

SCORE

Co-own. Prosume. Renew.

Supporting Consumer Ownership in Renewable Energies

Pilot project

“Franz Sales House & Vocational College East”

in the city of Essen



The S.C.O.R.E. Concept

NEW REGULATORY FRAMEWORK



Renewable Energy Directive EU



„Renewable Energy Community“



Energy sharing
becomes possible



Necessary to meet
requirements

Renewable Energies Directive (RED II; 2018)

- Defines "Renewable Energy Community"
- Simplification of "Energy Sharing" = joint generation, storage, consumption, sharing and trading of green electricity
- **Opportunity:** Cooperation of municipalities with local SMEs and citizens to accelerate the urban energy transition

Requirements for RE communities

- 51% local actors among the investors
- Min. 3 investors; no share more than 33%
- Citizen participation; open to low income households
- Focus not on profit maximization, but on general ecological, economic or socio-community benefits

The S.C.O.R.E. Concept

BACKGROUND OF PROJECT



RED II, Article 22 (4) => Member States create regulatory frameworks for EE communities

RED II, Article 22 (3) => Member States assess existing obstacles and development potential

- **European Horizon2020 funding for the applied research project S.C.O.R.E.**
- Three-year project until the end of 2021
- Essen has been a pilot location since February 2020
- Further pilot projects in
 - Italy (Susa Valley)
 - Czech Republic (Prague)
- More than 20 Follower Cities

Actors involved



Climate Alliance

co2online



POLITECNICO DI TORINO

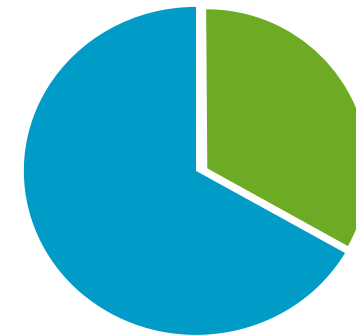
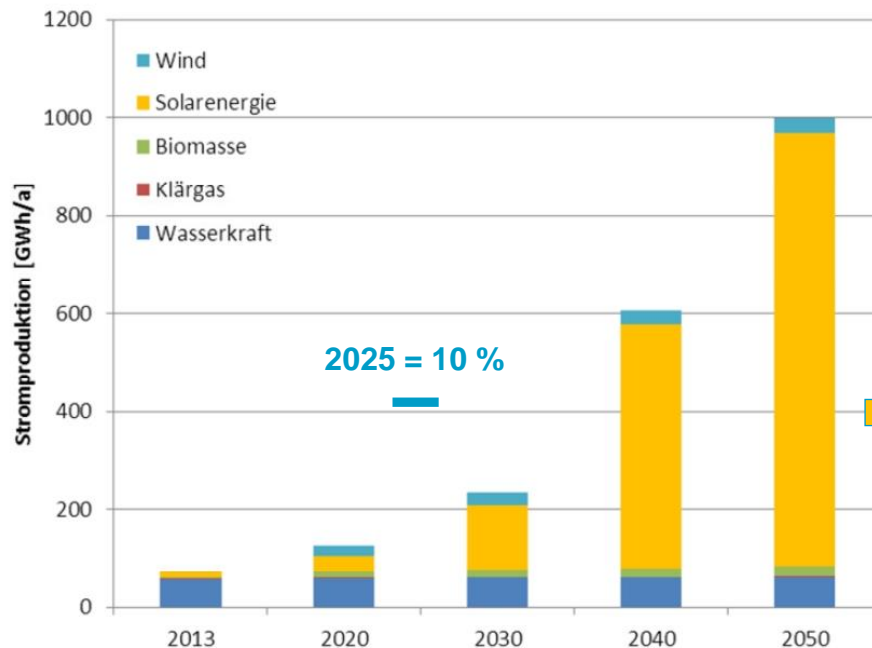


...und weitere!

Current situation and energy policy goals

Development of renewable energies in the urban area of Essen

-> today and 2050 (or 2030?)



= 33%

of electricity consumption
in 2050 / 2030

~ 3 % (about 0.7 % from PV)

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FRANZ SALES HOUSE & VOC. COLLEGE

Franz Sales House

- Catholic facility for disabled people
- 1,500 employees at 40 locations in Essen
- Central campus with 15 different buildings
- Living, training, working, sports and more

Vocational College East

- Day and evening school of the city of Essen
- approx. 3,000 students in 63 classrooms
- Large roof areas suitable for PV



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TECHNICAL IMPLEMENTATION

Franz Sales House



Power consumption
≈ 1,8 Mio. kWh/a

Roof areas for approx. 446 kWp PV

➤ **High self-consumption
because of high base load**



Private wire concept

- Energy sharing via new medium voltage cable
- Vocational college will be supplied via transformer station of Franz Sales Haus

