



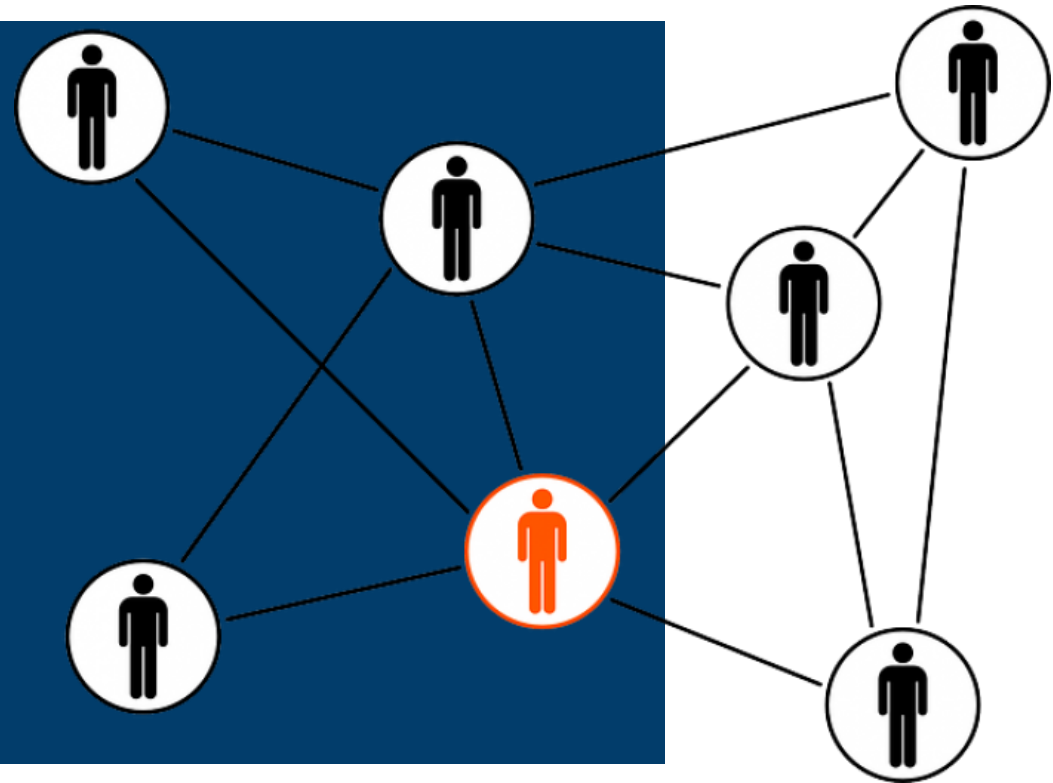
THE SOCIAL – A POSITIVE DRIVER OF THE ENERGY TRANSITION?

Six Case Studies from Germany

THE SOCIAL – A POSITIVE DRIVER OF THE ENERGY TRANSITION?

Overview

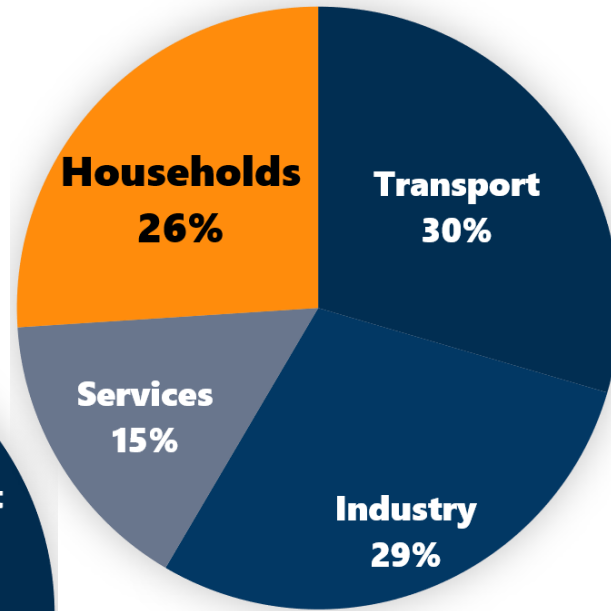
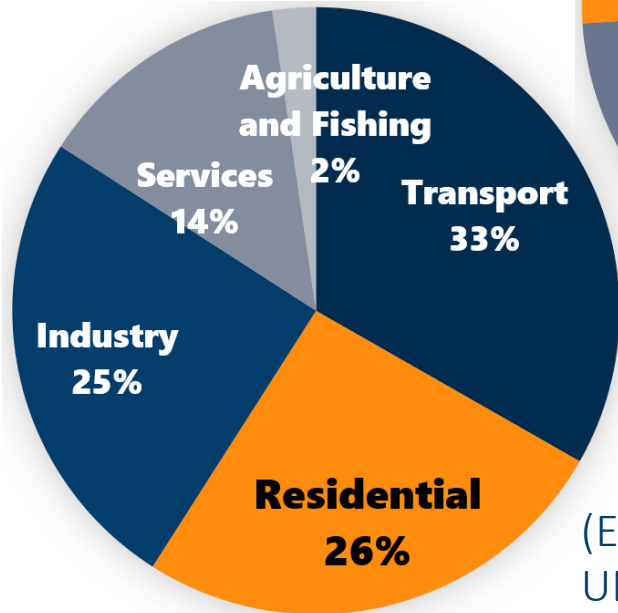
1. Introduction
2. Literature review & identified gaps
3. Research design & methodology
4. Results
5. Conclusions



1. INTRODUCTION – WHY BEHAVIOR CHANGE IS NEEDED

Final energy consumption by sector...

