# A new agenda for smart grids and user oriented studies – lessons from three demonstration projects

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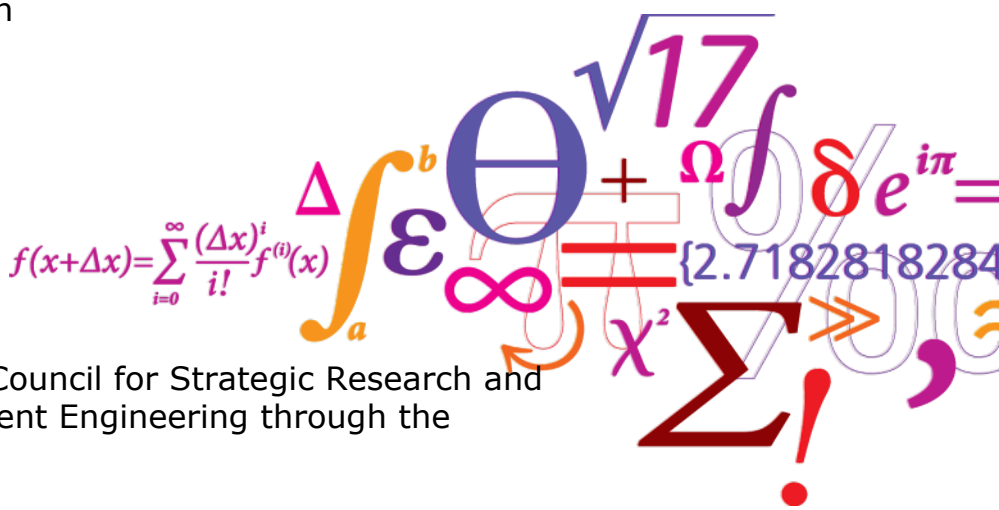

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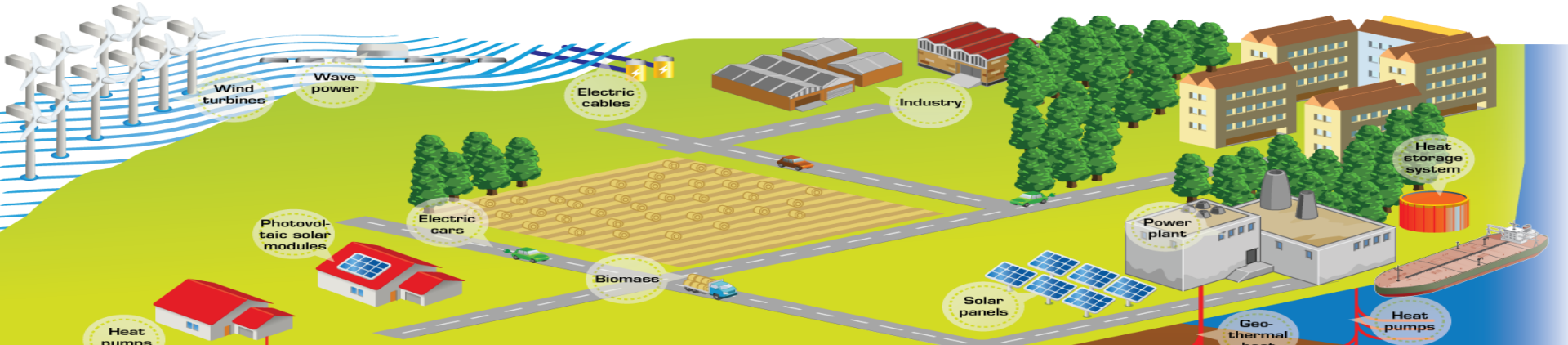
# Outline of presentation

- Background: The Danish perspectives for smart grids
- Aim
- Theoretical approach
- Empirical material
  - Eflex
  - Insero Live Lab
  - Energy Lab Nordhavn
- Results

# The smart grid in Denmark

- Smart grids: Apply information and communication technologies (ICT's) to the electricity grid
- In DK: Growing amount of wind energy requires increased national demand for 'green electricity': Danes should convert to heat pumps and electric cars
- Smart grid is implemented to intelligently manage increased electricity demand: Avoid peak loads and consume 'when the wind blows'



# The smart home and the new energy consumer

- Households should invest in heat pumps, electric cars and ‘smart homes’
- AND consume electricity with greater flexibility: E.g. wash clothes at night and get cheaper electricity

