Business models for the aggregation of PV electricity

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Enabling PV integration by delivering flexibility to the energy market
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Motivation for aggregation of PV

- Strengthen of the Merit-Order Effect of renewable energies (so-called „cannibalism of PV“)
- Increasing curtailment of RES-E due to grid congestion
- Decreasing support for funding schemes
- New legal and regulatory framework for common use of decentralized RES-E generation

“Aggregation” and “Aggregators” as defined in BestRES

Aggregation:

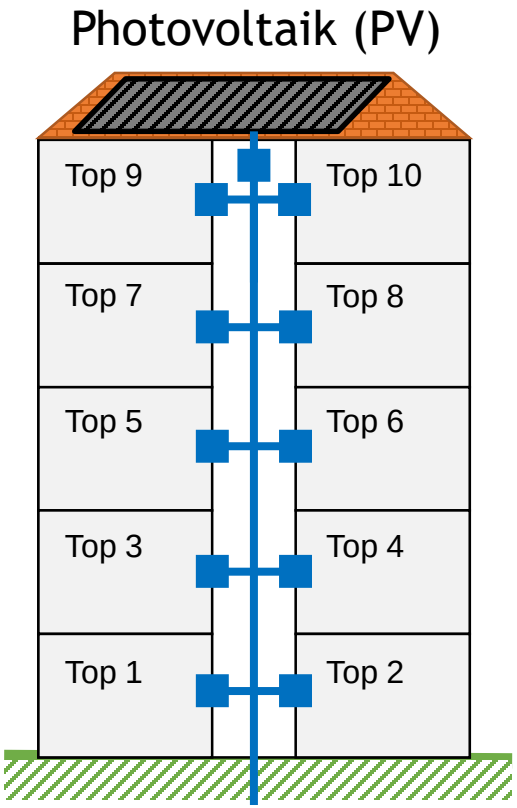
“a coordinated steering of vast amounts and types of consumers and producers”

Aggregators:

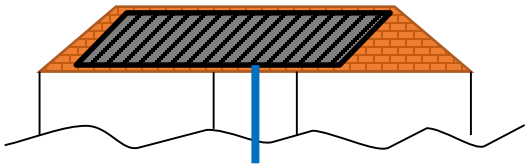
“legal entities that aggregate the load or generation of various demand and/or generation/production units and aim at optimizing energy supply and consumption either technically or economically”

Local aggregation

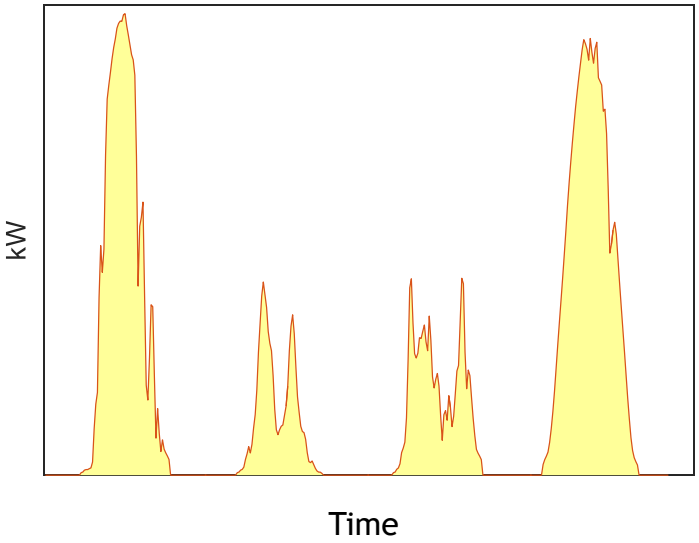
- Currently, the most economical way of investing and operating PV plants on buildings is to maximize self-consumption.
- “Economic and legal” equality of single-family and multi-dwelling house residents
- RES-E generation in urban areas
- Use of „economies of scale“ of PV Investments



