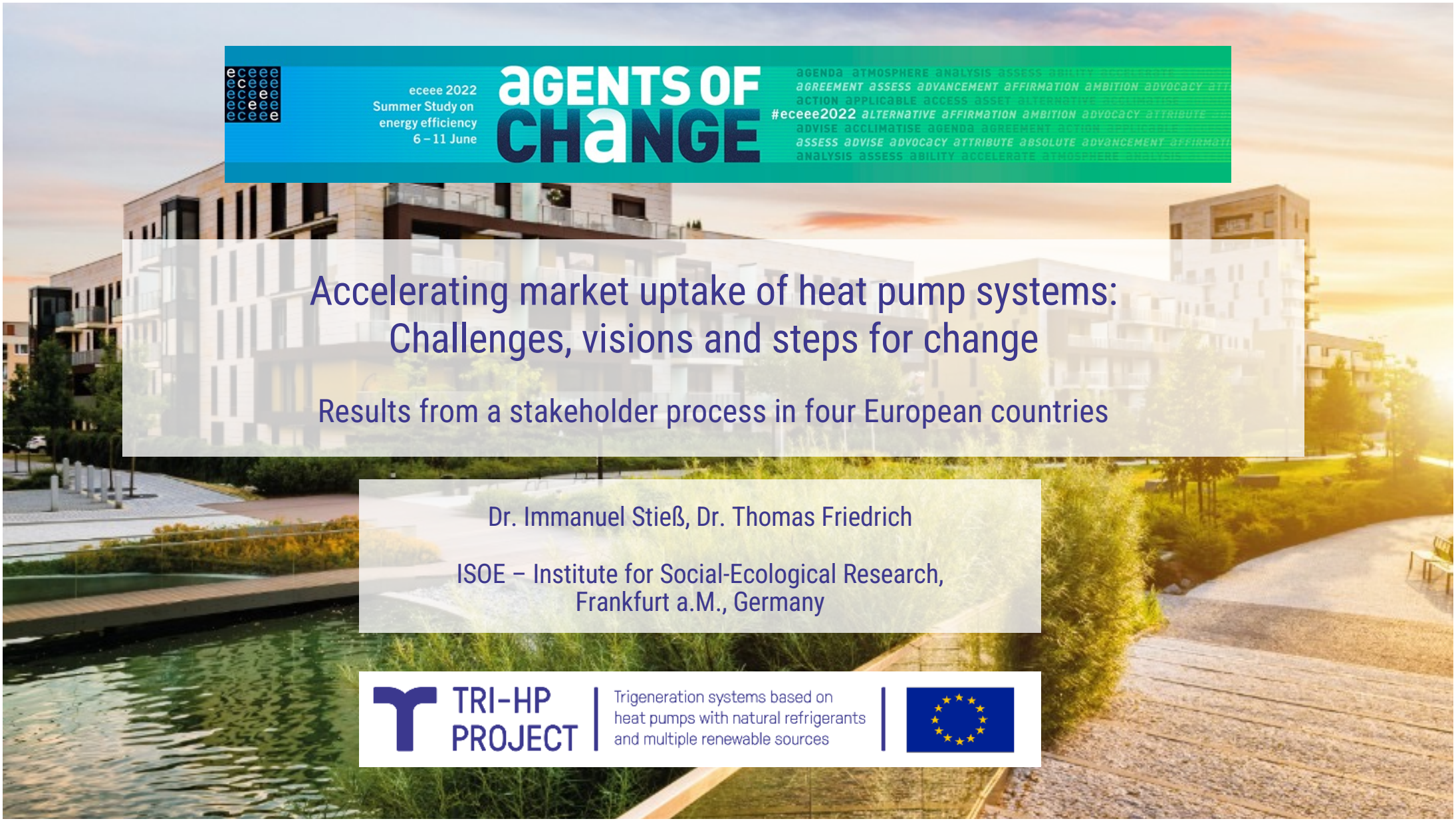

Accelerating market uptake of heat pump systems: Challenges, visions and steps for change

Results from a stakeholder process in four European countries

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TRI-HP PROJECT | Trigeneration systems based on heat pumps with natural refrigerants and multiple renewable sources

ISOE – Institute for Social-Ecological Research, Frankfurt

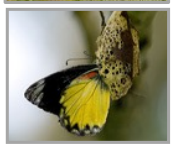
Water Resources
and Land Use

Water Infrastructure
and Risk Analyses

Energy and Climate Protection in Everyday Life

Mobility and Urban
Spaces

Biodiversity and
People



Transdisciplinary Methods
and Concepts

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Heat Pumps and energy transition

