German Institute for Economic Research – DIW Berlin

Prosumage of solar electricity: Tariff design, prices, and capacity investment

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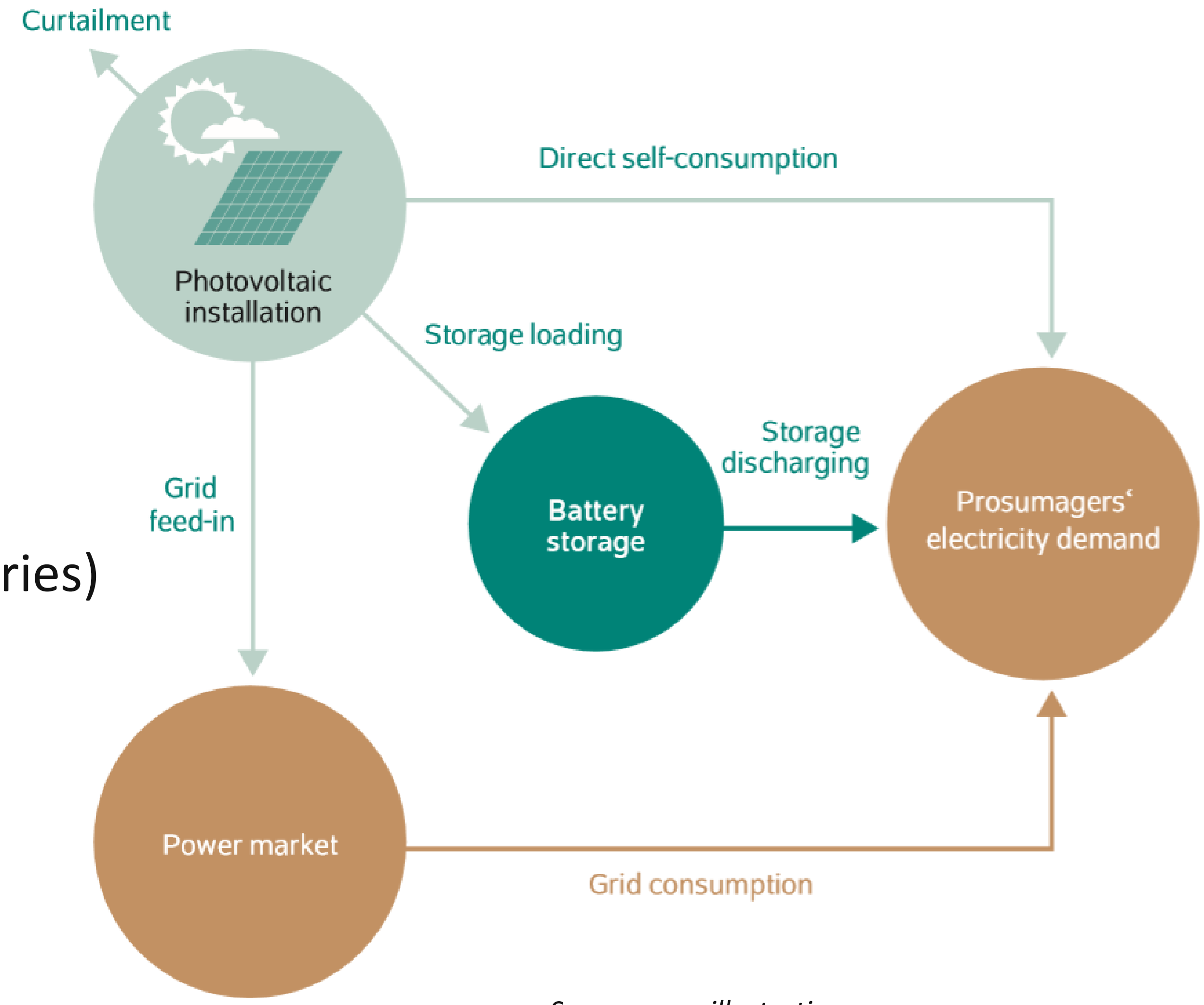
PRO-SUM-AGE*