Static energy allocation



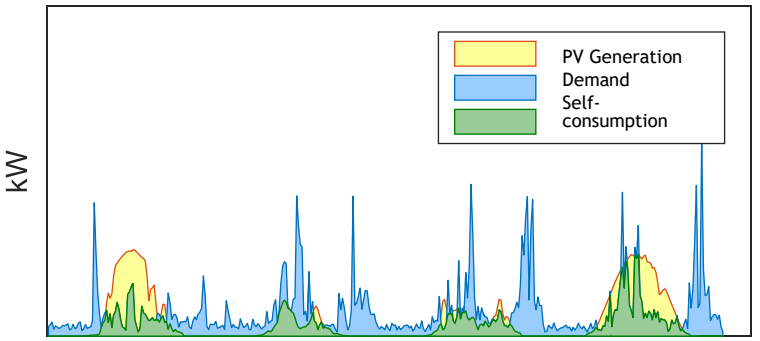
PV Generation



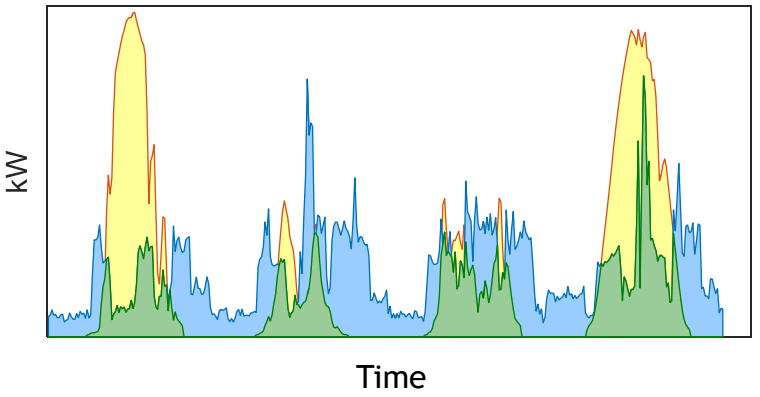
10%

60%

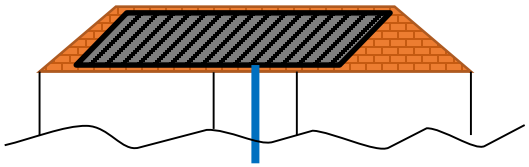
Top 1

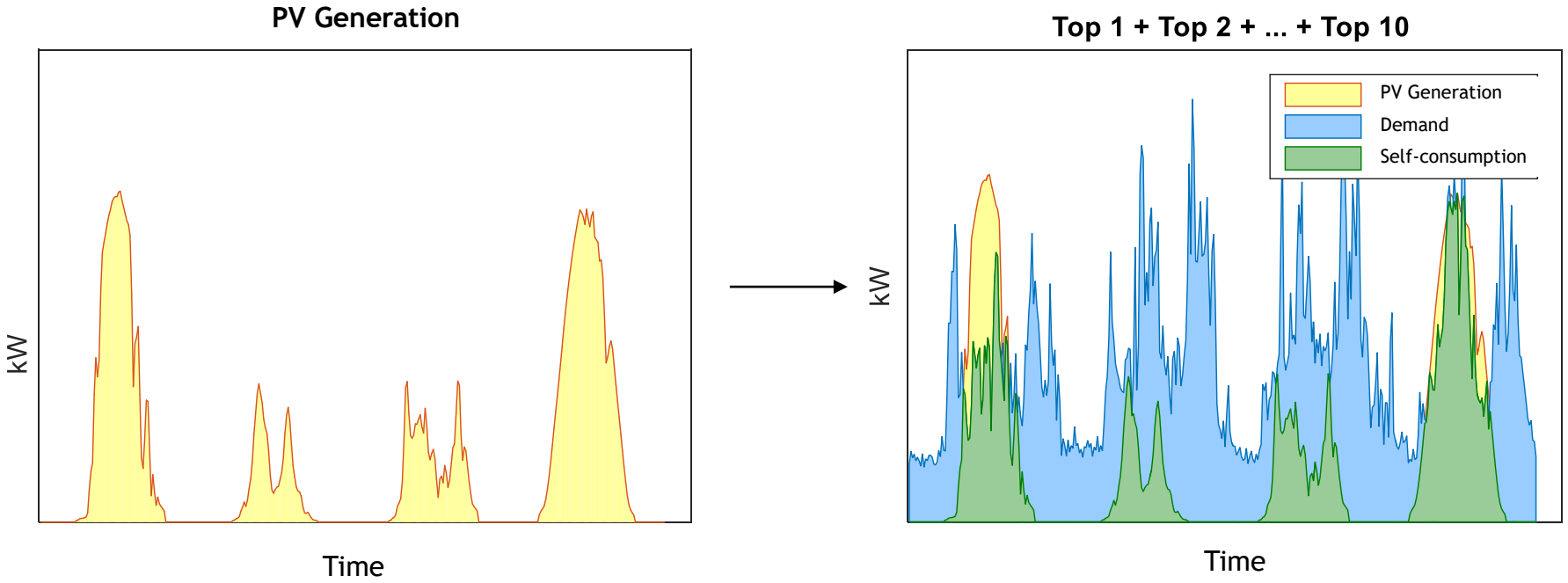


Top 10

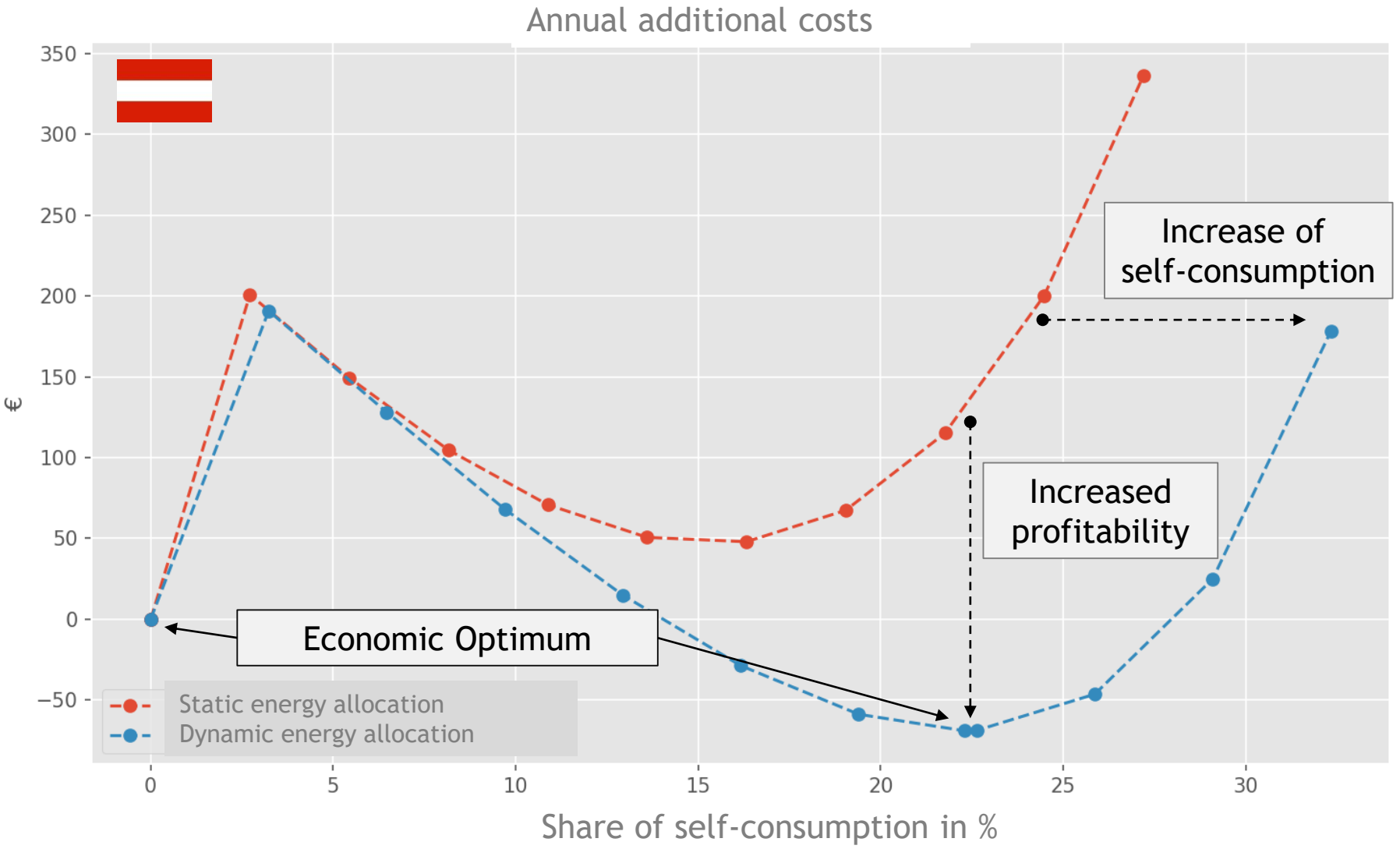


Dynamic energy allocation

