ANALYSING THE IMPACTS OF AN EXTERNAL POWER SUPPLIER IN A RENEWABLE ENERGY COMMUNITY

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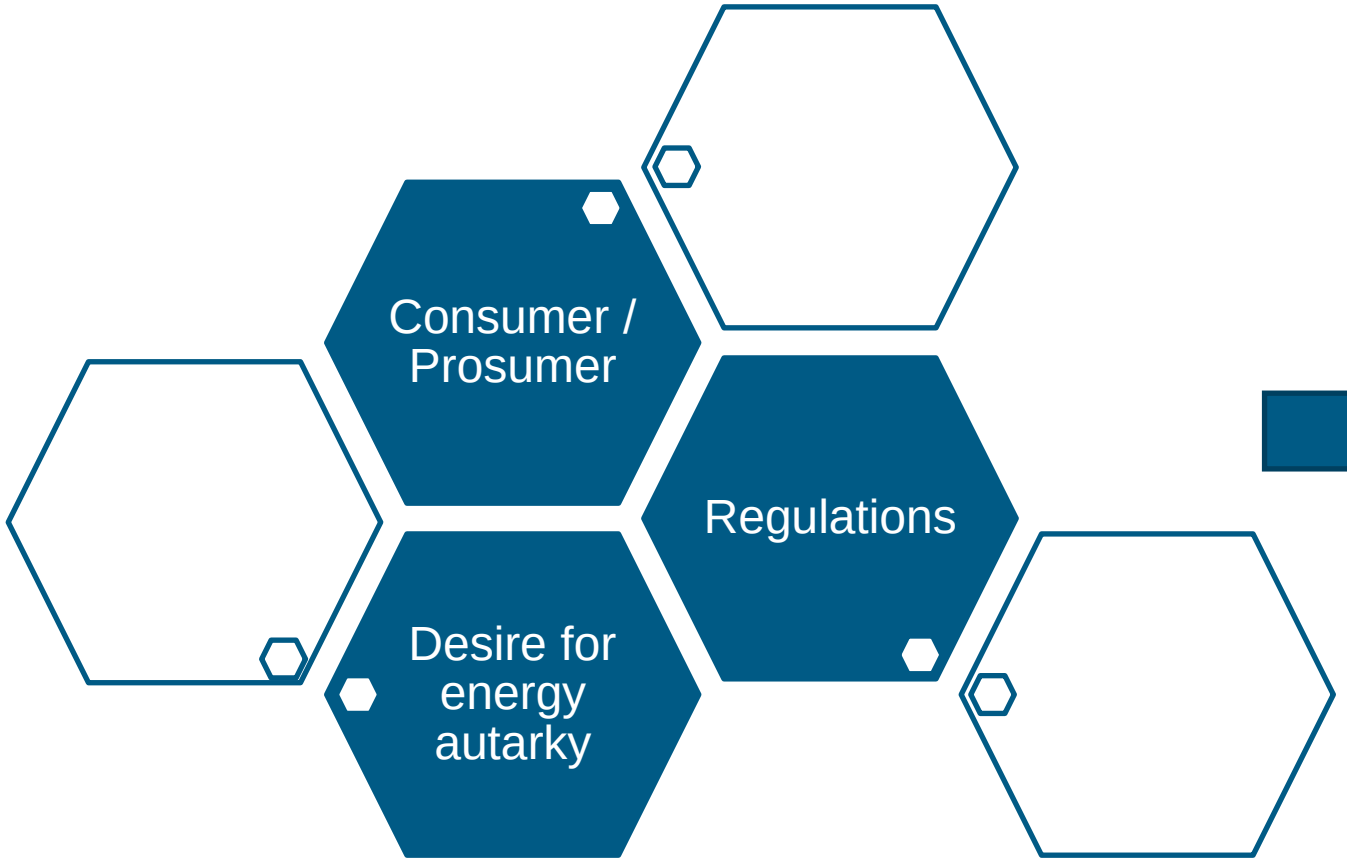
SCIENCE TO BUSINESS