- **PRO**duction
- Con**SUM**ption
- Stor**AGE** (batteries)



**Schill et al. (2017)*

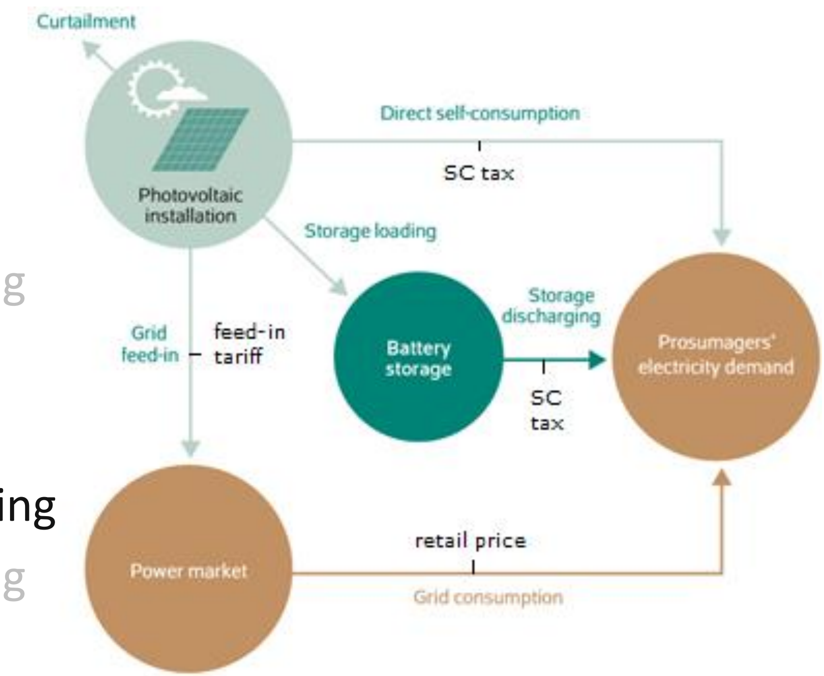
Source: own illustration

Research question

- How does the tariff design affect household incentives for investments in PV and battery capacity?