- deployment of HP:
  - important to achieve the EC's target of a 40% share of renewables in the energy mix.
  - In Germany: rapid HP market penetration as a priority to reach the 2030 targets in the buildings sector.
- increasing deployment of HP in most European countries.
- however, market share varies strongly between market segments and countries:
  - in newly constructed SFH the market share of HP is rather high: above 90 % in Norway, Sweden and over 50% in Germany (2021).
  - refurbishment of MFB: HPs are used around 10 % in Austria, France and Germany (2018).
- renovation market of MFB as a huge potential and challenge for HP

Objective

- better understanding of barriers, hindrances and incentives to **market adoption** of heat pumps in in multi-family buildings.
  - identification of interests and needs of key stakeholder groups towards the adoption of HP
  - determination of benefits and incentives to overcome barriers
- **stakeholder groups**: investors, architects, heat pump manufacturers, engineers, HVAC consultants and planners, technical consultants, representatives from associations, heating installers, plumbers etc.
- **cross-national perspective:**
  - identification of geographical, legal and cultural differences

TRI - Generation Systems

- based on electrically driven natural refrigerant heat pumps (HPs) coupled with PV to provide heating, cooling and electricity to multi-family residential buildings
- different energy sources
  - **ground and air**
  - heating and cooling with reversible heat pumps
  - **solar** with ice slurry as intermediate storage medium
  - heating with cooling as add-on feature
- natural refrigerants
- advanced energy management system

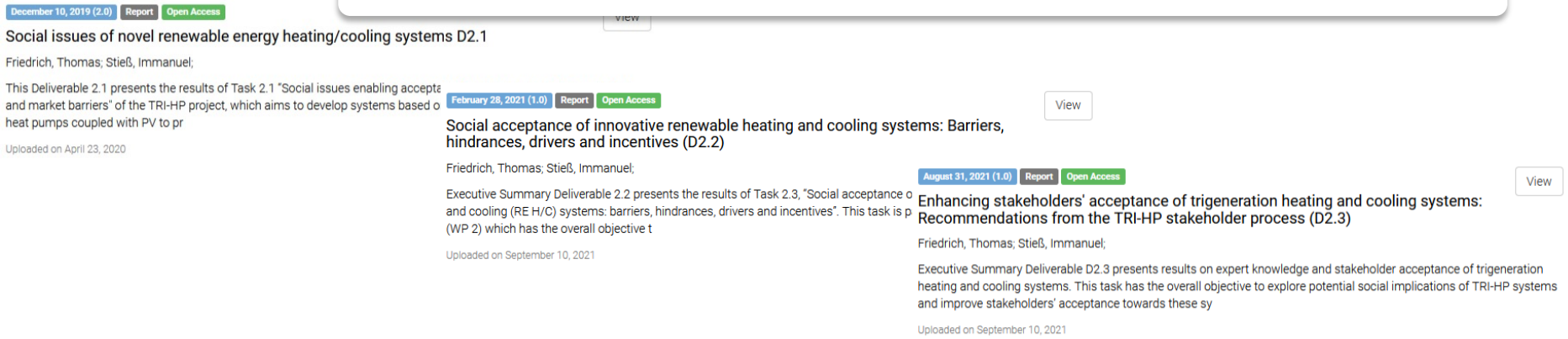
www.tri-hp.eu

Research Design

Literature study on social acceptance of novel renewable energy powered heating and cooling systems

Expert interviews with key stakeholder in CH, ES, NO, and DE

Expert stakeholder workshops with key stakholder in CH, ES, NO, and DE



Literature Review on Social Acceptance

- some results:
  - renewable energy technologies are generally well accepted in Europe
  - market acceptance of heat pumps varies strongly throughout Europe due to country specific contexts (political, legal and market conditions, structure of the building stock, etc.)
  - conclusion: perspectives of key stakeholders and intermediaries needs to be taken into account
- categories of barriers and drivers to social acceptance:
  - (1) economic-financial barriers
  - (2) barriers regarding practical implementation and feasibility
  - (3) psychological, social-cultural and organizational barriers