Motivation

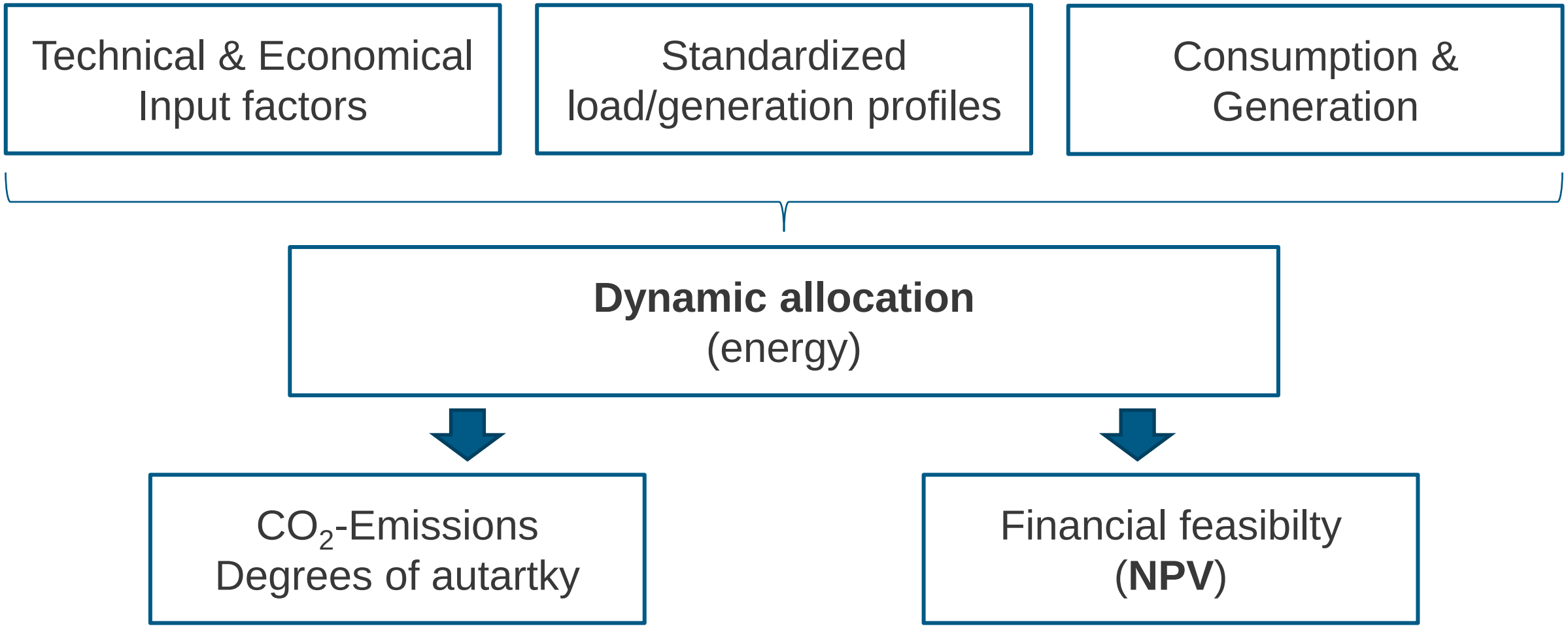


Simple modelling approach

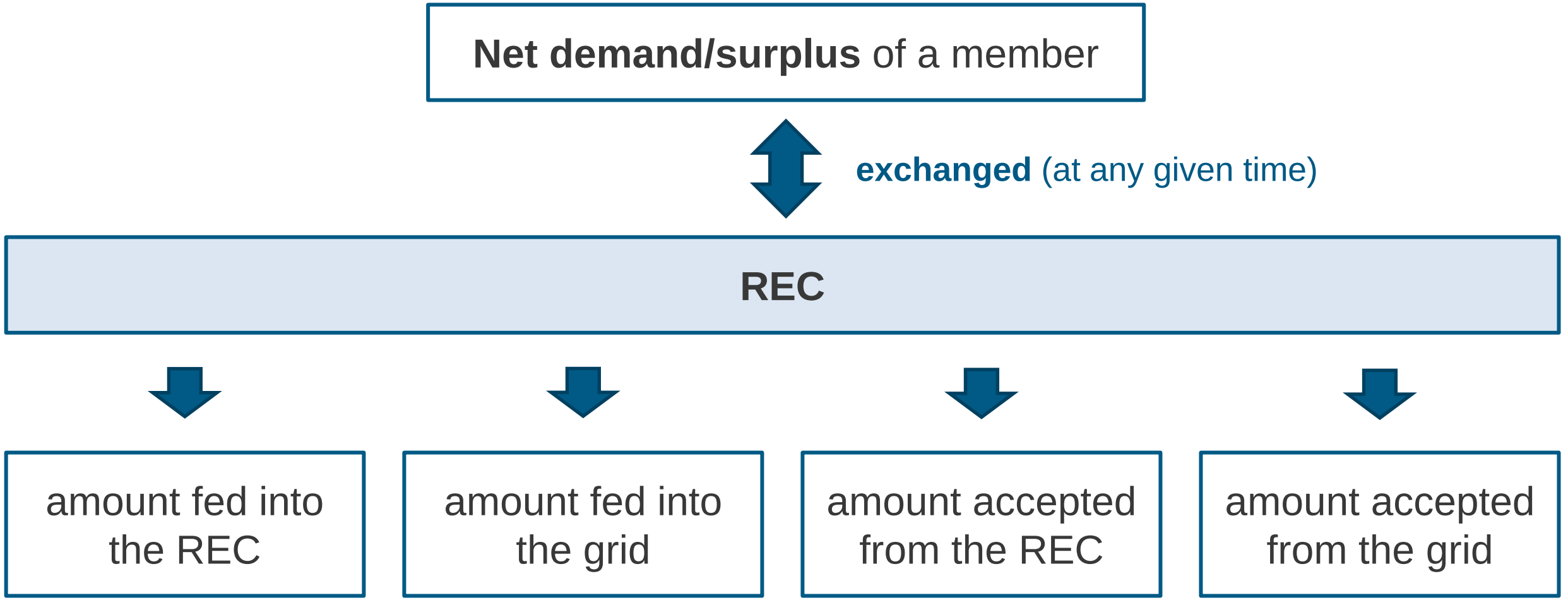
to analyze

Renewable Energy Communities

Modelling approach



Dynamic allocation approach



Financial feasibility

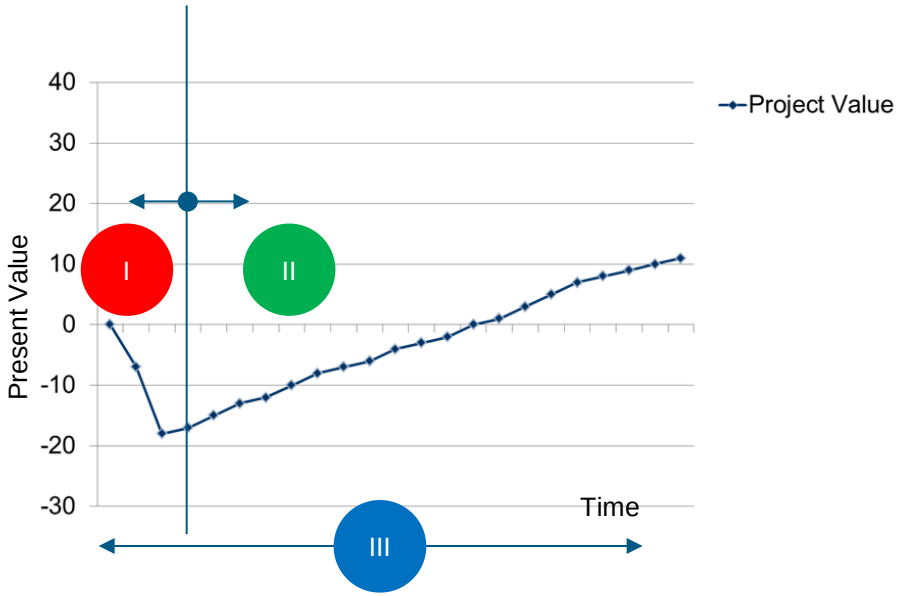
Net Present Value