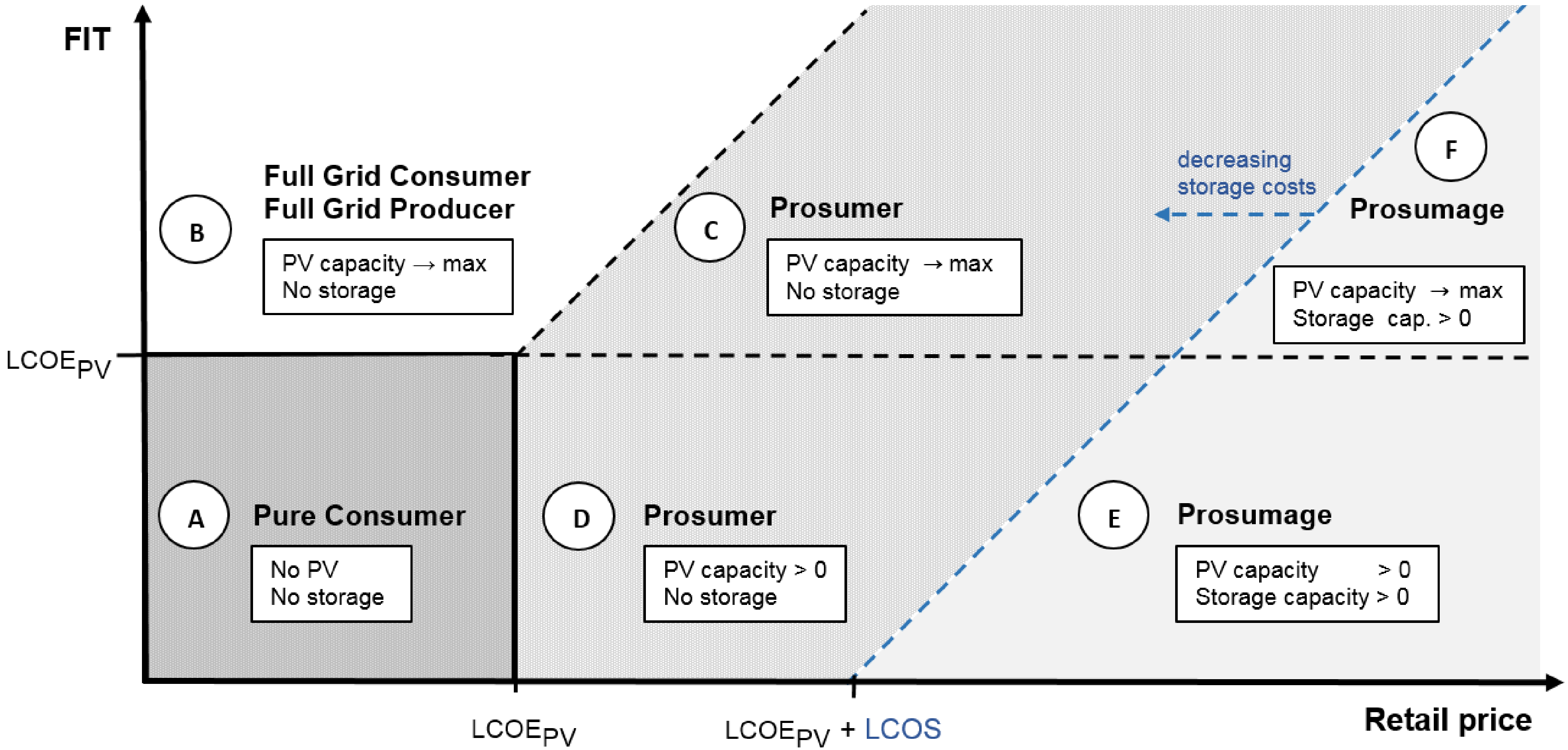
Tariff design options studied

- Feed-in tariff:
  - Different levels
  - Time-invariant vs. real-time pricing
  - Feed-in restriction
- Retail tariff:
  - Energy- vs. capacity-oriented pricing
  - Time-invariant vs. real-time pricing
  - Self-consumption tax