... in EU-28 in 2016



... in Germany in 2017

(European Commission, 2018; UBA, 2019)

Behavior change in the context of residential energy

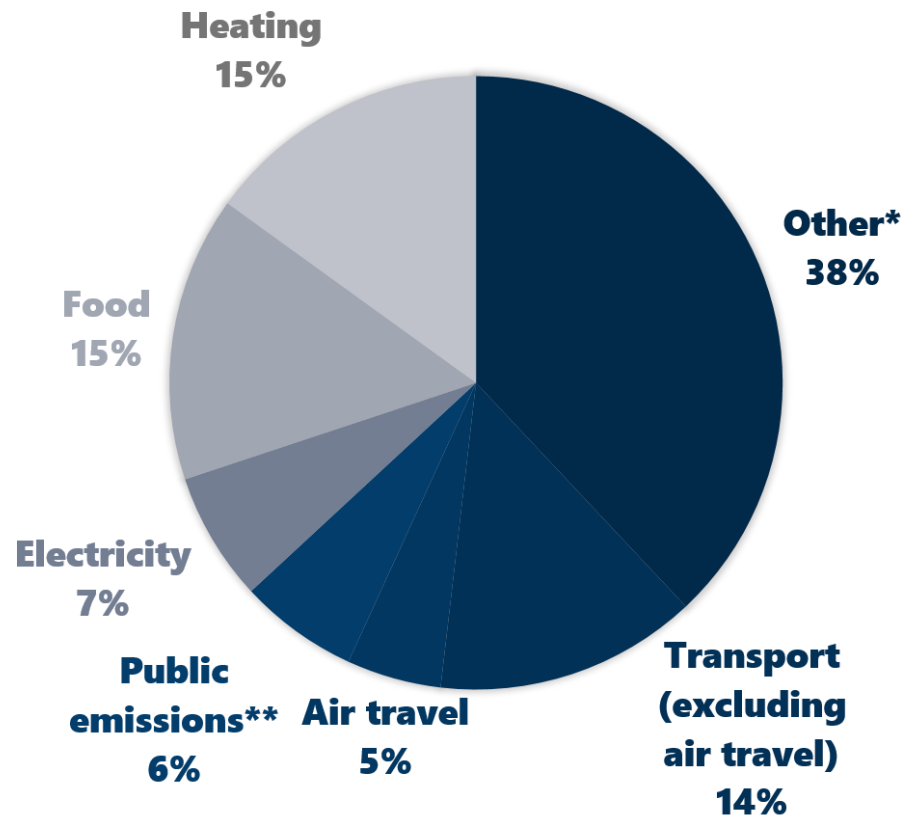
- active reduction in energy consumption
- adoption of energy-efficient technologies and measures around the home

Citizen's involvement on the production side of energy

- become a prosumer by installing a renewable energy system
- join a community-based renewable energy project

1. INTRODUCTION – WHY BEHAVIOR CHANGE IS NEEDED

**Greenhouse gas emissions of an average German in 2017
(total annual emissions per capita: 11.6 t CO₂ equivalents)**



→ a broader uptake of sustainable consumption & pro-environmental behaviors is needed

(BMU, 2018)

* e.g. clothing, home appliances, leisure activities
** e.g. water supply, sewage disposal, waste disposal

2. LITERATURE REVIEW – SPILLOVER EFFECTS

Study of extensive adoption of sustainable measures and behaviors

As **spillover effects** (Nilsson et al., 2017; Truelove et al., 2014) among citizens already active in the energy transition

Among prosumers

Among members of community-based renewable energy projects

Results: ambiguous

- (1) Reduced energy consumption (Keirstead, 2007; Stedmon et al., 2013)
- (2) Increased energy consumption (Hansen et al., 2017; Abi-Ghanem et al., 2011)
- (3) No changes in energy consumption and other pro-environmental behaviors (Wittenberg et al., 2016; Öhrlund et al., 2020; Bahaj et al., 2007; Palm et al., 2018; ...)

Results: no proof of spillover effects found (Rogers et al., 2012; Brummer, 2018; Sauter et al., 2014)

As other **observed** instances

Among individuals

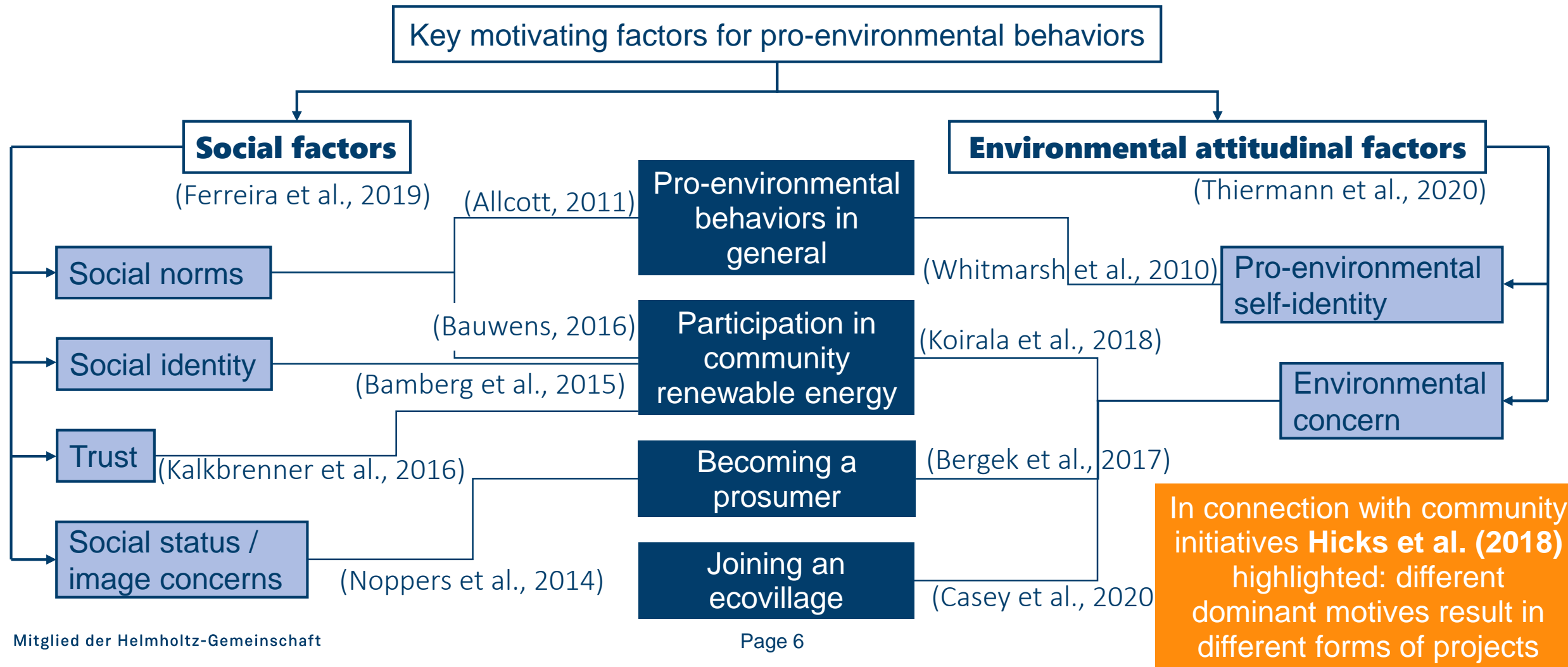
Among members of other community-based projects