Value Creation (I)

Value Capture (II)

$$NPV = -I_0 + \sum_{t=1}^{n} \frac{R_t - E_t}{(1+i)^t}$$

Value Communication (III)



NPV	Net Present Value of an investment
I_0	Initial investment
R_t	Revenues
E_t	Expenses
i	Discount factor
t	Period (year)

Scenario constellation & assumptions

Techno-economical assumptions

Factors	
Discount rate (p.a.)	3,0%
Inflation rate (p.a.)	3,0%
Wear and tear for PV and storage (p.a.)	0,5%
CAPEX	
PV (40 kWp), less subsidy	1.540 eur/kWp
PV (60 kWp), less subsidy	1.367 eur/kWp
Speicher, less subsidy	1.300 eur/kWp
OPEX	
O&M (REC)	350 eur/a
O&M (PV)	300 eur/a
Ecological	
CO_2 (grid)	202 g/kWh
CO_2 (PV)	14 g/kWh
Prices and renumerations	
Feed-in tariff (grid)	9,63 ct/kWh
Feed-in tariff (REC)	18,00 ct/kWh
Electricity price (grid)	36,49 ct/kWh
Electricity price (REC)	30,99 ct/kWh

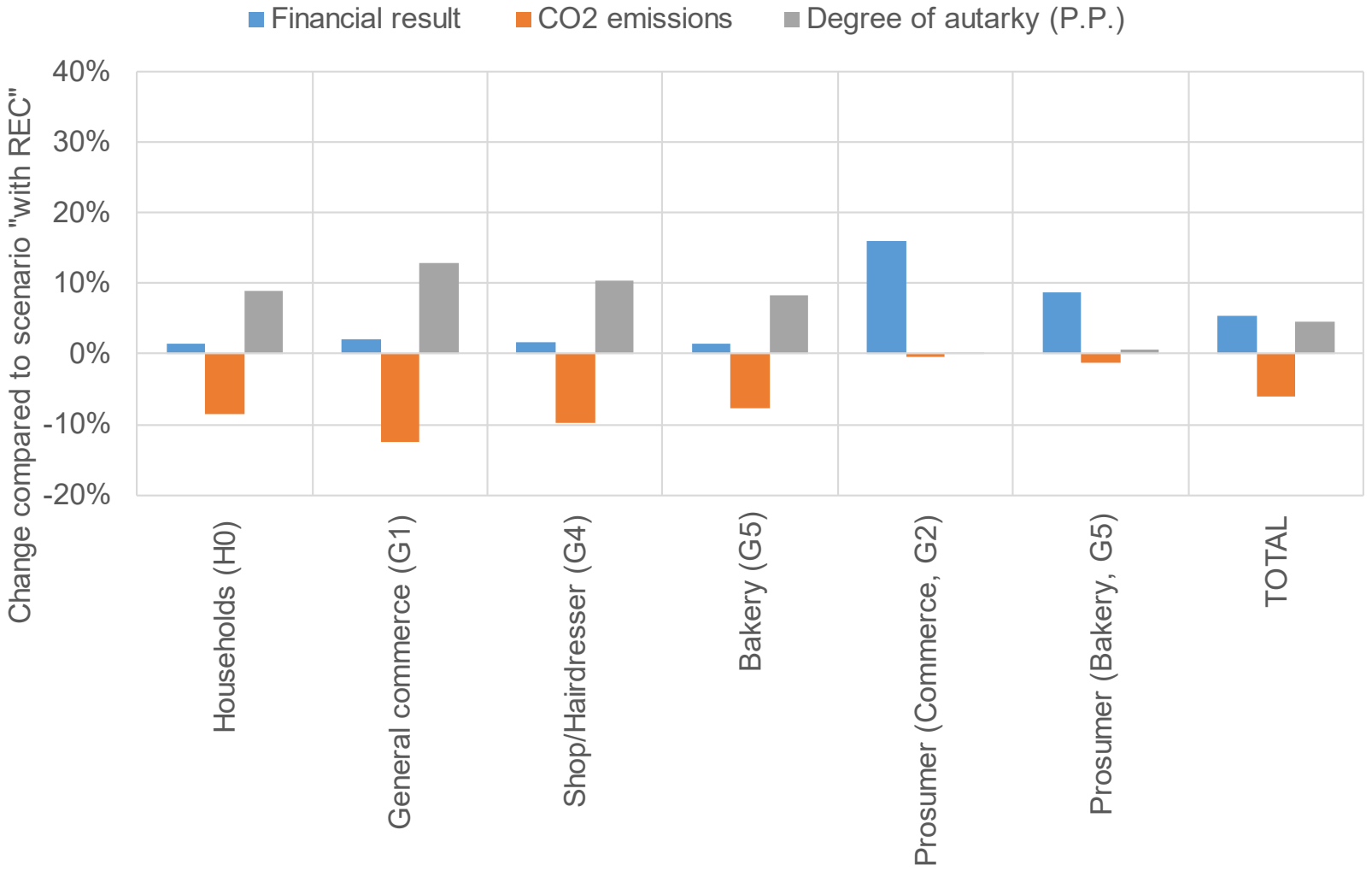
Constellation of the REC under consideration