Source: own illustration

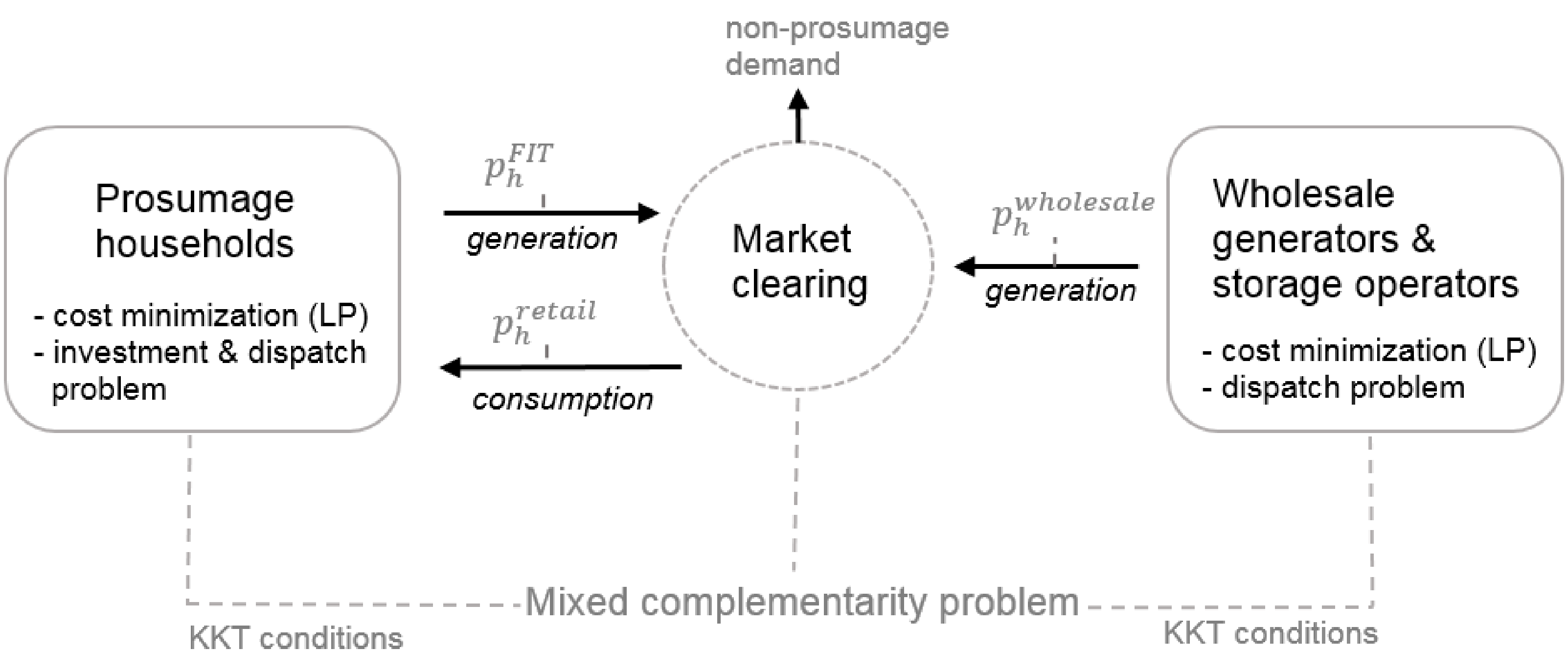
Intuition: prosumage incentives



Source: own illustration adapted from Ossenbrink (2017).

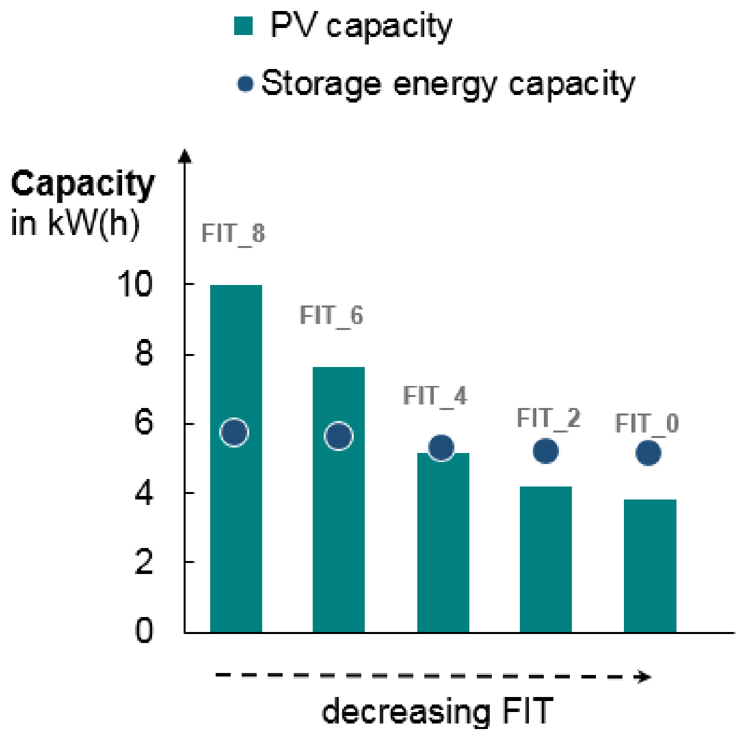
Electricity system modeling

- Formulation of DIETER* as mixed complementarity problem
- Prosumage segment 1 mio. households
- DIETER calibrated to German network development plan 2030