Results: 'home front transitioners' (Hagbert et al., 2017)

Results:

- (1) **ecovillages** Schäfer et al., 2018; Litfin, 2014; Marckmann et al., 2012)
- (2) **eco-districts** (Bottero et al., 2019; Coates, 2013)
- (3) **cohousing initiatives** (Boyer, 2018; Hamiduddin et al., 2016)

2. LITERATURE REVIEW – MOTIVATING FACTORS FOR PRO-ENVIRONMENTAL BEHAVIORS



3. RESEARCH DESIGN & METHODOLOGY – AIM AND HYPOTHESES

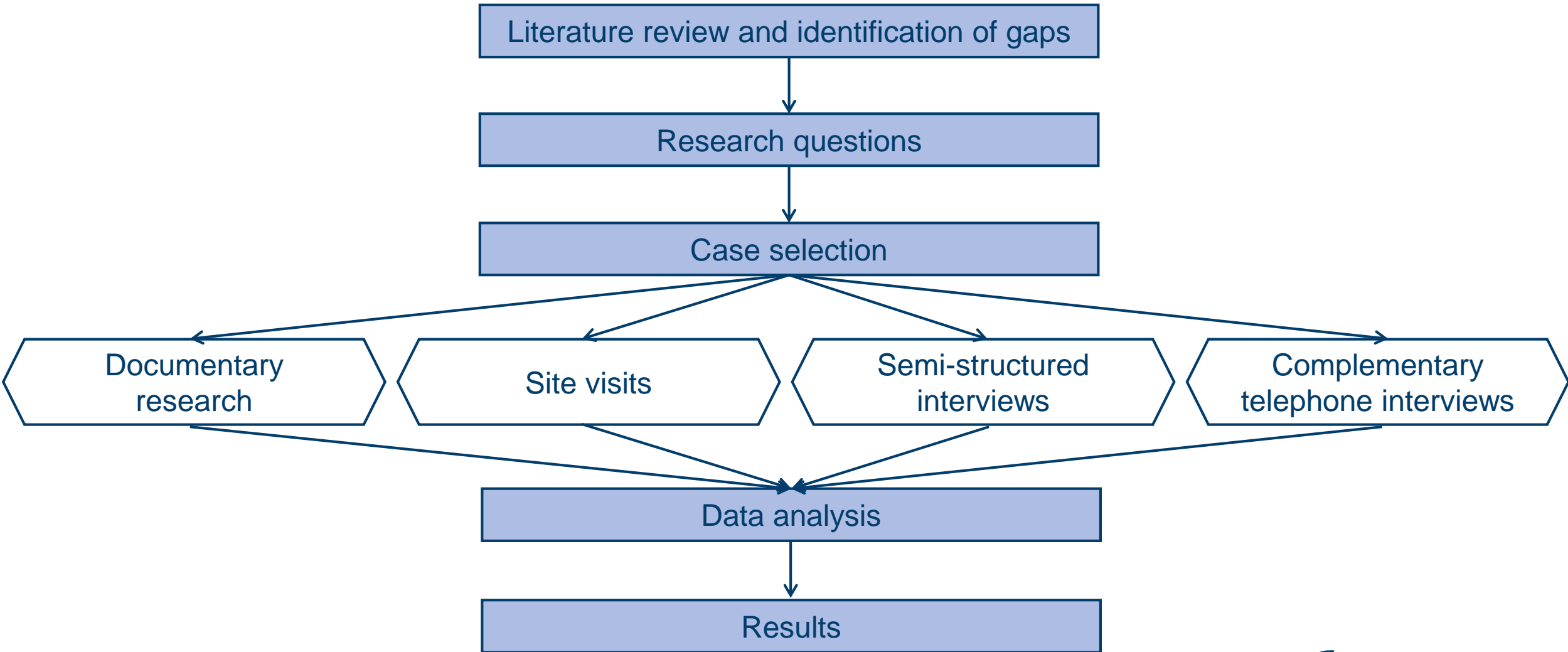
Aim of the study

In-depth comparative case study analysis of a larger variety of projects, which exhibit extensive adoption of sustainable behaviors and measures

Hypotheses based on literature review

- (1) A broad adoption of sustainable measures, technologies, and behaviors takes place when social factors have strong influencing power.
- (2) Key motivation to become active in these projects are pro-environmental attitudes and pro-environmental self-identity.