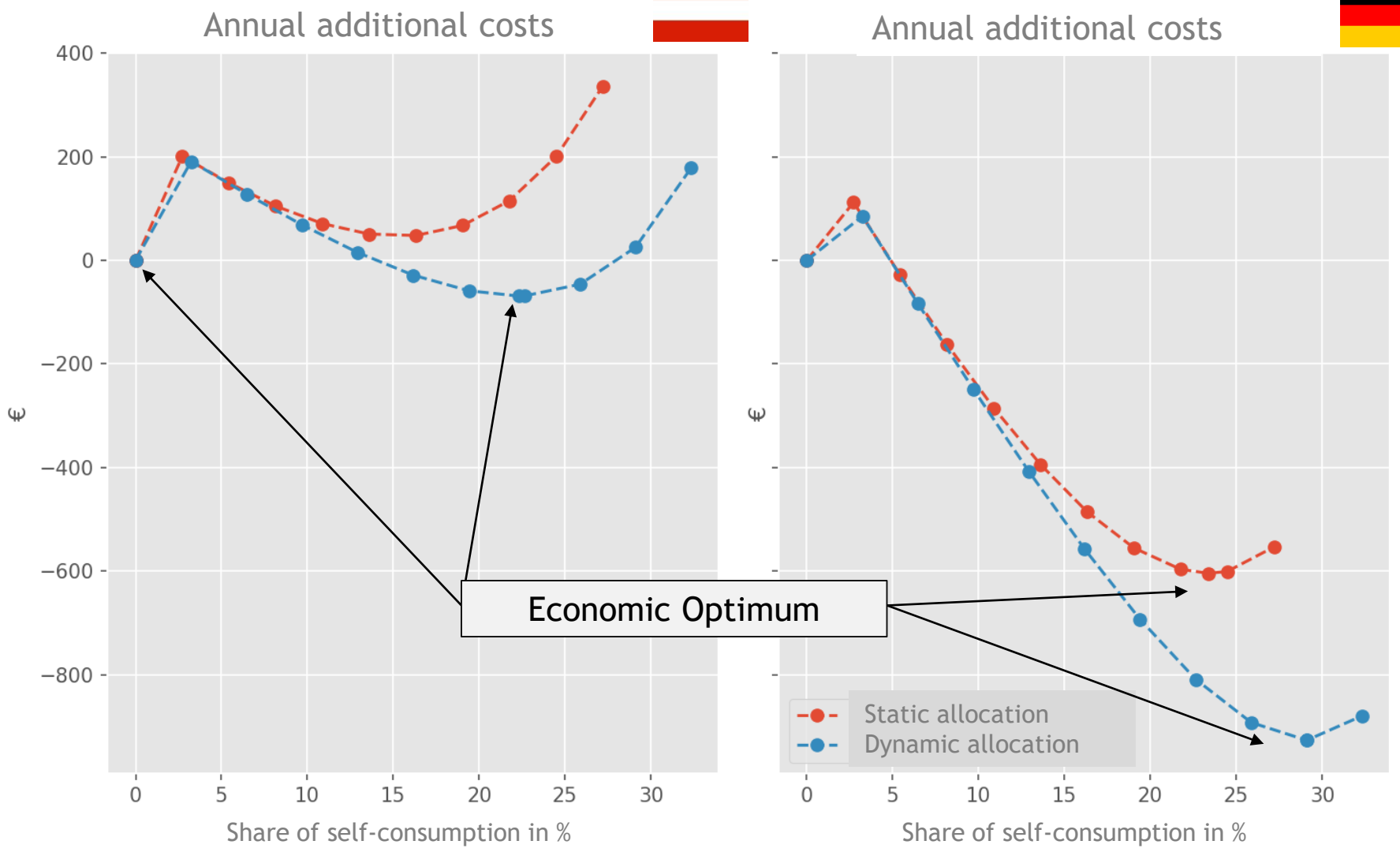




Comparision of static and dynamic energy allocation



Economic comparison AT and DE



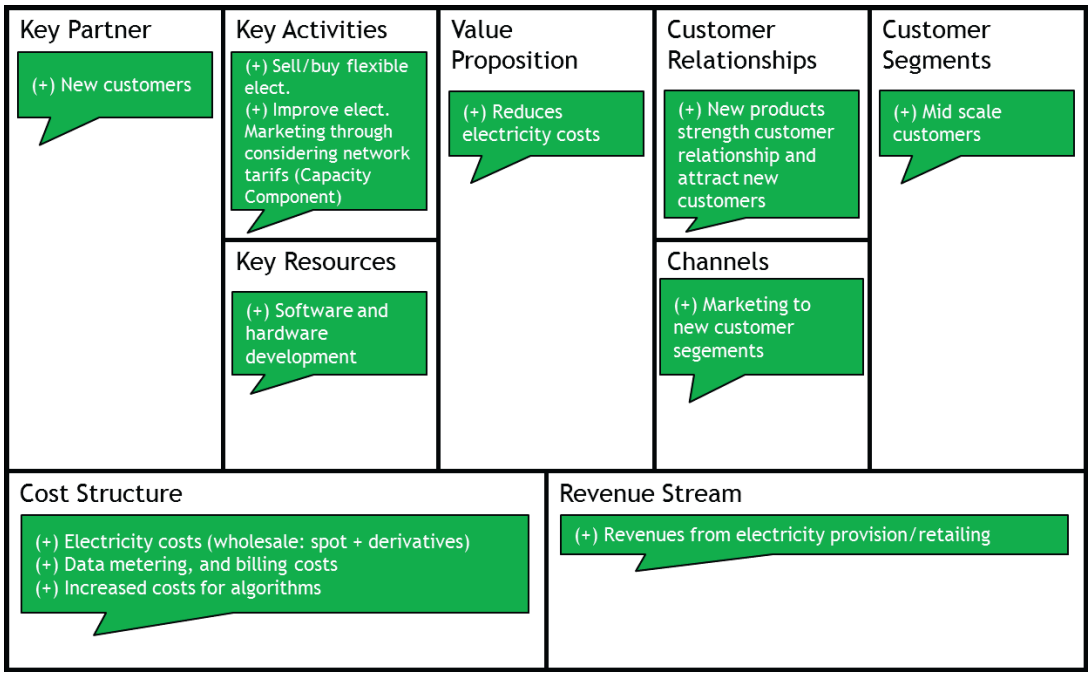
(Trans-) Regional Aggregation

- System integration of intermitted RES-E due to control of flexibilities and energy storage is crucial