# Aim of paper

- 3 Living labs (Eflex, Insero Live Lab, Energylab Nordhavn)
- Firstly, we investigate the role that the demonstration projects grant citizens with the concept of script (Akrich 92)
- Secondly, we are interested in how the demonstration projects approach the issue of 'control' of electricity consumption in relation to the users and smart grid technologies, also based on a script analysis (Akrich 92)
- Thirdly, we study how the projects support a broader energy system transition agenda in Denmark

# Script analysis

- The paper Investigates living labs with the concept of script

The concept of script

- "*..A large part of the work of innovators is that of "inscribing" this vision of (or prediction about) the world in the technical content of the new object.*" (Akrich 92)

- On the one side there is the scripting of the technology by the designers and on the other side there is the de-scripting of the technology done by the users: "*Once the artifact is displaced into sites of use, she (Akrich) argues, the work of the user becomes one of "de-scription" of recovering from the object a coherent program of action."* (Suchman 2006)

# The eFlex project

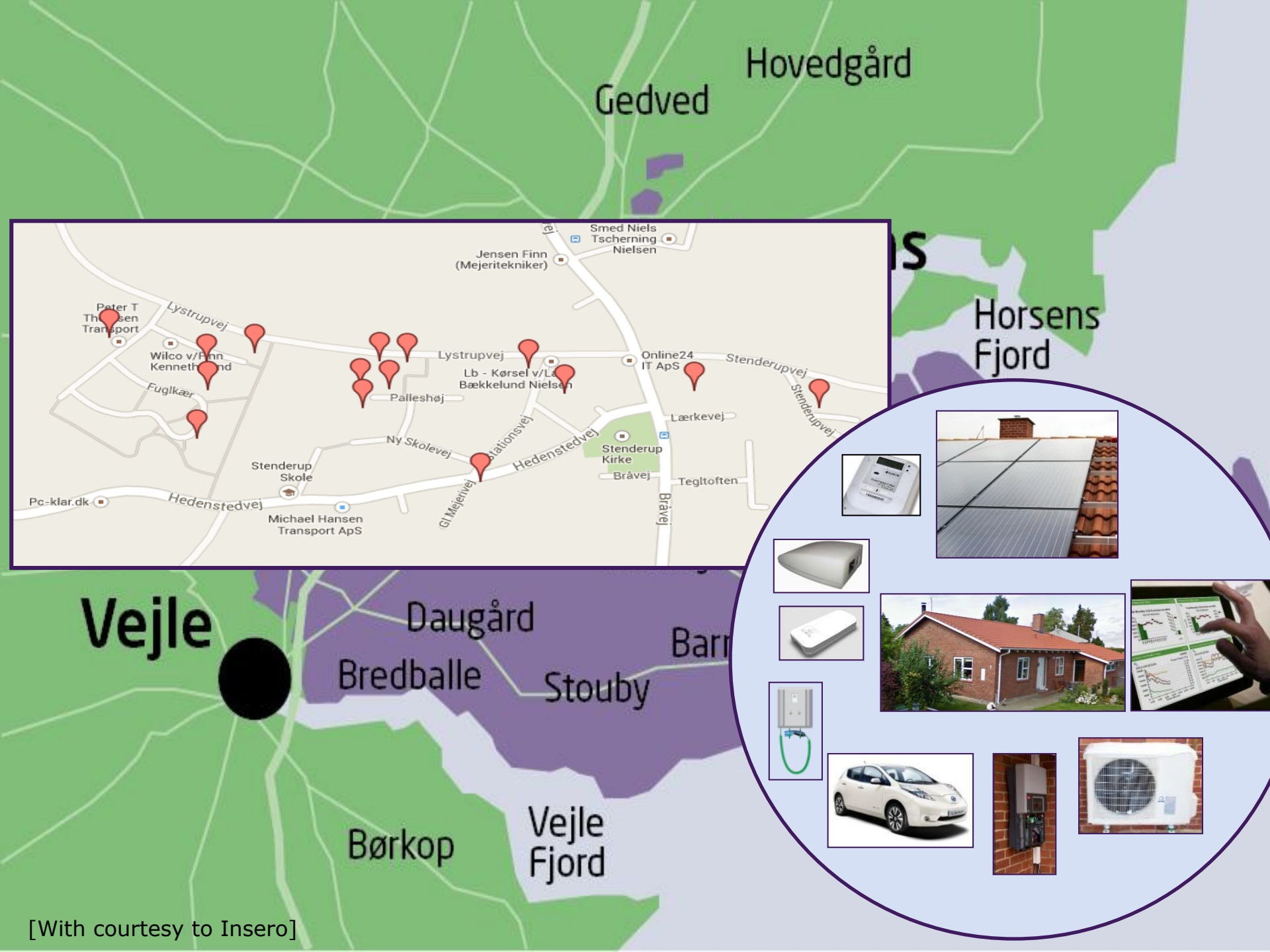
- A user oriented innovation project by DONG Energy Distribution involving 119 households
  - 81 heat pump owners
  - 9 electric car owners
  - 26 'ordinary households'
- DONG (now called Ørsted) is the leading energy company in Denmark
- Start 2010 – finished 2012
- Aim: to investigate the flexibility potential in households and motivations for becoming 'partners' in peak-shaving