Advantages

High joint self-consumption

- little direct marketing or funding necessary

No grid charges and other levies per kWh

- Approx. 40 percent lower costs per kWh

Disadvantage

Additional costs for cables and transformers

- Costs of more than 80,000 euros

Vocational College



Power consumption
≈ 0,5 Mio. kWh/a

Roof areas for approx. 299 kWp PV

➤ **No self-consumption on
weekends or during holidays**

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ECONOMICS OF SHARING



Electricity consumption FSH	1.849.448,32 kWh/a
PV electricity generation FSH	388.363,65 kWh/a
PV direct use FSH	379.554,60 kWh/a
PV surplus FSH	8.809,05 kWh/a
Residual electricity demand FSH	1.469.893,72 kWh/a
Degree of self-sufficiency FSH	20,52 %
Self-consumption quota PV FSH	97,73 %
Surplus quota PV FSH	2,27 %



Electricity consumption	2.401.948,10 kWh/a
PV electricity generation	643.554,69 kWh/a
PV direct use	597.461,87 kWh/a
PV surplus	46.092,82 kWh/a
Residual electricity demand	1.804.486,23 kWh/a
Degree of self-sufficiency	24,87 %
Self-consumption quota	92,84 %
Surplus quota	7,16 %
Sharing of PV Surplus	42,46 %
Energy shared	34.018,87 kWh/a



Electricity consumption BKO	552.499,78 kWh/a
PV electricity generation BKO	255.191,04 kWh/a
PV direct use BKO	183.888,40 kWh/a
PV surplus BKO	71.302,64 kWh/a
Residual electricity demand BKO	368.611,38 kWh/a
Degree of self-sufficiency BKO	33,28 %
Self-consumption quota PV BKO	72,06 %
Surplus quota PV BKO	27,94 %

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ECONOMICS OF SHARING

	Vocational Collage East	Franz Sales House	VC East & FSH
	Verbrauchsstelle: Knaudtstr. 25	Verbrauchsstelle: Steeler Straße 259	Verbrauchsstelle: Steeler Straße 259
Assumptions	(aus Jahresabrechnung 2020)	(aus Jahresprognose für 2020)	(aus Jahresprognose für 2020)
Hours of use	2.233 h/a (also < 2.500 h/a)	3.855 h/a (also > 2.500 h/a)	3.465 h/a (also > 2.500 h/a)
Grid and substation level	Mittelspannung zu Niederspannung	Mittelspannung	Mittelspannung
Annual peak power	245 kW	481 kW	693 kW
Cumulative amount of energy	546.963 kWh	1.854.305 kWh	2.401.268 kWh
Energy price (for amount of energy)	6,3848 ct/kWh	5,461 ct/kWh	? ct/kWh
Grid charges			
Price for peak power	14,66 €/kW*a	110,79 €/kW*a	110,79 €/kW*a
Energy price (for amount of energy)	4,72 ct/kWh	0,86 ct/kWh	0,86 ct/kWh
Netzeitige Umlagen (Werte von 2021)			
Concession fees	0,11 ct/kWh	0,11 ct/kWh	0,11 ct/kWh
EEG levy for feed in tariffs (Renewable Energies Act)	6,756 ct/kWh	6,756 ct/kWh	6,756 ct/kWh
CHP levy	0,251 ct/kWh	0,251 ct/kWh	0,251 ct/kWh
Electricity tax	2,05 ct/kWh	2,05 ct/kWh	2,05 ct/kWh
§ 19Strom NEV	0,425 ct/kWh	0,425 ct/kWh	0,425 ct/kWh
Offshore liability levy	0,397 ct/kWh	0,397 ct/kWh	0,397 ct/kWh
interruptible loads levy	0,009 ct/kWh	0,009 ct/kWh	0,009 ct/kWh
Sum of network charges and levies			
per kWh	14,718 ct/kWh	10,858 ct/kWh	10,858 ct/kWh
per kW*a	14,66 €/kW*a	110,79 €/kW*a	110,79 €/kW*a
Metering Costs	776,3 €/a	466 €/a	? €/a
Total energy price net	21,1028 ct/kWh	16,319 ct/kWh	?
inkl. 19 % Umsatzsteuer	25,112332 ct/kWh	19,41961 ct/kWh	
Leistungspreis pro Jahr gesamt netto	3591,7 €/a	53289,99 €/a	76777,47 €/a

