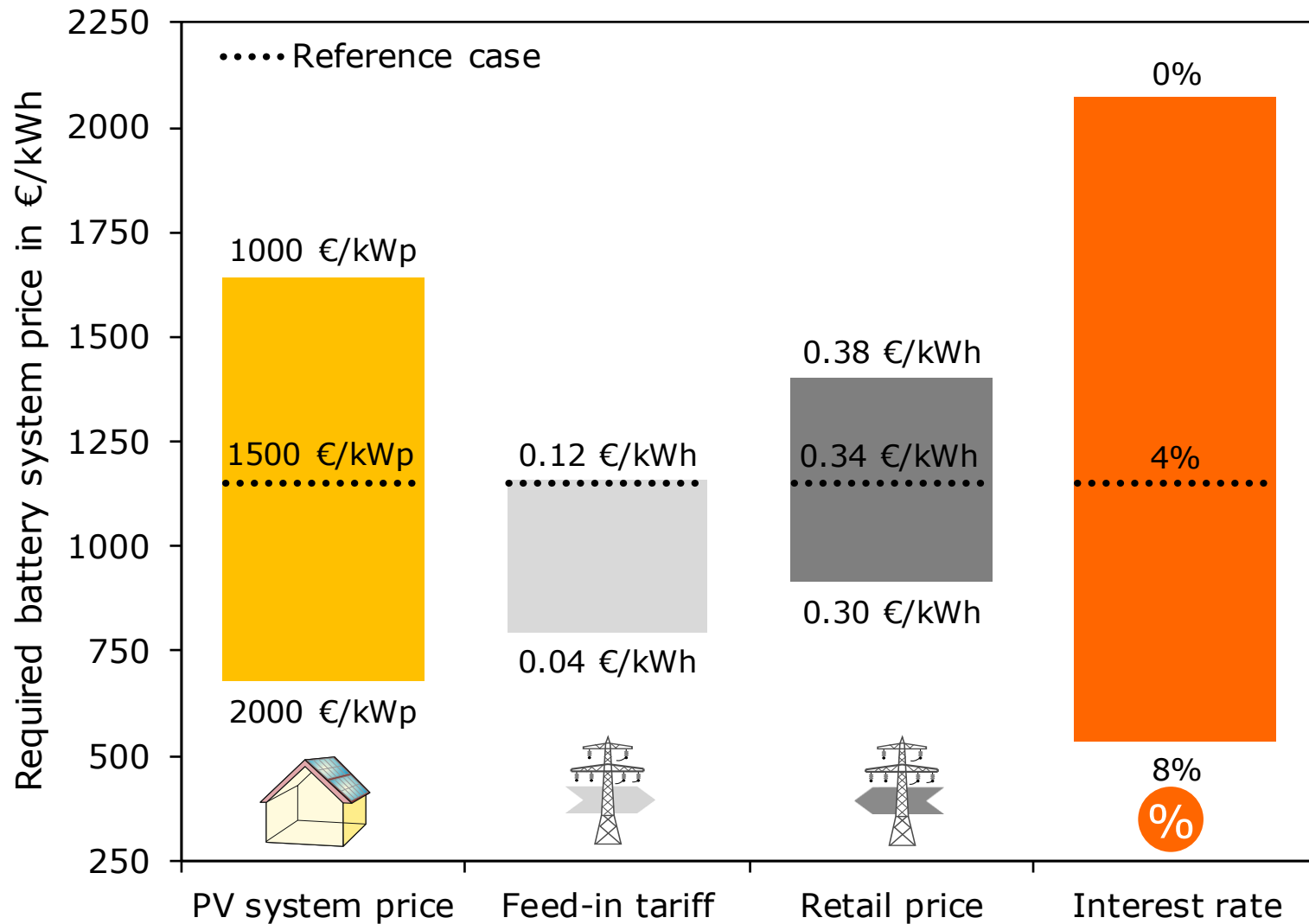
Mean electricity cost for varying system prices



Sensitivity analysis of the required battery system price



Sensitivity analysis of the required battery system price



Conclusion

- Self-consumption of PV energy is becoming an **essential prerequisite** for the profitable operation of PV systems.
- The profitability of PV battery systems is subjected to a **variety** of input parameters.
- The major factor is the **interest rate**, followed by the PV system price, retail electricity price and feed-in tariff.
- Required battery system prices in the range of about **500–2000 €/kWh** have been determined.
- Investing in a PV battery system will become **more attractive** than purchasing the entire electricity demand from the grid.
- It can be expected that **most of the residential PV systems** will be equipped with batteries in the future.