3. RESEARCH DESIGN & METHODOLOGY



3. RESEARCH DESIGN & METHODOLOGY

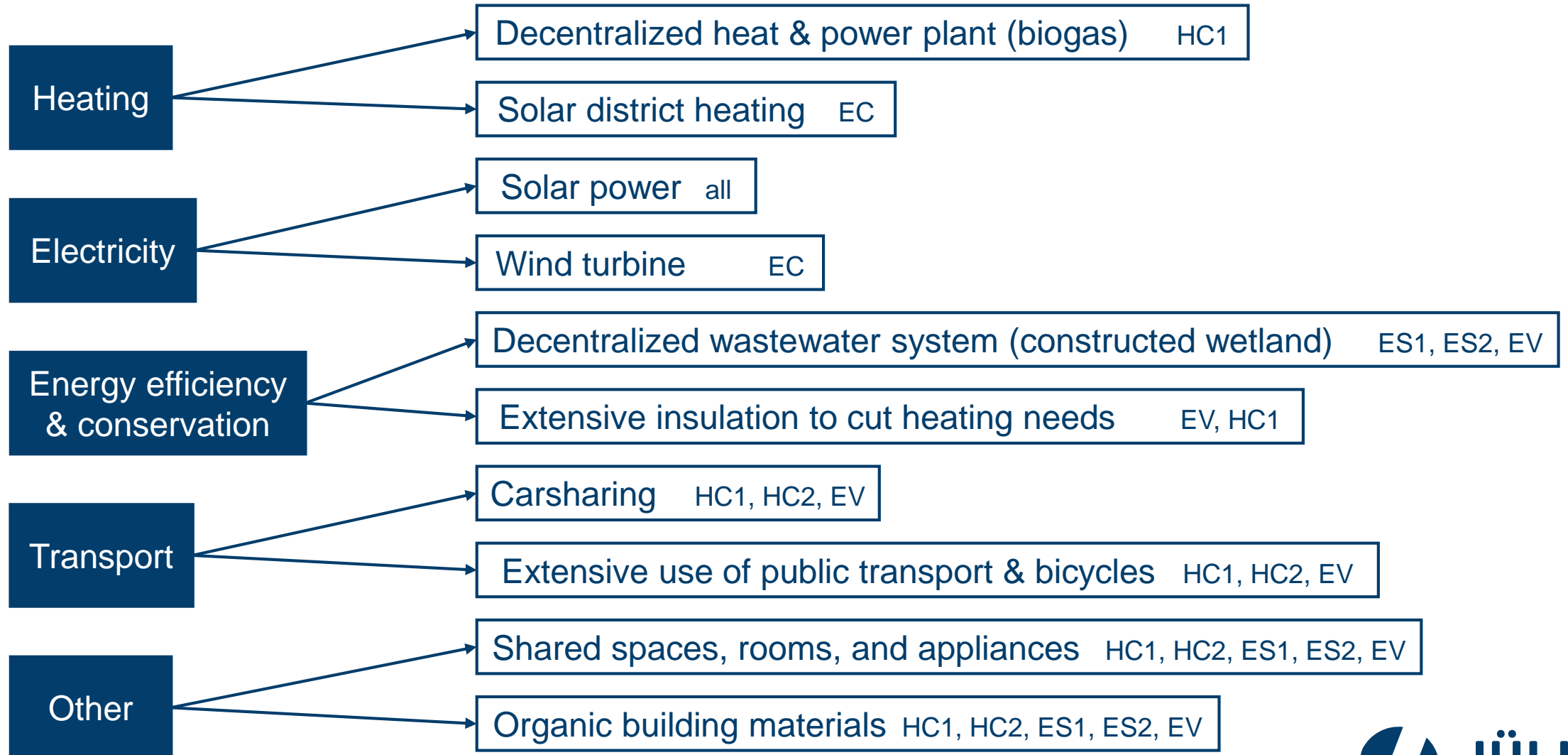
Research questions

- (1) What kind of sustainable energy measures and technologies were introduced in the community projects? What other sustainable measures and behaviors were taken up?
- (2) What motivated people to create or participate in such projects?
- (3) What are similarities and differences in the case studies?
- (4) How and when did sustainability enter the projects and their members' lives?