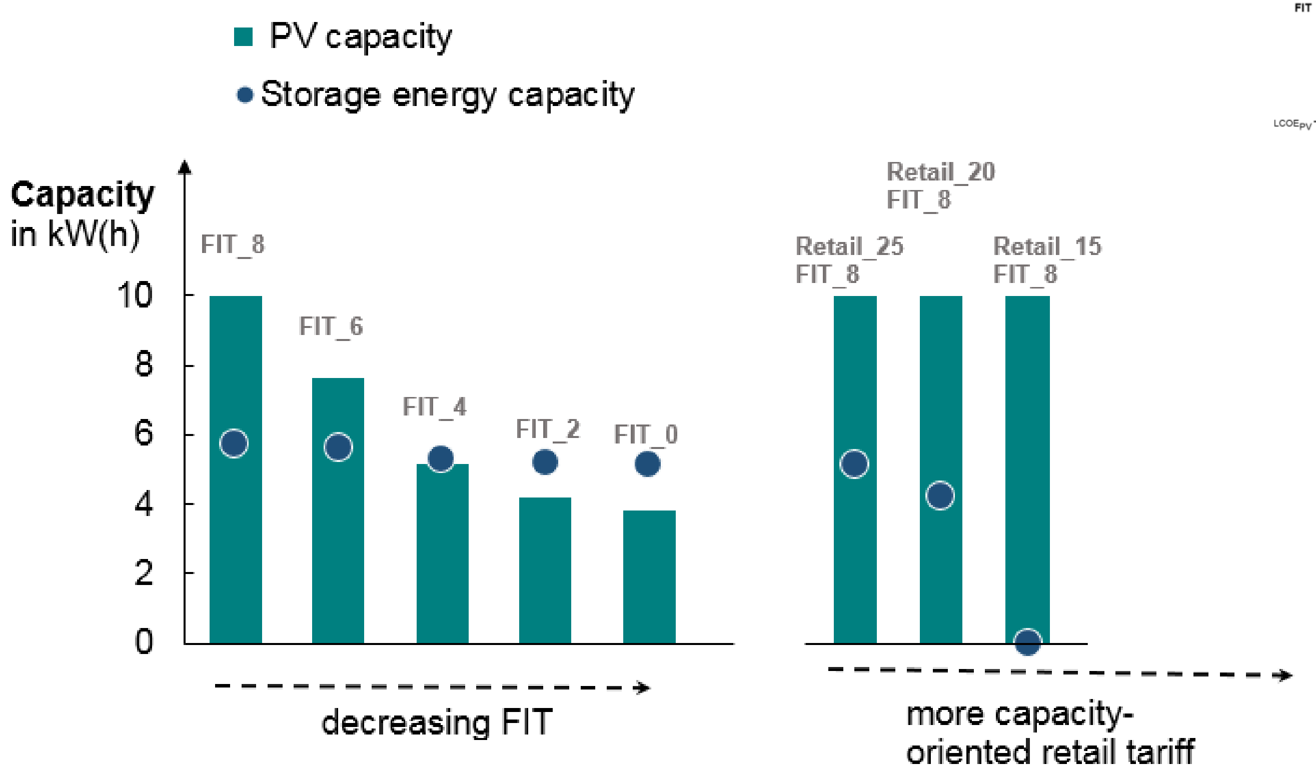
** Zerrahn & Schill (2017)*

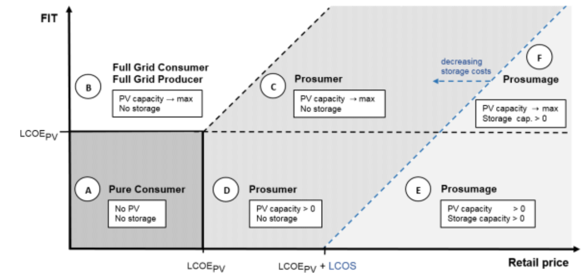
Results: optimal household PV and battery storage capacities



- PV capacity sensitive to feed-in tariff design
- Battery capacity rather robust