Type	Count	Profile[1]	Consumption (kWh/a)	Production (kWh/a)	Storage (kWh)
Business	3	G1	18.000	-	-
Prosumer	1	G2 E1	72.000	60.000	60
Business	2	G4	30.000	-	-
Prosumer	1	G5 E1	50.000	40.000	40
Business	1	G5	50.000	-	-
Household	22	H0	3.200	-	-
Total	*30*	-	*223.200*	*100.000*	*100*

Consideration of an external power supplier (30.000 kWh)

Results (I)

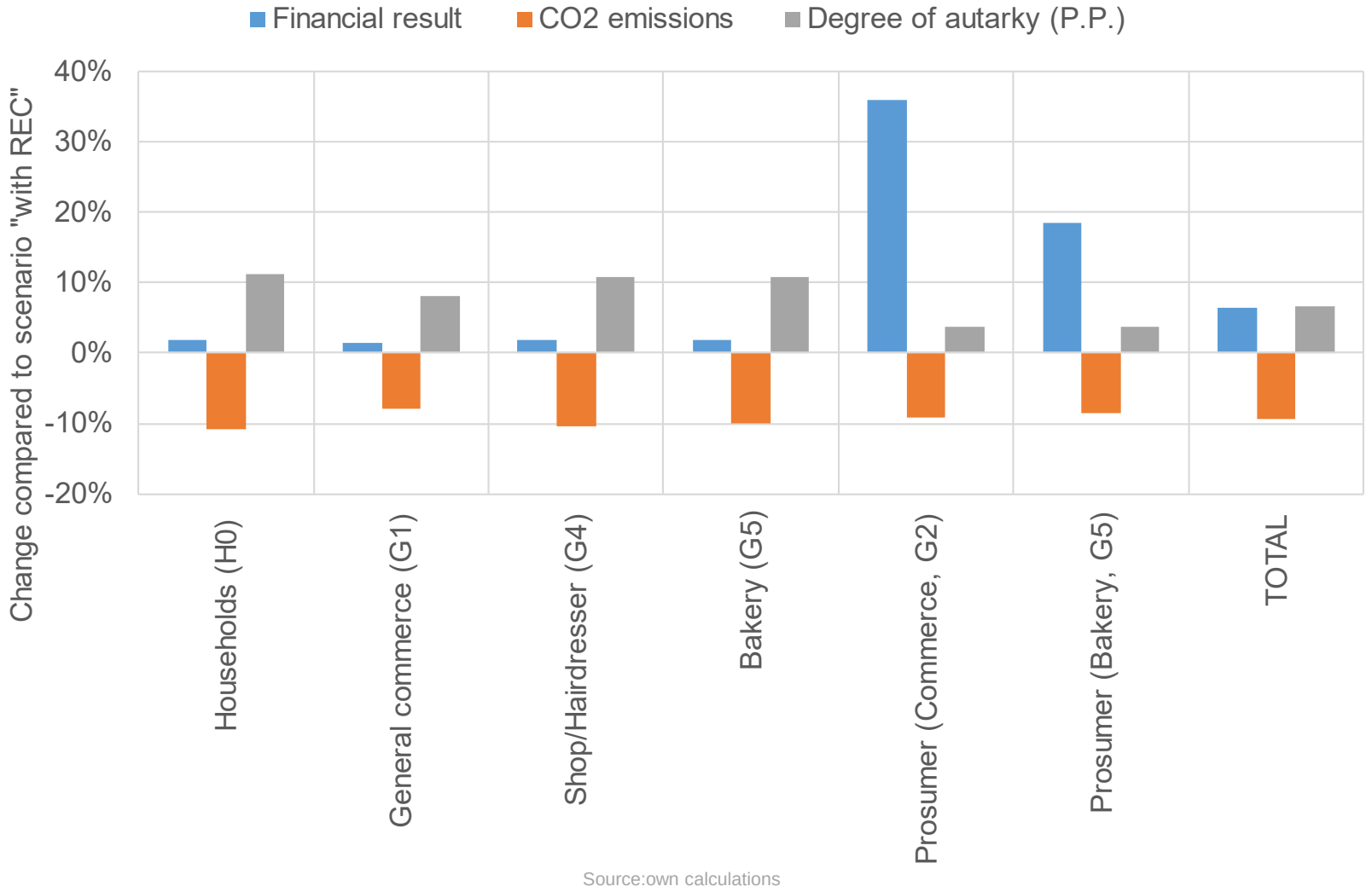
External power supplier having a fluctuating production E1



Source:own calculations

Results (II)