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ECONOMICS OF SHARING

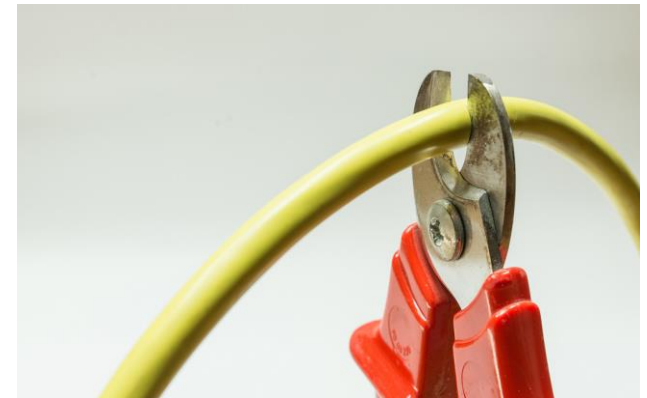
Sharing of ~35.000 kWh/a of PV energy for 20 years



**Pay construction
works and
transformers?**



**Pay grid charges and
and levies?**



**Forget about energy
sharing?**

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JOINT FINANCING

Four shareholders

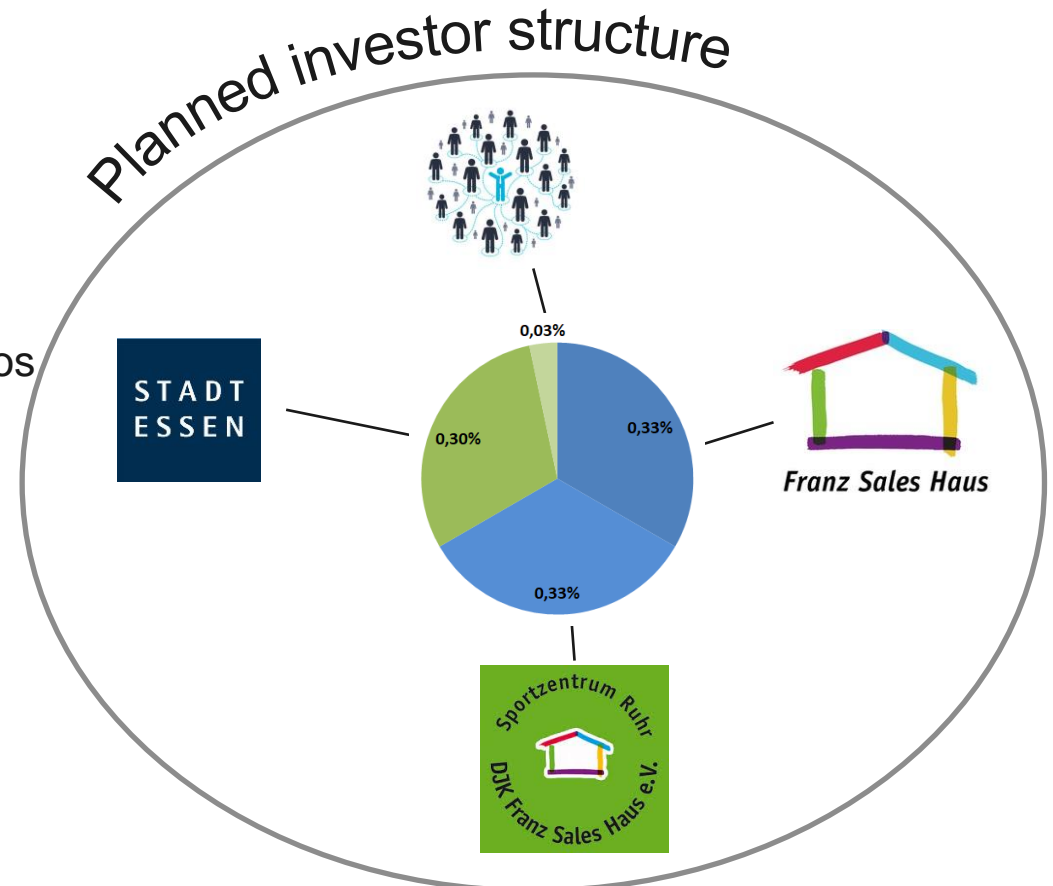
1. 33.3% Association of Franz Sales House
2. 33,3% DJK Sports Club
3. 30% City of Essen / municipal utility
4. 3,3% Citizens' cooperative

Investment costs of more than one a million euros

➤ **100% equity capital**

Opportunities

- Profitable project with payback period of approx. 10 years
- Joint financing by municipality, local businesses/associations and citizens can accelerate urban energy transition.