4. RESULTS – THE CASES SELECTED

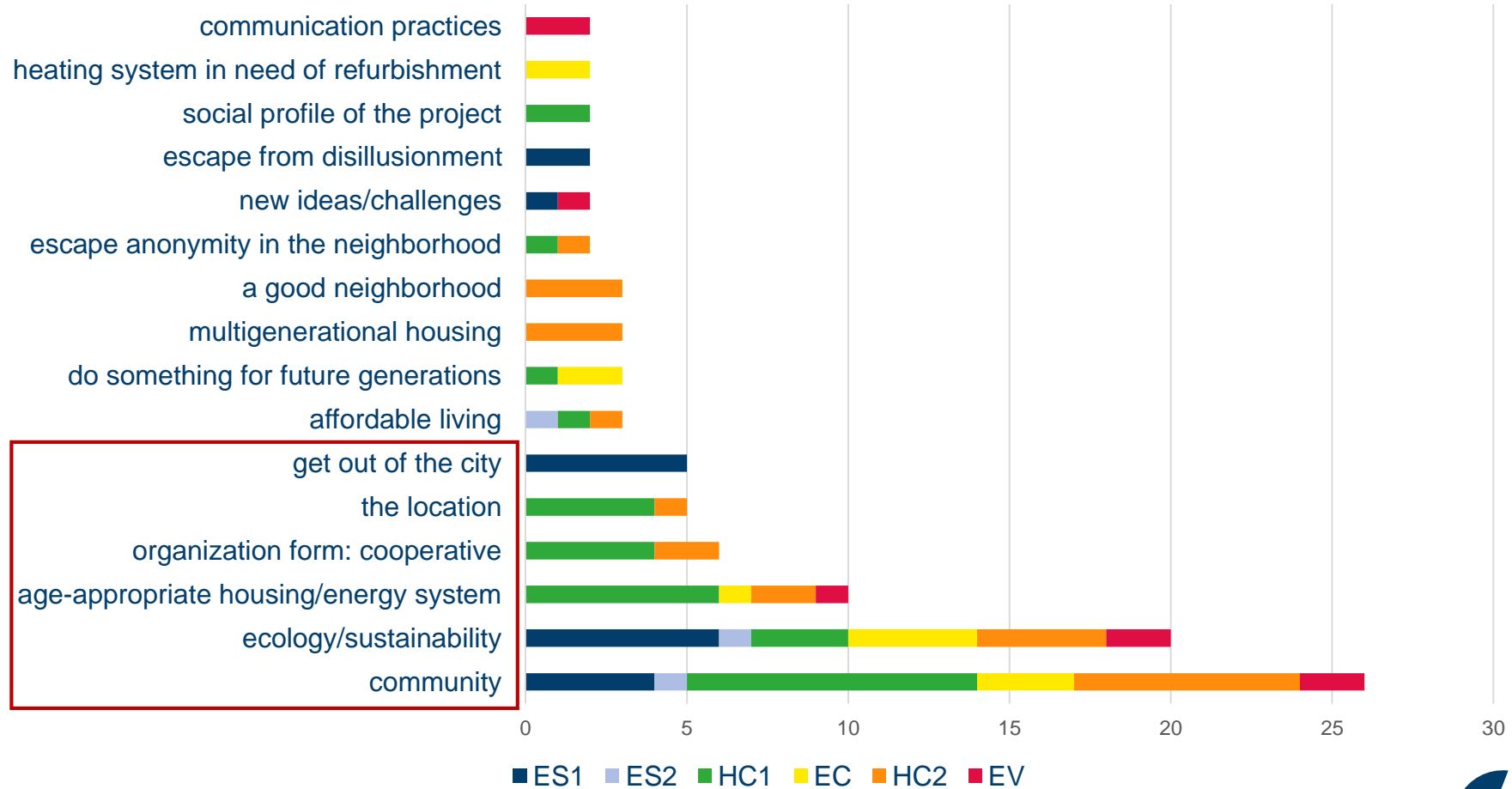
Community project name	Community type	State of Germany	Legal status	Membership	Landscape	Housing type	Founding year	Number of interviews
Moldenhauer Hof	eco-settlement (ES1)	Brandenburg	homeowners' association	16	rural	town houses	1992	6
Landhof Schöneiche	eco-settlement (ES2)	Brandenburg	homeowners' association	41	suburban	town houses	1992	1
Gut Jahnishausen	ecovillage (EV)	Saxony	cooperative	53	rural	flats	2001	2
Möckernkiez	housing cooperative (HC1)	Berlin	cooperative	2300; approx. 800 in residence	urban	flats	2007	11
Bioenergiegenossenschaft Mengersberg	energy cooperative (EC)	Hessen	cooperative	150 (households)	rural	detached houses	2014	4
PatchWorkHaus Aachen	housing cooperative (HC2)	North Rhine-Westphalia	cooperative	39	urban	flats	2008	7