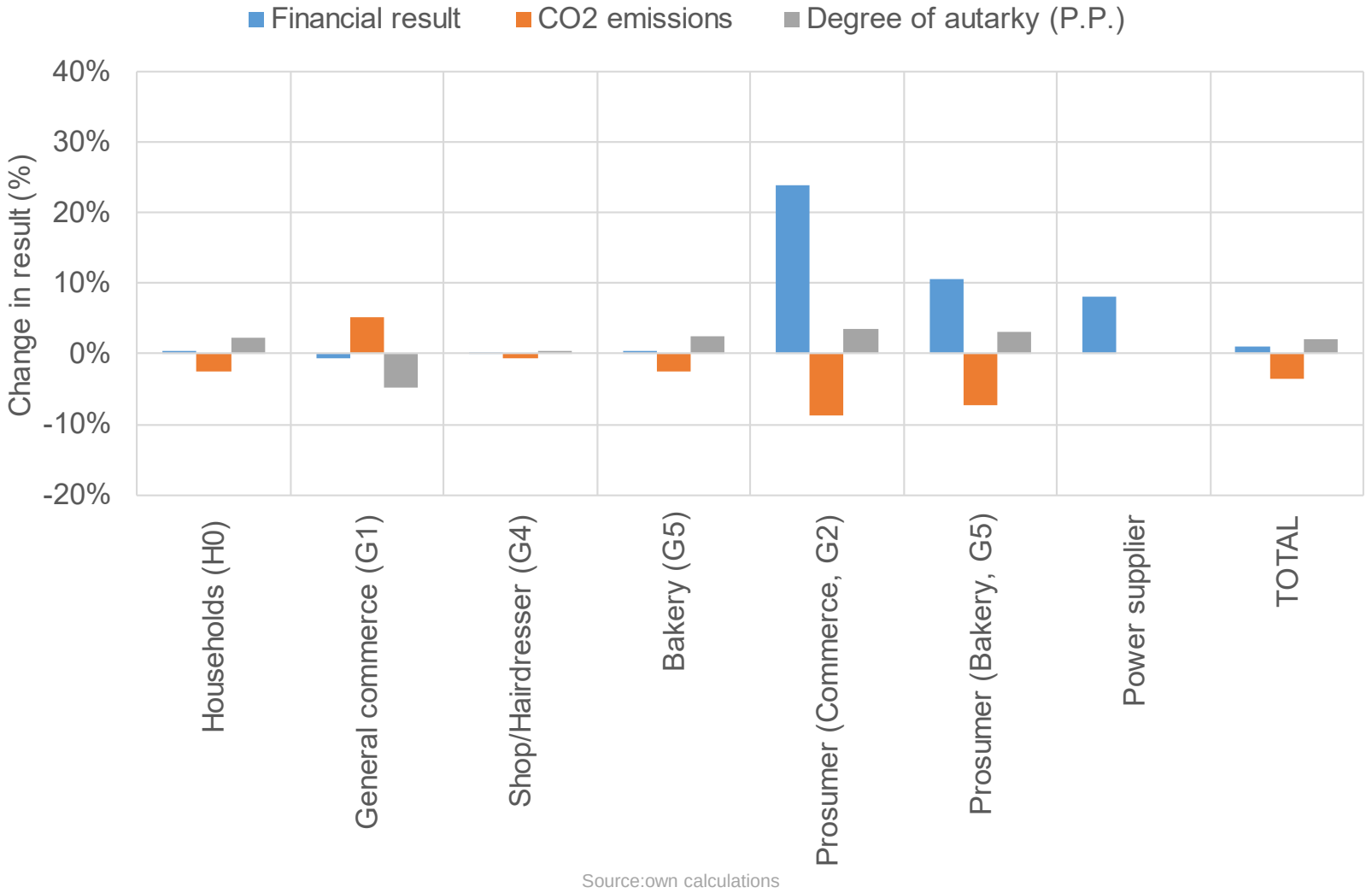
External power supplier having a constant band production E0



Source:own calculations

Results (III)