# The eFlex user study

- Basic element: test smart home equipment
- Remote control by DONG Energy
- Create a new relationship (consumer <-> electricity)
- User study by 'Antropologerne' – 49 households
- Two hypotheses:
  - Home automations systems will promote flexibility
  - Price is not the only motivation

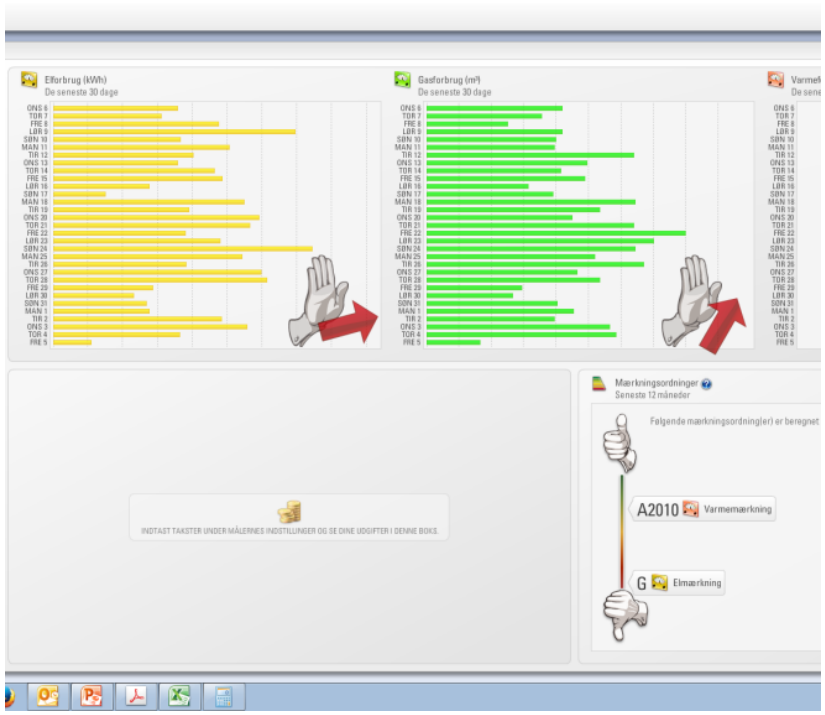
# Insero Live Lab

Illustration: Insero.com

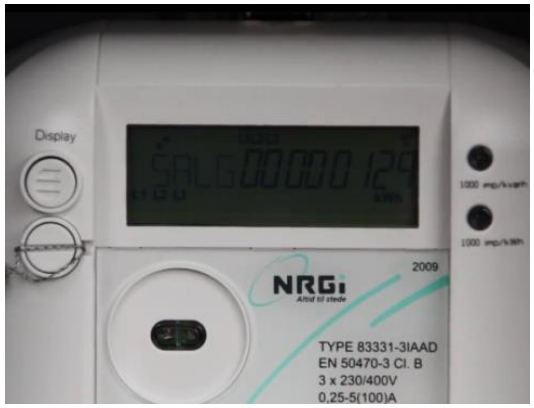



[With courtesy to Insero]