full report available at:
https://zenodo.org/communities/tri-hp

Stakeholder Interviews

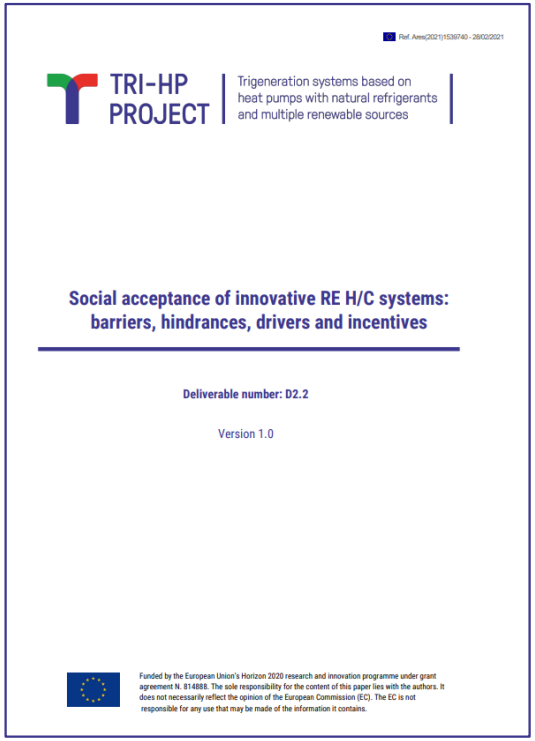
expert interview sample					
respondents: primary stakeholder assignment					
	DE	CH	ES	NO	Total
building owners, housing cooperatives, investors	1	2	2	2	**7**
HVAC consultants, planners	3	2	1	2	**8**
manufacturers, distributor	2	1	1	1	**5**
installers, craftsmen	2	1	2	1	**6**
architects	3	1	1	1	**6**
engineers	1	1	1	1	**4**
Total	**12**	**7**	**8**	**8**	**36**

<u>interview conduction:</u>

- 36 interviews conducted and fully transcribed
- 11% women, mean age: 50 years (28-72)
- total duration of the audio recordings: more than 44h
- total amount of transcripts: more than 500 pages
- transcripts fully analysed (qualitative content analysis)

Stakeholder Interviews

- some results:
  - categories of barriers and drivers: validated
  - crucial topics:
    - economic efficiency
    - simplicity
    - practical feasibility
    - competence and skill
    - cooperation
    - public support
  - contexts matter: nationally, regionally, locally
  - common features: discussed in stakeholder workshops



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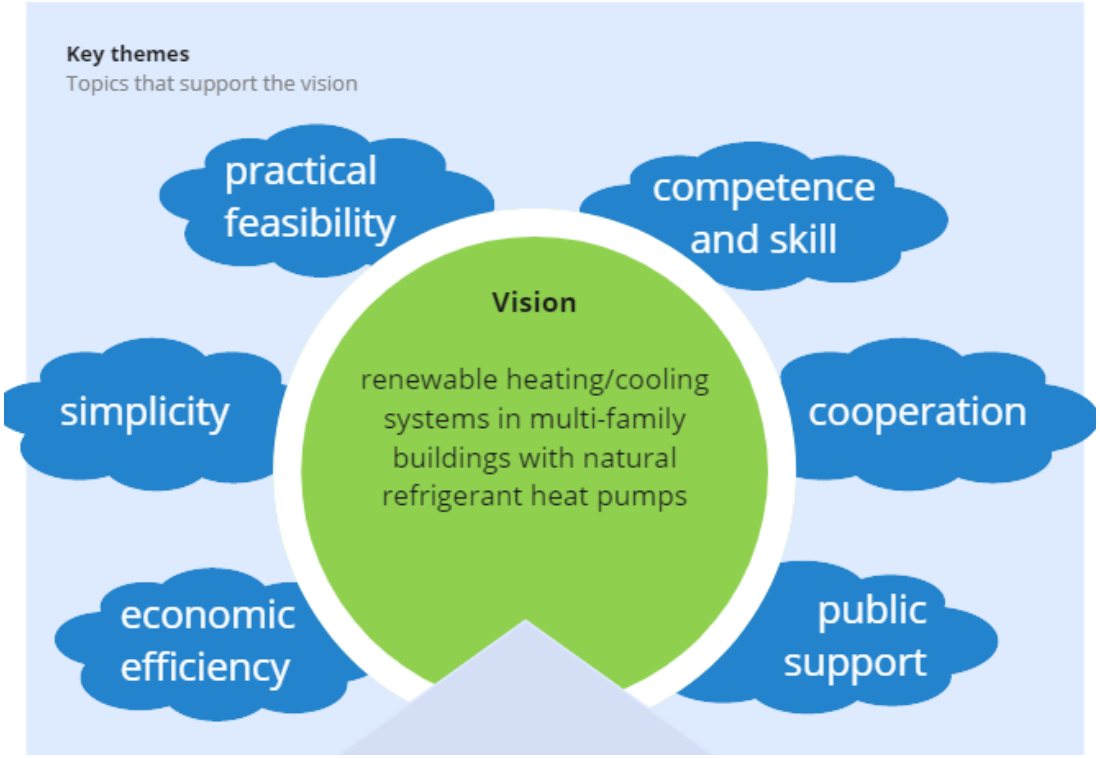
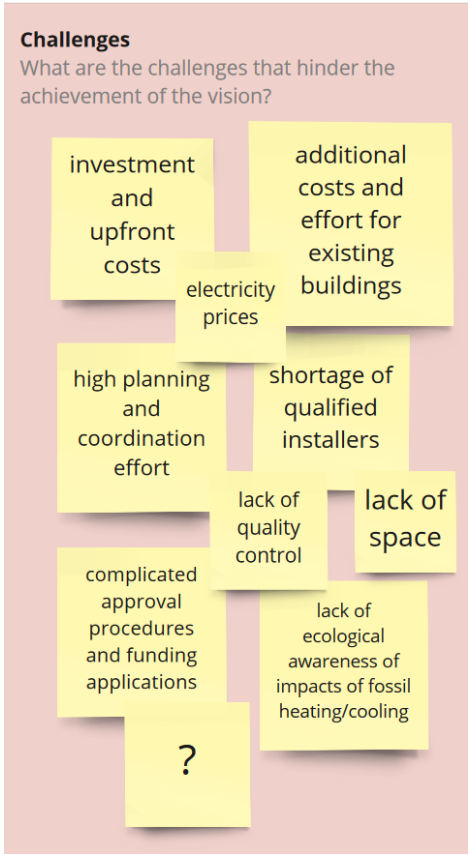
Stakeholder Workshops