4. RESULTS – RQ1: KEY SUSTAINABLE MEASURES TAKEN

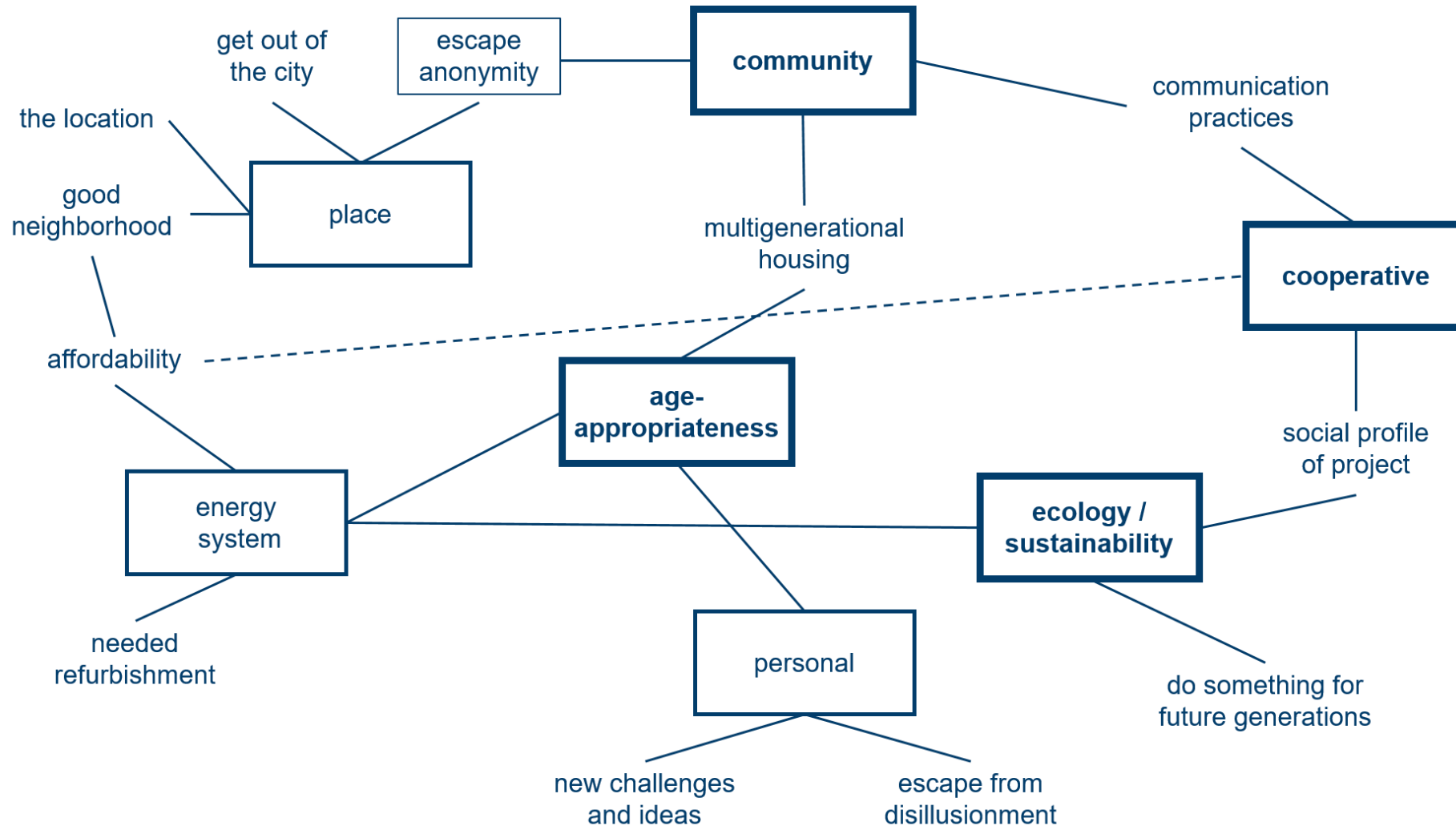


4. RESULTS – RQ2: MOTIVATION TO PARTICIPATE

Stated motives (multiple answers)

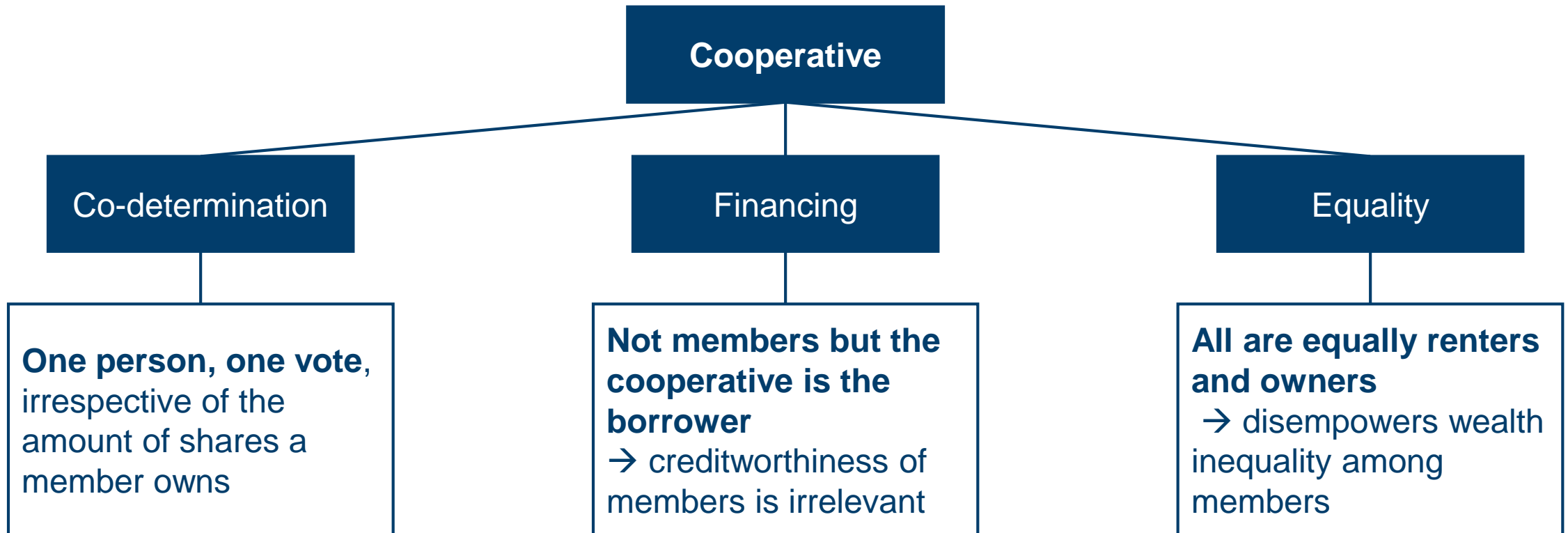


4. RESULTS – RQ2: LINKAGES BETWEEN MOTIVES



4. RESULTS – RQ2: COOPERATIVE AS MOTIVE

Under German cooperative law, registered cooperatives serve the purpose of promoting **economic, social, and cultural interests of its members** through joint business operations (**§1 I GenG**).



These motives are all social characteristics of the organization form

4. RESULTS – RQ2: TOP MOTIVES

Top three ranked motives per project (in terms of times named by interviewees of a project)

Ranking	ES1		HC1		HC2		EC		EV*		ES2**	
1	ecology / sustainability	6	community	9	community	7	ecology / sustainability	4	community	2	community	1
									ecology / sustainability	2	affordable living	1
									communication practices	2	ecology / sustainability	1
2	get out of the city	5	age-appropriate housing	6	ecology / sustainability	4	community	3				
3	community	4	organization form: cooperative	4	multigenerational housing	3	do sth. for future generations	2				
			the location	4	a good neighborhood	3	heating system needed refurbishment	2				

* no ranking possible; these motives were named equally by the two interviewees in EV

** no ranking possible; only one interviewee in ES2

4. RESULTS – RQ3: SIMILARITIES & DIFFERENCES

	ES1	ES2	HC1	EC	HC2	EV
primary focus	living space	living space	living space	energy supply	living space	living space
keywords in mission statement/short description						
community/collectively	x	x	x	x	x	x
sustainability			x			
ecology	x	x	x	x	x	x
social	x		x			
renewable energy				x		
economical		x				x
multigenerational			x		x	x
self-determined					x	
existing or emergent community	emergent	emergent	emergent	existing	emergent	emergent
joint living spaces	x	x	x		x	x
existing buildings or new construction	new	new	new	existing	new	existing
sustainability/ecology among top three motives	x	x		x	x	x

4. RESULTS – RQ4: SUSTAINABILITY

Sustainability
– for some a matter of course

Sustainability

Instances of perceived social norms

Social norms against...

