

POLITICISED NEXUS THINKING IN PRACTISE: INTEGRATING URBAN (WASTEWATER) UTILITIES INTO ENERGY MARKETS

Background: Potential role of wastewater treatment plants (WWTP) in Germany's energy transition/markets:

WWTP offer flexibility to power distribution grids

- As yet no balancing markets in power distribution grids
- operators reluctant to accommodate new market entrants

WWTP offer flexibility to power transmission grids

- tough prequalification standards to operate in balancing energy markets >>> pooling
- Municipal utilities or traders could market virtual power plants around wastewater plant

WWTP offer flexibility to district heating network

- sewage gas used to cogenerate heat and power: surplus heat fed into local network
- dependent upon proximity of heating network, cost of new connections, cooperation of operator

Surplus electricity stored as purified sewage gas/hydrogen/synthetic gas

- Pioneers are feeding gas into regional network: resistance from incumbent gas grid operators
- Power-to-gas (storing surplus electricity from grid): currently limited given legal uncertainties

WWTP can store surplus energy and generate renewable energy in various ways, e.g. from power-to-gas to adjusting wastewater treatment processes

Literature review on Nexus Thinking Municipal companies and infrastructures are key interfaces of cross-sectoral collaboration for energy transition

- Nexus thinking advances in understanding urban infrastructures as dynamic, relational and socio-technical configurations
- Conversely, research on urban infrastructures highlights interactions between infrastructures and cities, between nature and the city and between production and consumption, but neglects interplay between different infrastructure systems
- Why, how and for whom can municipal companies act in energy transformation: as legitimate, decentral and non-profit oriented political actors?

Actor aspirations

1. Hesitant observer: waiting to see whether nexus Interventions could jeopardise core business: wary of interventions
2. Energy-optimised wastewater processor: maximising self-sufficiency, minimising costs & selling excess energy: economic feasibility
3. Inter-sectoral resource manager: enrolling municipal wastewater utilities to advance urban energy transitions: model projects

Objective/methodology Social science study to connect urban wastewater to regional energy systems

- Aspirations and experiences of 8 German cities/city-regions to enrol their wastewater utilities as so-called 'flexibility option' providers in energy markets for electricity, gas and heating
- Reality check on ideals of 'urban nexus'
- Explaining nexus practices in terms of reordering political geographies of socio-technical assemblages

Moss, Timothy; Huesker, Frank (in review): Politicised nexus thinking in practice: integrating urban wastewater utilities into regional energy markets. In: Urban Studies (Special Issue: "Interfacing Infrastructures in Cities: Politics and Spatialities of the Urban Nexus").

Conclusions

Deconstruct notion of urban nexus as win-win solutions of universal benefit and need to interpret experiences in terms of materialities, spatialities and politics of integration

Spatialities of integration

- Cities as nexus pioneers: positioning their wastewater utilities as models for cross-sectoral practices in urban energy transitions
- Beyond urban self-sufficiency: connecting renewables from cities to energy networks locally (e.g. district heating), regionally (e.g. distribution grid), nationally (e.g. pooling for transmission grid) > problems of scalarmismatch

Politics of integration

- Involvement of municipal wastewater utilities in regional energy markets politicising grids → resistance of network operators as gatekeepers
- Utilities responding by enrolling support of their cities, entering alliances with other utilities, lobbying for less restrictive regulations & market incentives

Materialities of integration

- Flows of energy and resources: understanding different kinds of energy produced at specific stages in wastewater treatment process and how these can help balance supply and demand in power, gas and heating networks
- Physical infrastructures: assessing potential connectivity between wastewater and energy networks, using ICT to measure, model and steer interactions