Energy Sharing

DISTRIBUTION OF PROFITS

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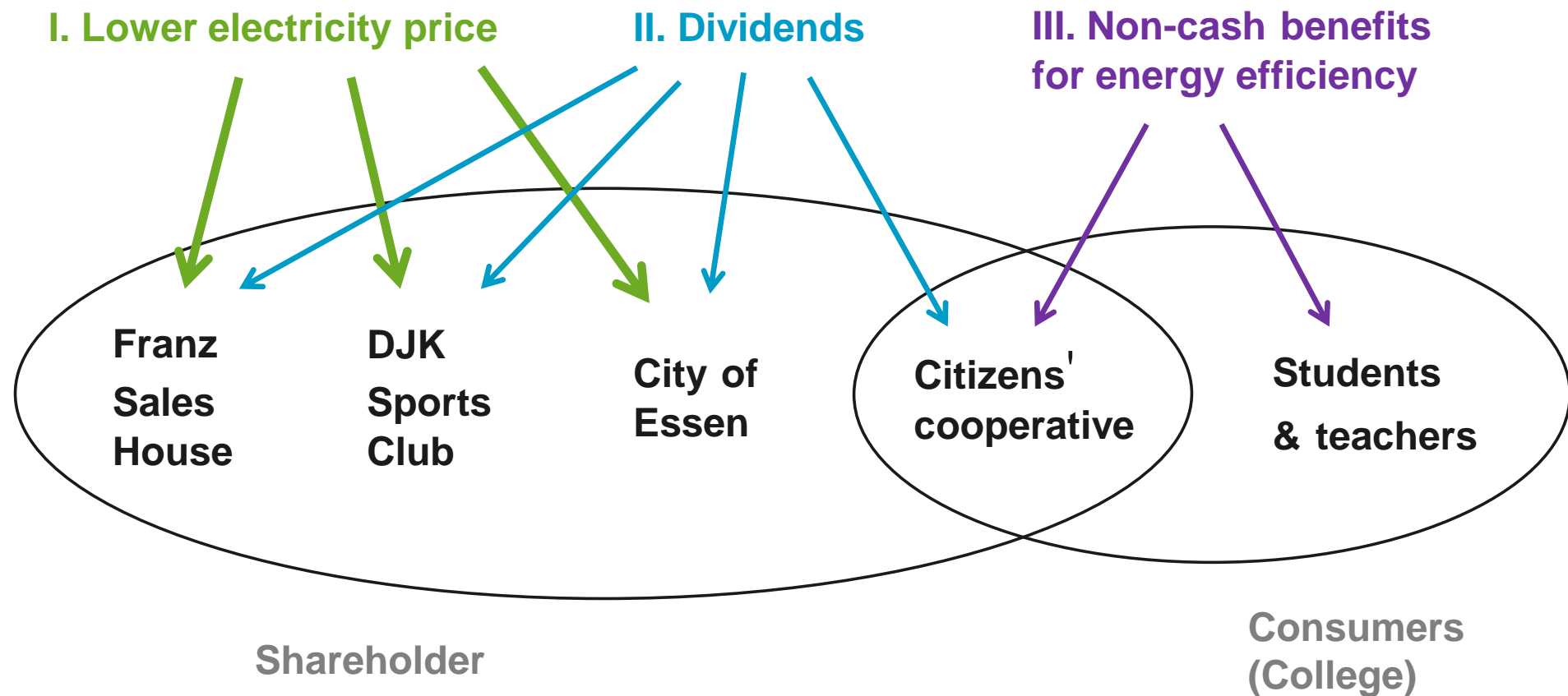
Chosen model for Essen pilot

- Shareholders sell electricity to themselves through an operating company
- Production yield: approx. 640.000 kWh/a with 93 % joint self-consumption
- Cash flow arises primarily from avoided expenses
- Additional formation of a monetary reserve
 - Dividend for shareholders incl. cooperative
 - Leveraging non-cash benefits
 - Further development of the company



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DIFFERENT REVENUE PATHS



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INCLUDING A CITIZENS COOPERATIVE

Private Corporation + Citizens Cooperative + Educational project

=> New approach to citizen participation



- Management of REC
- Contracts & decisions
- Administration
- O&M services
- ...



- Financial participation
- Decision making
- Consulting
- Public Relations
- ...



- School project
- Education in REs
- O&M services
- Consulting in efficiency
- Changes in behavior?
- ...

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CSOP IMPLEMENTATION CHALLENGES

Challenges and necessary conditions for CSOP-financing of prosumer projects

- Legal framework for non-discriminatory energy sharing between buildings, quarters and districts
- Citizen participation / financing makes things more complicated in the eyes of some community and SMEs representatives => more persuasive work needed
- Co-Owners have to be electricity connection users to profit from lower self-consumption prices and thus to cause changes in behavior towards more energy efficiency
- Individual solutions to overcome the welfare dilemma of low-income households
- ...



Target dimensions S.C.O.R.E. OPPORTUNITIES FOR ESSEN

New impulses for accelerated PV installation:

✓ Innovation

- technically
- legally
- regulatory

✓ Cooperation between local actors

- Confidence / Trust
- Skills / Roles
- Business Models

✓ Pilot as a learning field

- Scaling concept for further combinations in urban areas
- New territory - even for experts



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Thank you for your attention!