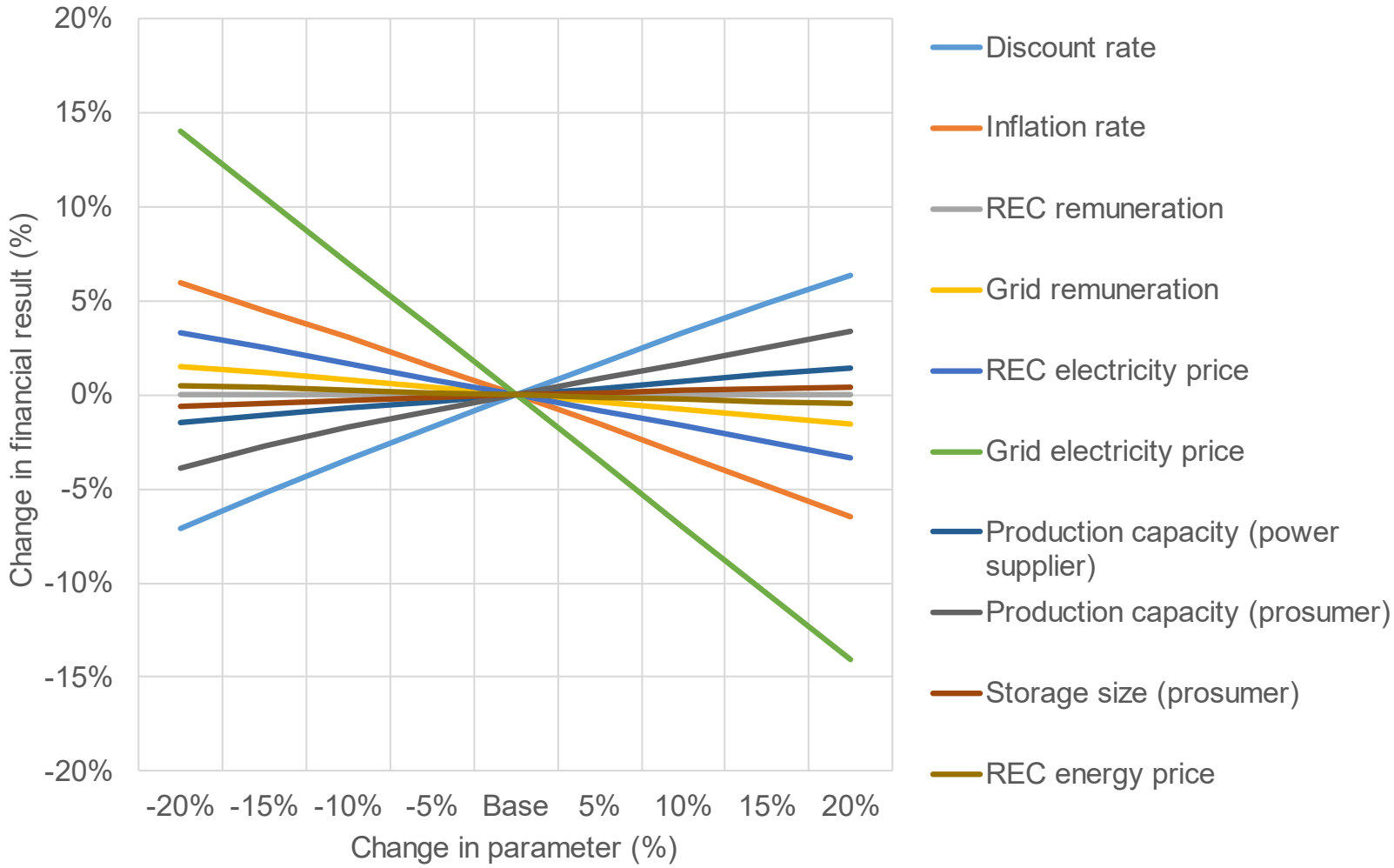
External power supplier switching from E1 to E0



Source:own calculations

Sensitivity

Selected key parameters with an external power supplier having E0



Source: own calculations

Discussion

- **Discount rate** plays a special role ➔ positive correlation between the change in the uniform discount rate and the financial result of the REC untypical
- **Inflation rate** of particular importance ➔ annual inflation adjustment increases the price difference between (higher) electricity prices and (lower) feed-in tariffs (renumeration)
- **REC renumeration leads to** a **redistribution** within the REC ➔ a decrease of the renumeration is beneficial for consumers (while producers lose) and vice versa
- **Potential model extension** would be the integration of an **external power storage unit** to temporarily store a surplus in the production from members of the REC

Conclusion

- **Simple modelling approach** that offers a simple way of analyzing different constellations of REC in Austria based on the NPV method
- Potential **effects are analyzed on** three important **levels**: (i) the financial level, (ii) the ecological level, and (iii) a social level in a special form of self-sufficiency (the level of autarky)
- Model thus **provides in advance helpful insights** into the effects of various socio-economic parameters of REC
- Model still **offers options for future expansions** to better reflect special features of the electricity economy
- **Integration of** an **external electricity producer** into a local REC **is beneficial**: (i) positive financial effect, (ii) lower CO2 emissions, and (iii) a higher degree of autarky

Thx!

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