POSITIVE ENERGY DISTRICTS IN NORWAY AND SWITZERLAND

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SUMMARY

By looking at different recent developments of PEDs in Switzerland and Norway, we describe the characteristics of national approaches towards PEDs. By deepening the description of two respective case studies in the two countries, we analyzed how PED approaches are implemented within the specific context. We compare the PED concepts, local implementation and functional issues to analyze the approaches. Our research is based on literature and document analysis and qualitative interviews.

The results show that different implementation concepts require different measures. From the analysis of the results, the conclusions are that integrated energy planning is more important than ever. Understanding the different dimensions of sustainable development in combination with energy supply and consumption is important to plan and realize settlements that not only contribute significantly to reducing energy consumption and securing the location of energy infrastructure (generation, distribution, storage), but also in terms of long-term sustainable development and specifically climate neutrality. shows/highlight the importance of integrated and cross-sector approaches of PEDs that are implemented and operated in multi-stakeholder settings.

INTRODUCTION

Reaching for the Global Sustainability Goals, urban areas play a crucial role, as they are identified as the main area for global emissions. Cities do play a prominent role to put global goals into local policies and means and at the same time embedding it in local context with site specific demands and settings. The Positive Energy District (PED) concept is currently evolving based on the Strategic Energy Transition (SET) plan of the European Union member states and contributions from different initiatives. As the first PEDs are developing all over Europe, we have little knowledge on how the PED concept is implemented nationally and how first PED projects develop within the specific national contexts. Tables 1 and 2 give an overview of the projects. We asked several questions, such as: What are the concepts and approaches towards PED developments in Switzerland and Norway? What are the implementation strategies and how are functional issues addressed?

TABLE 1: DEMO SITES FOR ZERO EMISSION NEIGHBOURHOODS IN NORWAY

Demo site	location	Type of area	Area size (m^2)	Project owner	further information
Ydalir	Elverum	Brownfield	430 000	Public	Residential area with a school and kindergarten
Furuset	Oslo	Mixed-use neighbourhood with local centre	870 000	Public	Retrofitting/upgrading and new construction: 1 700 – 2 300 dwellings and 2 000 – 3 400 workplaces (up to 160000 m^2)
ZVB	Bergen	Greenfield	378 000	Private	Residential area with 720 dwellings (92 000 m^2), a kindergarten and additional service functions
NTNU Campus	Trondheim	University Campus	339 031	Public	Retrofitting and new construction (ca. 136 000 m^2)
Sluppen, Trondheim	ZEN/ +CxC	Mixed use area, mainly commercial	275 000	Private/ Public	Multifunctional local centre with a mobility hub, residential area, offices,

					warehouses; incl. retrofitting and new construction
Evenstad Campus	Evenstad	University Campus	61 000	Public	Optimisation of energy system
New City – New Airport	Bodø	Former airport	3 400 000	Public	Multifunctional city quarter with residential and business areas; 2 800 dwellings in first construction stage
Fornebu	Bærum	Former airport	3 400 000	Public	Multifunctional city quarter, ca. 265 000 m^2 existing building stock with ca. 3 700 new dwellings
Mære	Steinkjer	Agricultural school	18 000	Public	Optimisation of energy system and control

TABLE 2: DEMO SITES FOR 2000-WATT-SITES IN SWITZERLAND

Site	**Location**	**Certification**	**Area size (m2)**	**Achieved**	**Further information**
«Erlenmatt West»	Basel	2017 (re)	25 600	66%	http://erlenmatt-west.ch/
«Stöckacker Süd»	Bern	2020 (re)	1 750 000	74%	http://www.stoeckackersued.ch/
«Burgunder»	Bern-Bümpliz	2017 (op)	7 660	61%	https://www.npg-ag.ch/projekte/siedlung-burgunder/
«Im Lenz»	Lenzburg	2018 (re)	61 400	63%	https://www.imlenz.ch/de/home
«Freilager»	Zürich	2018 (re)	7 050 000	74%	https://freilager-zuerich.ch/
«Hunziker Areal»	Zürich	2017 (op)	41 000	75%	https://www.mehralswohnen.ch/
«Kalkbreite»	Zürich	2021 (re)	6 393	89%	https://www.kalkbreite.net/
«Sihlbogen»	Zürich	2017 (re)	2 100 000	64%	https://www.bgzurlinden.ch/home
«City West»	Chur	2020 (tr)	26 500	57%	https://www.citywest-chur.ch/
«AXA»	Winterthur	2019 (tr)	32 000	63%	https://www.rwpa.ch/axa-gebaeude-g
«Campus Sursee»	Oberkirch LU	2019 (tr)	142 065	67%	https://www.campus-sursee.ch/2000-watt-areal/
«UNIL Dorigny»	Lausanne	2019 (tr)	90 000 000	65%	https://www.unil.ch/index.html
«Campus Mythenquai»	Zürich	2019 (tr)	22 908	68%	https://www.swissre.com/about-us/our-global-presence/campus-mythenquai.html

(op) in operation
(re) in operation, re-certifiied
(tr) in transformation

RESULTS

We introduce the two concepts for PED development in Norway and Switzerland and present our findings within the three dimensions Concept and approach, Implementation (Pilots) and Functionality. We present the findings for each dimension and in relation to the Norwegian and Swiss Case. More detailed results will be further elaborated in the full paper.

CONCLUSIONS

Two different concepts of PEDs are introduced. The differences between the two concepts was analyzed along the three dimensions Concept and approach, Implementation (Pilots) and Functionality.

The 2000-Watt Site certificate creates added value for all stakeholders – for investors, planners, users, law enforcement agencies and authorities: users enjoy a high standard of housing and living. They can live with the assurance that they are contributing to resource conservation and climate protection. Investors and owners are interested in value-preserving sites offering a high quality of living and working. The quality characteristics are useful for marketing and image-building. Due to the high level of acceptance, cooperation with authorities is much easier.

The ZEN demo sites are all part of a larger research initiative and thus a progressive academic environment. Previous research projects with ambitions goals have shown that on the technical side it is relatively easy to get new technology used, especially when their economic benefits are communicated. It is more complicated to ensure that social practice is implemented. This implies a societal acceptance of the goals and that individuals follow those goals.

In a typical district, there will exist several heating, or cooling loops and many electrical subdivisions (distribution boards) on top of various end uses of energy. The different concepts are explained in more detail in Haase (2020).

The energy related operation processes are usually in the control of facility managers and technical staff of each building. Multi-owned districts often lack professional skilled workers. A multitude of performance indicators can be related to this structure. Some performance indicators are important in the design and commissioning of the systems, others are of use in the day-to-day running of the buildings.

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