

Reassembling urban infrastructure: an exploration of heating, ventilation and air conditioning repair work in times of energy transition – SNF Project (I.Strebel, A. Bovet, M. Fürst)

1. Summary of the research plan

Energy infrastructure management and servicing play a crucial role in the transition to energy-efficient buildings and built environments. A large number of actors (e.g. technicians, engineers, facility managers, call centre operators, caretakers, etc.) contribute to on-going functioning, efficiency, quality and performativity of various energy flows (electricity, gas, heat). In Switzerland, research focuses either on scientific and technological innovation of energy transition (ET) or on the behavioural and regulatory aspects of energy consumption. No research currently addresses the mutations of energy efficient infrastructure through situated practices of use, operation and servicing, which in turn re-specify the infrastructure's sustainability and durability. Against this background, this project has three objectives:

- 1) **To ethnographically record and analyse maintenance and repair work on heating, ventilation and air conditioning (HVAC) infrastructure.**
- 2) **To visually document how repair and maintenance work relates to and shapes buildings and infrastructure.**
- 3) **To develop a theoretical and methodological framework to understand repair and maintenance as steady agents of ET.**

Hitherto research shows that the following levels have to be taken in account when analysing repair and maintenance work (Bovet, Strebel and Sormani forthcoming): 1) *the worn out or broken thing* (material level); 2) *the organisational framework* (socio-technical level); and 3) *the accomplished practices* (situational level). Each of the project objectives will be worked out on three analytical levels. And in turn, each level will consist of themes, from which research questions will be derived.

ET infrastructure repair and maintenance is a very dynamic and complex field. Because of their invisible nature, repair and maintenance remain a 'missing link' (Graham and Thrift 2007) in social theory. The planned project uses theoretical concepts from various fields: *Science and Technology Studies* will be used to understand how ET infrastructures relate to extended social and geographical time-spaces; *Infrastructure Studies* will be used to understand the incremental and relational work of repair and maintenance; *Energy Research* will be used as an entry point to locate where maintenance and repair could contribute to energy transition; *Social Practice* approaches will be used to understand how workers reconfigure ET technology in their everyday work.

The project seeks to provide solid social-scientific knowledge on the unfolding work of repair and maintenance on ET infrastructures. It will develop the approach of *broken world thinking* (Jackson 2014) through research in two infrastructural settings. The first empirical focus is on *energy saving and building technology*. The project analyses care work on heat and cooling systems in office and residential buildings. The second empirical focus is on *energy transport and storage*. The project analyses models, business cases and everyday practices of repair and maintenance work on district heating and heat storage. Research in these two settings will be supplemented with mappings and diagrams that aim at visualising impact and transformation capacity of repair and maintenance on selected buildings and ET infrastructures.

Empirical investigation in the two infrastructural settings is grounded in a qualitative, case-based approach. Diagrams and maps will be produced from 20 to 30 year maintenance records of selected buildings and ET infrastructures. The research project aims at generating detailed and original factual evidence of the capacities of repair work, and also at providing the energy and building sectors with a coordinated and rigorous assessment of transformation and adaptation as qualities of energy transition.