

Netto-Null – Lösungen für eine nachhaltigere Welt

HSLU Hochschule Luzern

Technik & Architektur

Achieving the Energy Transition using inter and transdisciplinary methods

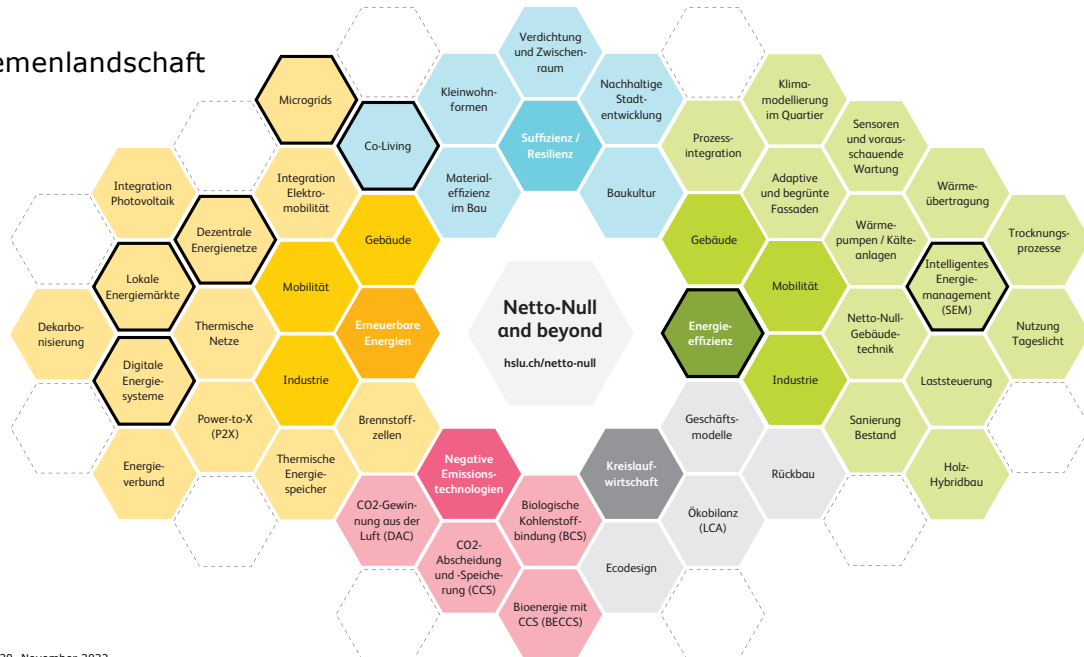
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FH Zentralschweiz



Themenlandschaft



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Folie 2

Agenda

Local energy communities

- Concept and governance
- Smart services for local energy communities

Citizen empowerment within LEMs

- The living lab approach
- Overview of research in Europe

STRUCTURE
Architecture & Design

GOVERNANCE
Rules & Regulation

TRANSACTIONS
Contractual Arrangements:
Participation Models

Transmission grid

MicroGrid
Co-owned generation & storage plants

Wind turbines, PV, Biofuels, Hydro, Storage

Construction & operation, Control

Distribution grid

Flexibility, Demand-side management

LECs in different Institutional Environments

Public Authorities, Households (different demographics & levels of digitisation), Corporations (public / private / RECs, Civil Society Networks)

Local energy communities

Concept and governance

- Communities that generate, store and consume their own electricity;
- Their operation is based on a set of principles emphasizing voluntary and democratic participation;
- Owned by their shareholders or members and their aim is to generate economic, social and environmental gains for their members, not exclusively financial profits;
- Decision-making power must be distributed equitably among the stakeholders involved.

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The diagram illustrates a 'Local Energy Market' as a central hub. It features a network of icons representing 'Consumer' (red circles) and 'Community' (black circles) connected by lines. This network is situated within a larger circle labeled 'Smart services'. To the right, a power line tower labeled 'Grid' is connected to the market. A callout box points to the network with the text 'Social Benefit & Behavioral Adaptation'. A legend at the bottom identifies the red circle as 'Consumer' and the black circle as 'Community'.

Local energy communities

- Different types of smart services can be offered in an energy context
- Complete smart-integration of electric vehicle charging and heat pumps leads to flexibility-business cases allowing users earn/save money.
- Information systems enable the emission of certificates of origin, giving users more power to choose the electricity mix of their preference
- The use of smart services and web-based platforms can result in stronger community ties.