... unsustainable consumption

“I no longer dare to order things from Amazon.” (HC1-11)

... unsustainable energy supply

“In this group, I would never have dared to propose an oil or gas heating system.” (HC2-6)

... unsustainable transport

“Sometimes a glance alone is enough if someone says: “I'm going to fly to Mallorca now.” (EV-2)

The role of initiators

Campaigning for (new) members
→ **Creators of social capital**

Trusted members of social network
→ **Users of pre-existing social capital**

“Initiator convinced me of the necessity of sustainability/ecology (ES1-1, ES2-1), of community (ES1-4).”
→ **Opinion leaders**

“Sustainability was not a concern for me” (HC1-1)
→ **Enforcers of sustainability**

Multidimensional sustainability

Ecology

Broad adoption of sustainable measures and behaviors

Economy

Realization of projects within members' financial means

Social

-Multi-generational living
-Cooperatives
-Creation/strengthening/future-proofing of communities

5. CONCLUSIONS – HYPOTHESES REVISITED

Hypothesis 1:

A broad adoption of sustainable measures, technologies, and behaviors takes place when **social factors** have strong influencing power.

yes

Findings:

- **Social needs**, i.e. a desire for **community** drove people to join and invest
- Use of and creation of **social capital**
- Realization of projects through **collective action**
- Communities, i.e. **social structures** are strengthened and created
- **Social norms** enforce sustainable behaviors

Hypothesis 2:

Key motivation to become active in these projects are **pro-environmental attitudes** and pro-environmental self-identity.

yes & no

Findings:

Underlying pre-existing environmental attitudes, **not among all, but among a critical mass** and critical individuals (initiators) are vital.

5. CONCLUSIONS

→ **Sustainability as a default option:**

If someone joins a project or living environment where sustainability measures and behaviors are established

→ **Strong environmental motives not necessary requirement:**

If critical mass has environmental motives & if other linked motives are met instead

→ **Demographic developments make growing interest in 'community' likely**

→ **Support programs of community projects should make sustainable measures a condition for funding**

REFERENCES – 1

- Abi-Ghanem, D., & Haggett, C. (2011). Shaping people's engagement with microgeneration technology: The case of solar photovoltaics in UK homes. In P. Devine-Wright (Ed.), *Renewable Energy and the Public: From NIMBY to Participation* (Vol. 149, pp. 149–165). London: Earthscan.
- Allcott, H. (2011). Social norms and energy conservation. *Journal of Public Economics*, 95(9), 1082-1095.
<https://doi.org/10.1016/j.jpubeco.2011.03.003>
- Bahaj, A. S., & James, P. A. B. (2007). Urban energy generation: The added value of photovoltaics in social housing. *Renewable and Sustainable Energy Reviews*, 11(9), 2121-2136. <https://doi.org/10.1016/j.rser.2006.03.007>
- Bamberg, S., Rees, J., & Seebauer, S. (2015). Collective climate action: Determinants of participation intention in community-based pro-environmental initiatives. *Journal of Environmental Psychology*, 43, 155-165. <https://doi.org/10.1016/j.jenvp.2015.06.006>
- Bauwens, T. (2016). Explaining the diversity of motivations behind community renewable energy. *Energy Policy*, 93, 278-290.
<https://doi.org/10.1016/j.enpol.2016.03.017>
- Bergek, A., & Mignon, I. (2017). Motives to adopt renewable electricity technologies: Evidence from Sweden. *Energy Policy*, 106, 547-559.
<https://doi.org/10.1016/j.enpol.2017.04.016>
- BMU. (2018). *Klimaschutz in Zahlen: Fakten, Trends und Impulse deutscher Klimapolitik*. Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit.
- Bottero, M., Caprioli, C., Cotella, G., & Santangelo, M. (2019). Sustainable cities: A reflection on potentialities and limits based on existing eco-districts in Europe. *Sustainability*, 11(20), 5794. <https://doi.org/10.3390/su11205794>
- Boyer, R. H. W. (2018). Intermediacy and the diffusion of grassroots innovations: The case of cohousing in the United States. *Environmental Innovation and Societal Transitions*, 26, 32-43. <https://doi.org/10.1016/j.eist.2017.08.001>
- Brummer, V. (2018). Community energy – benefits and barriers: A comparative literature review of Community Energy in the UK, Germany and the USA, the benefits it provides for society and the barriers it faces. *Renewable and Sustainable Energy Reviews*, 94, 187-196.
<https://doi.org/10.1016/j.rser.2018.06.013>
- Casey, K., Lichrou, M., & O'Malley, L. (2020). Prefiguring sustainable living: an ecovillage story. *Journal of Marketing Management*, 1-22.
<https://doi.org/10.1080/0267257X.2020.1801800>
- Coates, G. J. (2013). The sustainable urban district of Vauban in Freiburg, Germany. *International Journal of Design & Nature and Ecodynamics*, 8(4), 265-286. <https://doi.org/10.2495/DNE-V8-N4-265-286>