- Direct marketing of intermitted RES-E
- Market integration and development of innovative business models for small/medium customers/prosumers („winter package“)
- Reduction of reinforcement and congestion of the distribution grid
- Decrease of costs for ancillary services.

Selected Example: Improved Business Model for Next Kraftwerke Germany

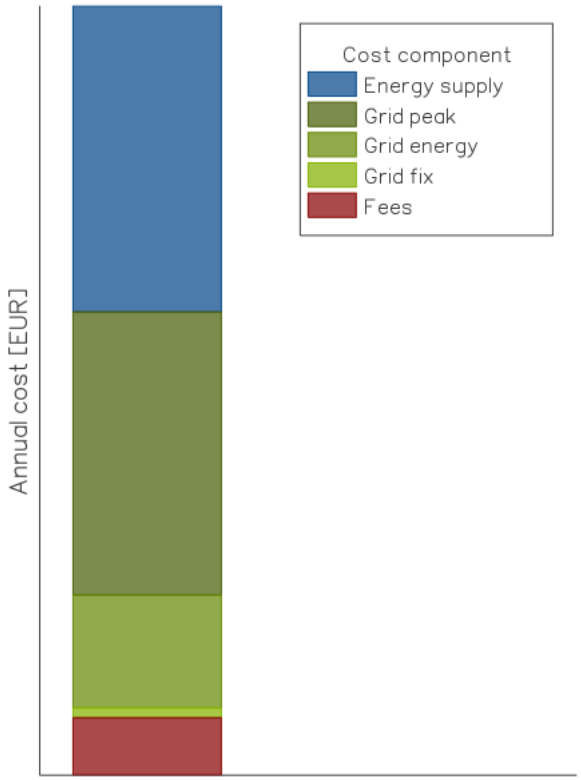
Supplying „mid-scale“ consumers with time variable tariffs including grid charges optimization

- Provide flexible customers with price signals (already implemented)
- Consider other tariff components like grid charges in the optimization algorithm.