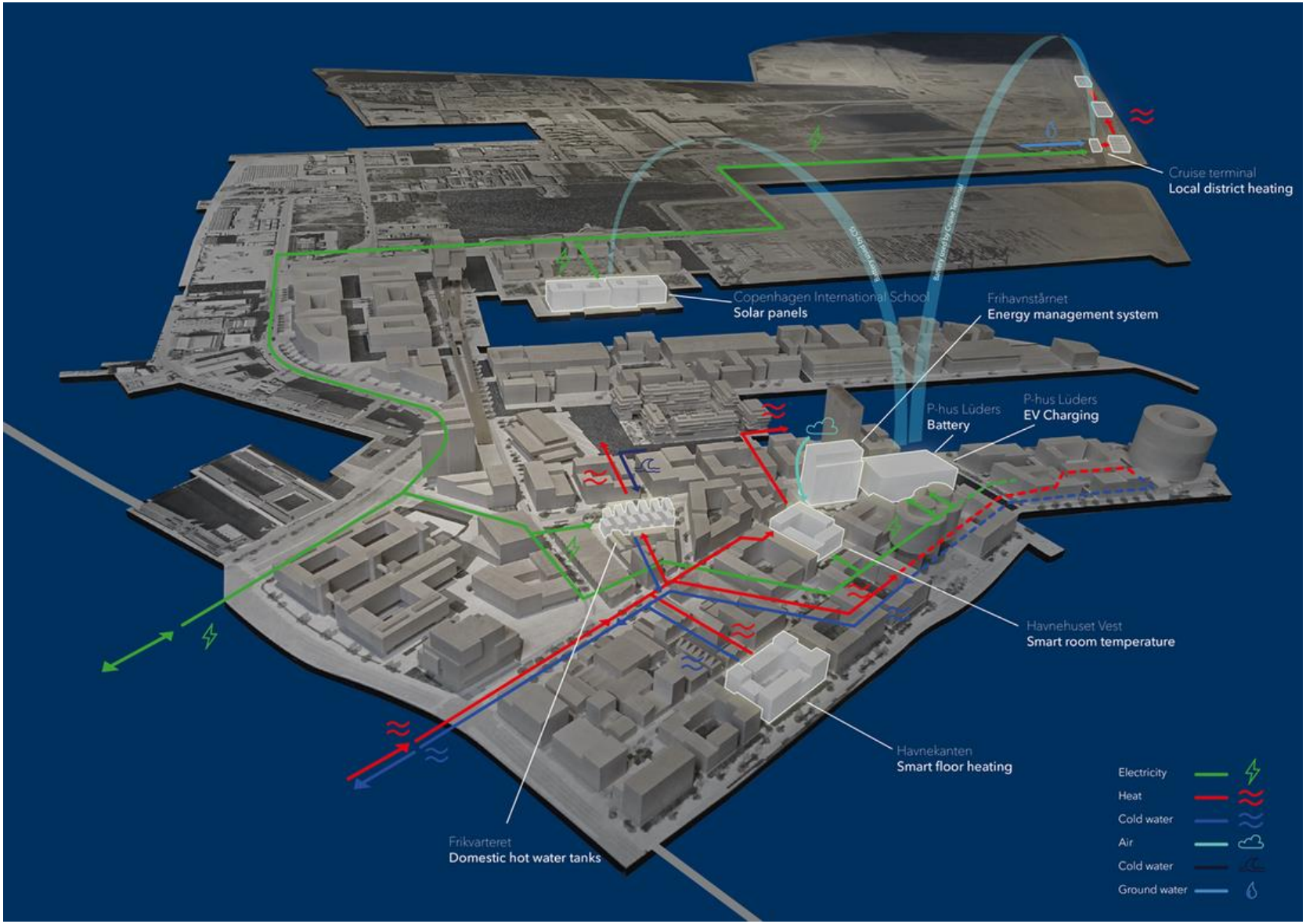
# Energy management equipment (and energy visualization equipment)





# EnergyLab Nordhavn




 http://energylabnordhavn.weebly.com/solutions1.html 

# Results (1)

*"You just unscrew the lid of the relay box and put a cord between the two legs of the resistor… it has been discussed on PODIO and I can see that several others have short-circuited the resistor just as I have". (Nyborg, 2015)*

"The most awesome thing that we could do here is to collect it, so that many units together saved the energy, so that the whole village could contribute to heating up a pool that was going to be heated anyway." (Hansen & Hauge 2017)

# Results (2)

”..the more the devices get controlled from above the less it becomes something that we feel a sense of ownership of…and there is something about having these devises yourself, I think there is something in it. That there are some technologies that you have and that you can provide yourself with energy and that you would like to control how it should work..” (insero Live Lab)

” I have a need to optimize according to my solar cells, according to what we produce ourselves, then the other thing (external control over charging and heating) is something that is being added, and I will not notice any difference..” (insero Live Lab)

# Results (3)

What is the role of the Living labs?

Previously the projects have not all been aligned with overall 'system demands'

-tariff structures not fitting the original project idea-

What needs to be done on a systems level to increase the amount of wind in the project through e.g. heating, comfort and mobility practices has been not been the center of attention

# Thank you for your time

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