REFERENCES – 2

- European Commission. (2018). EU energy in figures - Statistical Pocketbook 2018. Luxembourg: European Union. Retrieved Oct 6, 2019, from <https://publications.europa.eu/en/publication-detail/-/publication/99fc30eb-c06d-11e8-9893-01aa75ed71a1/language-en/format-PDF/source-77059768>
- Ferreira, M., & van den Wijngaard, R. (2019). Pro-Environmental Behaviour - We Care Because Others Do. In A. Samson (Ed.), *The Behavioral Economics Guide 2019* (pp. 121-130).
- Hagbert, P., & Bradley, K. (2017). Transitions on the home front: A story of sustainable living beyond eco-efficiency. *Energy Research & Social Science*, 31, 240-248. <https://doi.org/10.1016/j.erss.2017.05.002>
- Hamiduddin, I., & Gallent, N. (2016). Self-build communities: the rationale and experiences of group-build (Baugruppen) housing development in Germany. *Housing Studies*, 31(4), 365-383. <https://doi.org/10.1080/02673037.2015.1091920>
- Hansen, M., & Hauge, B. (2017). Prosumers and smart grid technologies in Denmark: developing user competences in smart grid households. *Energy Efficiency*, 10(5), 1215-1234.
- Hicks, J., & Ison, N. (2018). An exploration of the boundaries of 'community' in community renewable energy projects: Navigating between motivations and context. *Energy Policy*, 113, 523-534. <https://doi.org/10.1016/j.enpol.2017.10.031>
- Kalkbrenner, B. J., & Roosen, J. (2016). Citizens' willingness to participate in local renewable energy projects: The role of community and trust in Germany. *Energy Research & Social Science*, 13, 60-70. <https://doi.org/10.1016/j.erss.2015.12.006>
- Keirstead, J. (2007). Behavioural responses to photovoltaic systems in the UK domestic sector. *Energy Policy*, 35(8), 4128-4141. <https://doi.org/10.1016/j.enpol.2007.02.019>
- Koirala, B. P., Araghi, Y., Kroesen, M., Ghorbani, A., Hakvoort, R. A., & Herder, P. M. (2018). Trust, awareness, and independence: Insights from a socio-psychological factor analysis of citizen knowledge and participation in community energy systems. *Energy Research & Social Science*, 38, 33-40. <https://doi.org/10.1016/j.erss.2018.01.009>
- Litfin, K. T. (2014). *Ecovillages: Lessons for Sustainable Community*: John Wiley & Sons.
- Marckmann, B., Gram-Hanssen, K., & Christensen, T. H. (2012). Sustainable Living and Co-Housing: Evidence from a Case Study of Eco-Villages. *Built Environment*, 38(3), 413-429. <https://doi.org/10.2148/benv.38.3.413>
- Nilsson, A., Bergquist, M., & Schultz, W. P. (2017). Spillover effects in environmental behaviors, across time and context: a review and research agenda. *Environmental Education Research*, 23(4), 573-589. <https://doi.org/10.1080/13504622.2016.1250148>

REFERENCES – 3

- Noppers, E. H., Keizer, K., Bolderdijk, J. W., & Steg, L. (2014). The adoption of sustainable innovations: Driven by symbolic and environmental motives. *Global Environmental Change*, 25, 52-62. <https://doi.org/10.1016/j.gloenvcha.2014.01.012>
- Öhrlund, I., Stikvoort, B., Schultzberg, M., & Bartusch, C. (2020). Rising with the sun? Encouraging solar electricity self-consumption among apartment owners in Sweden. *Energy Research & Social Science*, 64, 101424. <https://doi.org/10.1016/j.erss.2020.101424>
- Palm, J. (2018). Household installation of solar panels – Motives and barriers in a 10-year perspective. *Energy Policy*, 113, 1-8. <https://doi.org/10.1016/j.enpol.2017.10.047>
- Rogers, J. C., Simmons, E. A., Convery, I., & Weatherall, A. (2012). Social impacts of community renewable energy projects: findings from a woodfuel case study. *Energy Policy*, 42, 239-247. <https://doi.org/10.1016/j.enpol.2011.11.081>
- Sauter, R., & Watson, J. (2007). Strategies for the deployment of micro-generation: Implications for social acceptance. *Energy Policy*, 35(5), 2770-2779. <https://doi.org/10.1016/j.enpol.2006.12.006>
- Schäfer, M., Hielscher, S., Haas, W., Hausknost, D., Leitner, M., Kunze, I., & Mandl, S. (2018). Facilitating Low-Carbon Living? A Comparison of Intervention Measures in Different Community-Based Initiatives. *Sustainability*, 10(4). <https://doi.org/10.3390/su10041047>
- Stedmon, A. W., Winslow, R., & Langley, A. (2013). Micro-generation schemes: user behaviours and attitudes towards energy consumption. *Ergonomics*, 56(3), 440-450. <https://doi.org/10.1080/00140139.2012.723140>
- Thiermann, U. B., & Sheate, W. R. (2020). Motivating individuals for social transition: The 2-pathway model and experiential strategies for pro-environmental behaviour. *Ecological Economics*, 174, 106668. <https://doi.org/10.1016/j.ecolecon.2020.106668>
- Truelove, H. B., Carrico, A. R., Weber, E. U., Raimi, K. T., & Vandenberg, M. P. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. *Global Environmental Change*, 29, 127-138. <https://doi.org/10.1016/j.gloenvcha.2014.09.004>
- UBA. (2019). Energieverbrauch nach Energieträgern, Sektoren und Anwendungen. German Environment Agency (Umweltbundesamt). Retrieved Oct 6, 2019, from <https://www.umweltbundesamt.de/daten/energie/energieverbrauch-nach-energetraegern-sektoren>
- Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology*, 30(3), 305-314. <https://doi.org/10.1016/j.jenvp.2010.01.003>
- Wittenberg, I., & Matthies, E. (2016). Solar policy and practice in Germany: How do residential households with solar panels use electricity? *Energy Research & Social Science*, 21, 199-211. <https://doi.org/10.1016/j.erss.2016.07.008>