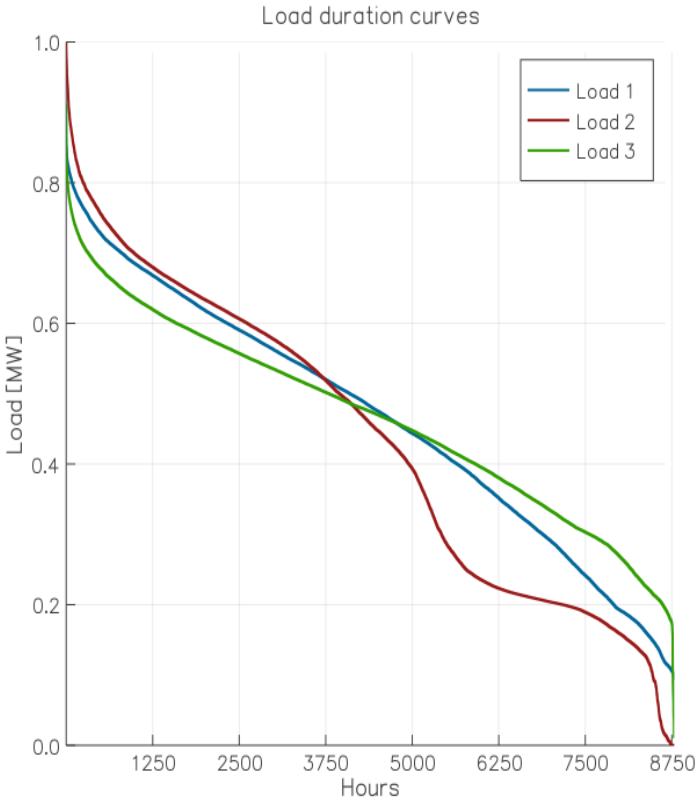
Aggregation of flexible consumer loads

- Energy supply
- Grid charges
  - **Peak-load** pricing component [EUR/MW] (for the maximum load per year/month)
  - **Energy-dependent** component [EUR/MWh]
  - **Fixed** annual component [EUR/a]
- Fees