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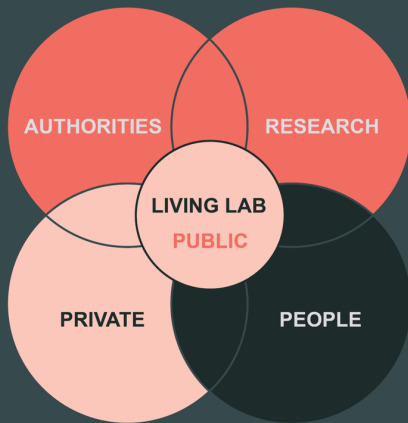
Local energy communities

Smart services and links to citizen empowerment

- Smart meter data can be used in demand prediction, as a first step toward demand side management in grids, and for the optimization of conventional power generation.
- An accurate demand prediction allows the DSO to inform users of flexibility costs, ahead of time, which can lead to behavioral changes in end use customers
- Regular information on personal energy usage can have an effect on consumption.
- Effectiveness of data driven information campaigns can be investigated in so called "Living Labs".

Citizen empowerment within LECs

The Living Lab approach



"User-centered, open innovation ecosystems based on systematic user co-creation approach, integrating research and innovation processes in real life communities and settings"

A Living Lab is composed of many stakeholders within a Quadruple Helix Model working together in a public-private-people-partnership (PPPP)

Source: Schuurman, 2015.

3 Levels of Research in Living Labs

	Definition	Research aspect
MACRO	Living Lab constellation consisting of organised stakeholders (PPP-Partnership)	Open Innovation: Knowledge transfers between organizations
MESO	Living Lab innovation projects using Living Lab methodologies	Open & User Innovation: Real life experimentation, active user involvement, multi-method and multi-stakeholder
MICRO	Tools and activities linked to the stakeholders' assets and capabilities	User Innovation: User involvement & contribution for innovation e.g. co-design

Transdisciplinary research within LEMs is conducted at the MACRO (neighbourhood), MESO (buildings) and MICRO (households) levels.

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Citizen empowerment within LECs

The diagram is a 2x2 matrix with 'Interest' on the vertical axis and 'Power' on the horizontal axis. The quadrants are: Top-Left (Subject), Top-Right (Empower), Bottom-Left (Crowd), and Bottom-Right (Context & Setters). Arrows indicate transitions: from Subject to Empower, from Crowd to Context & Setters, and from Context & Setters to Empower. A diagonal arrow points from the bottom-left towards the top-right.

- allows to determine who are the “context setters” to engage, who are the “subjects” interested and to empower them and who are already the “players” with power and the “crowd” not interested nor empowered
- The analysis is done before and after the intervention to measure empowerment

Power-Interest Matrix (Adapted from Eden and Ackermann, 1998).

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Citizen empowerment within LECs

CO-CREATION

The CO-CREATION cycle consists of four stages: CODESIGN (Goal: Empowerment), DISSEMINATION (Goal: Engagement), EXPLOITATION (Goal: Empowerment), and COMMUNICATION (Goal: Awareness). A central 'METHODOLOGICAL STUDY' (Goal: Impact Assessment, Definition of KPIs for each LL scenario → protocol) is connected to all four stages.

PROTOCOL ASSESSMENT

The PROTOCOL ASSESSMENT process starts with 'Setting the context' leading to 'LL scenarios' (represented by a cluster of red dots). This leads to a 'Methodological study' which identifies 'KPIs criteria' and 'Metrics/evaluation criteria'.

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H2020 Projects

Examples of energy and climate projects using the Living Lab Approach

- the oPENLab Project on Positive Energy Neighborhoods in establishing three Living Labs in Belgium, Estonia & Spain ;
- the SCORE Project on Smart control of climate resilience in European coastal cities is establishing 11 Living Labs;
- the 2iSECAP project on Institutionalized Integrated Sustainable Energy and Climate Action Plans to engage civil society towards energy transition;
- domOS Project on Operating System for Smart Services in Buildings.

HSLU Projects

Examples of energy and using the Living Lab Approach

- the LANTERN project on Living Labs approaches for the energy transition;
- the eNET project on establishing local energy markets;
- the GENTE Project on Distributed Governance for Green Energy Communities in Switzerland, Spain, Turkey and Sweden;
- ENFLATE on Enabling flexibility provision by all actors and sectors through markets and digital technologies.

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World Café

Establishing a Living Lab within the LEC context