Stakeholder	Germany	Switzer-land	Spain	Norway
heat pump associations	X		X	X
heat pump (component) manufacturer	X	X	X	X
HVAC planners / energy counselling	X	X	X	X
installing / tradesmen associations	X			X
investors / housing company	X	X		X
facility management / energy contracting	X	X	X	X
architects / building engineers	X	X	X	
other		X	X	X

- 4 national SWS
- June 2021
- online
- 2-3 hours
- ∅ 12 stakeholder

Stakeholder Workshops





Stakeholder Workshops

- important **trans-national challenges**:
  - investment and upfront costs
  - shortage of skilled workers
  - high planning and coordination effort (especially in existing buildings)
  - prevailing fossil path dependencies and business models in the heating sector

full report available at:
https://zenodo.org/communities/tri-hp

Suggestions from national SWS

Germany

- Training offensive to enhance capacity to install HP
- Design HP to be more standardized and easy to install.
- Planning tools for installers

Spain

- Life cycle assessments should include GWP of refrigerants
- Awareness raising about HP benefits

Switzerland

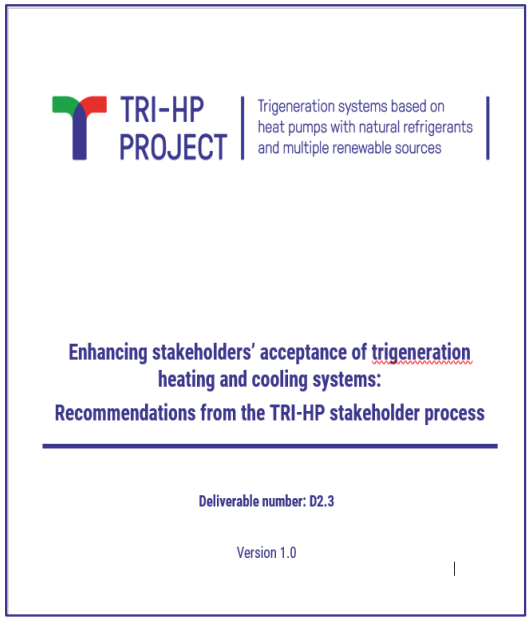
- Promote examples of solar-ice
- Remunerate planners for extra planning efforts
- Change in tenancy law / enhanced tax reduction schemes

Norway

- -> how „green“ is electricity?
- Include GWP of refrigerants in Environmental Impact Assessement

Conclusions for market acceleration

- phasing out of fossil heating systems / quota for renewable
- consideration of economic efficiency of H/C systems over the entire life cycle
- support for new business models such as energy contracting and new finance schemes
- simplifying systems (e.g. “Wärme-Pumpen-Modul-System”)
- providing easy-to-use planning and installation tools
- adapt funding schemes
- awareness raising about the HP benefits
- frequently mentioned **key actors to drive solutions**: building owners, heating installers, HVAC planners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Trigeneration systems based on heat pumps with natural refrigerants and multiple renewable sources

Enhancing stakeholders' acceptance of trigeneration heating and cooling systems:
Recommendations from the TRI-HP stakeholder process

Deliverable number: D2.3

Version 1.0

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 814888. The sole responsibility for the content of this paper lies with the authors. It does not necessarily reflect the opinion of the European Commission (EC). The EC is not responsible for any use that may be made of the information it contains.

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