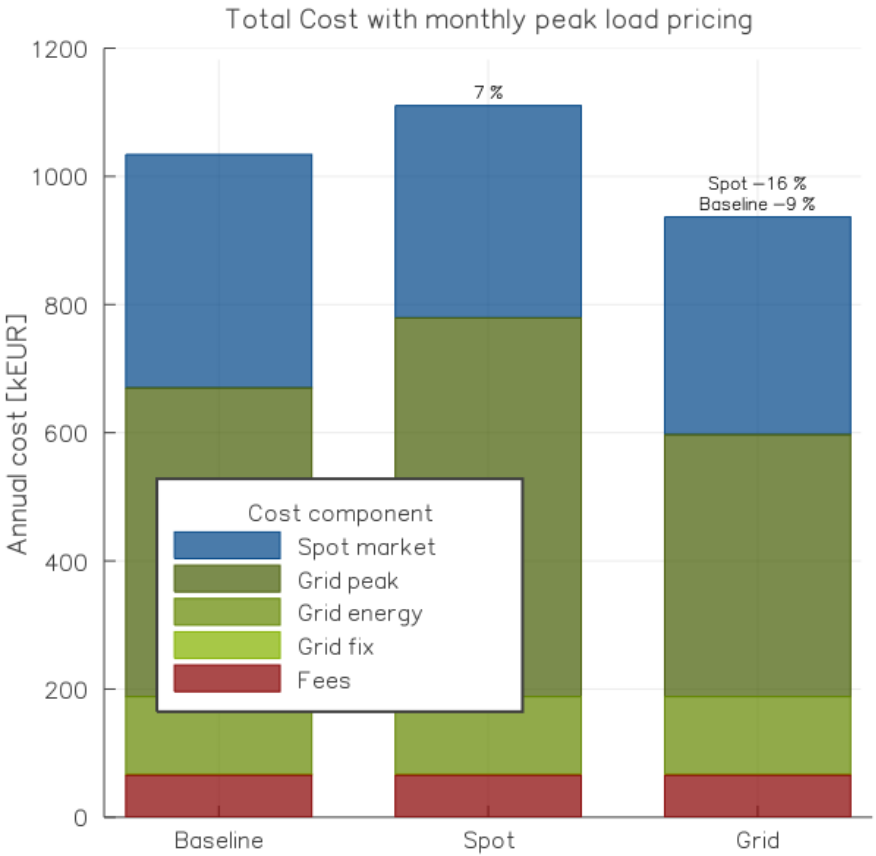


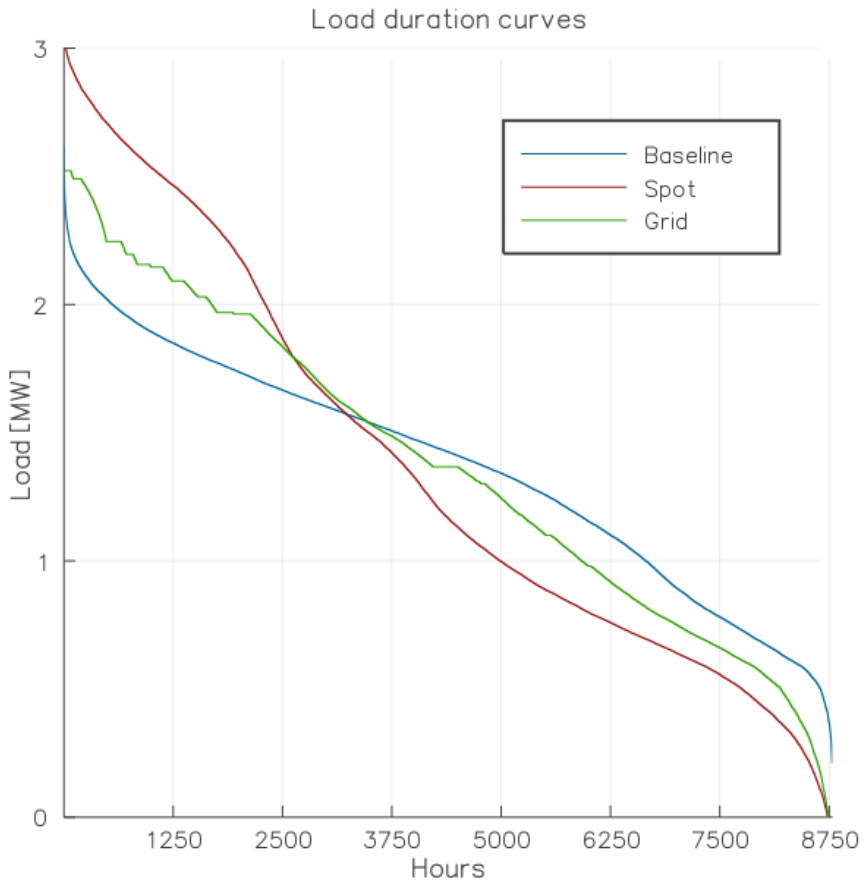
Quantitative Analysis

- It minimizes the cost of purchasing energy for flexible loads from the day-ahead spot market
- Three scenarios are compared:
  - Baseline (no optimization)
  - Spot (optimization considering the market prices only)
  - Grid (optimization considering both market prices and grid charges)
- Three different loads of consumers connected to the medium voltage network are considered



Results with monthly peak-load pricing





Conclusion

- Innovative aggregation concepts are crucial for a successful market and system integration of PV.
- The load and generation characteristics have to be taken into account for the implementation of new business models for aggregators.
- The Aggregator‘s revenues in new business models are:
  - Cost reduction of customer
  - Management of shared PV plants
  - Energy trading between prosumers and customers
- Aggregators will play a significant role in market and grid integration for flexibilities and storage

Thank you!
http://bestres.eu/

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