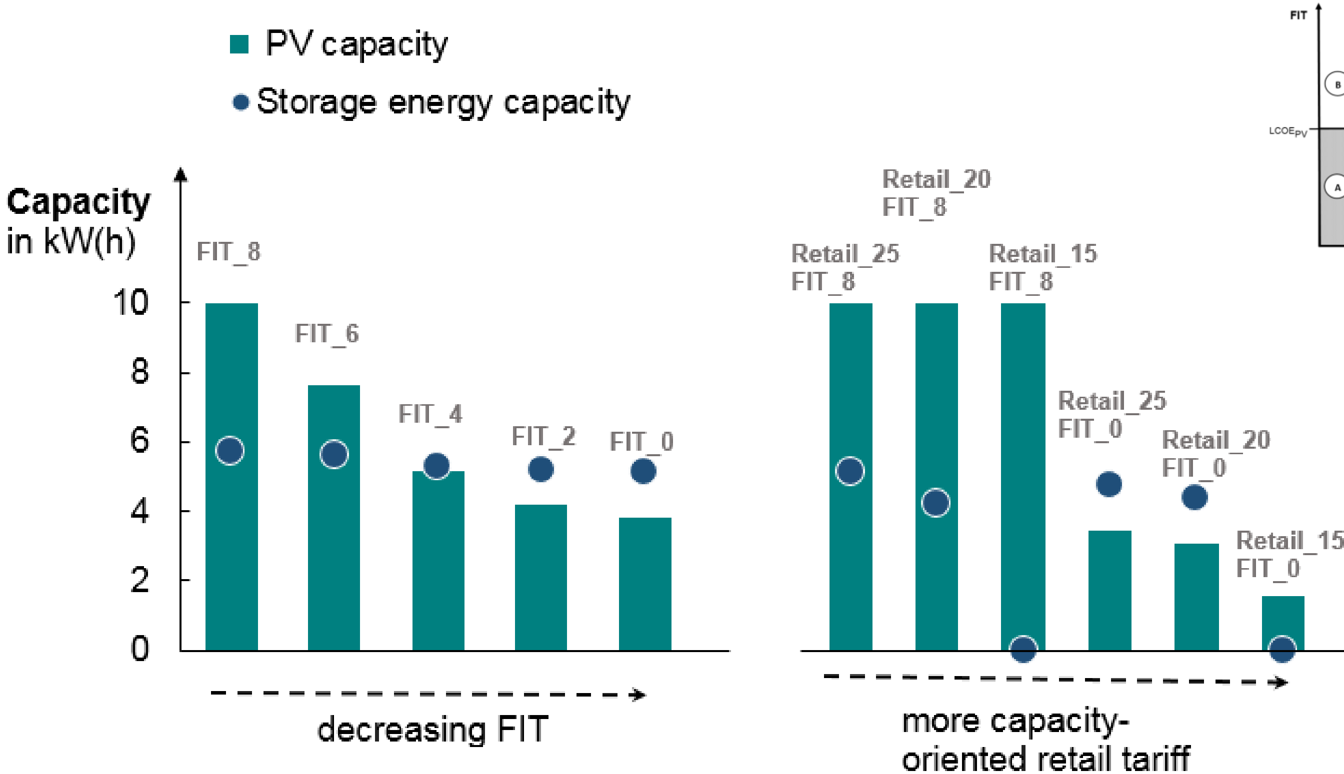
3 Results: optimal household PV and battery storage capacities

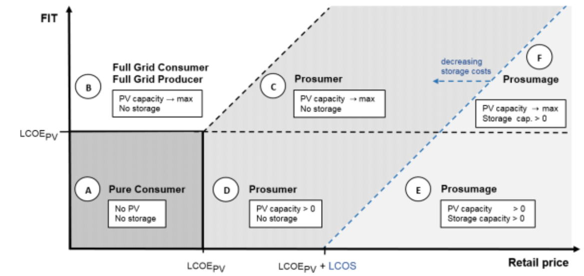




- PV capacity sensitive to feed-in tariff design
- Battery capacity rather robust
  - However, no storage deployed at strong capacity-oriented retail design

Results: optimal household PV and battery storage capacities





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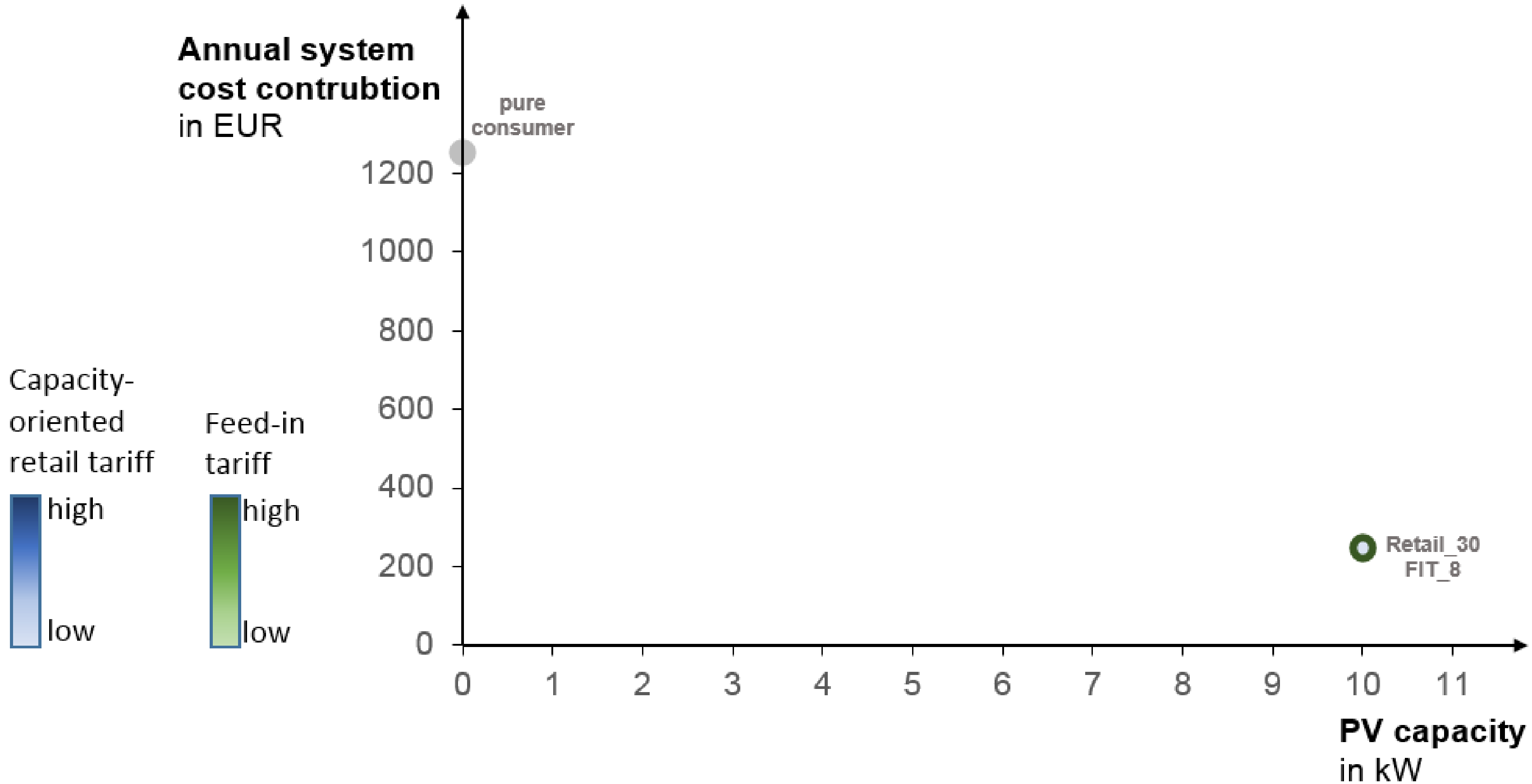
Results: central trade-off



Conclusion

- Under continuation of current tariff design:
  - Expansion of prosumage segment expected
  - This may lead to load defection issues
- Mitigation possible by more capacity-oriented retail pricing…
  - … but not with lower FIT
- See paper for other tariff design options

Thank you for your attention.

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Editor
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