



Schweizerische Eidgenossenschaft  
Confédération suisse  
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Confederaziun svizra

Federal Office for Civil Protection



# Energy and Climate Action Plan 2030

## *Use of civil protection shelters as self-sufficient energy supply systems in urban areas*

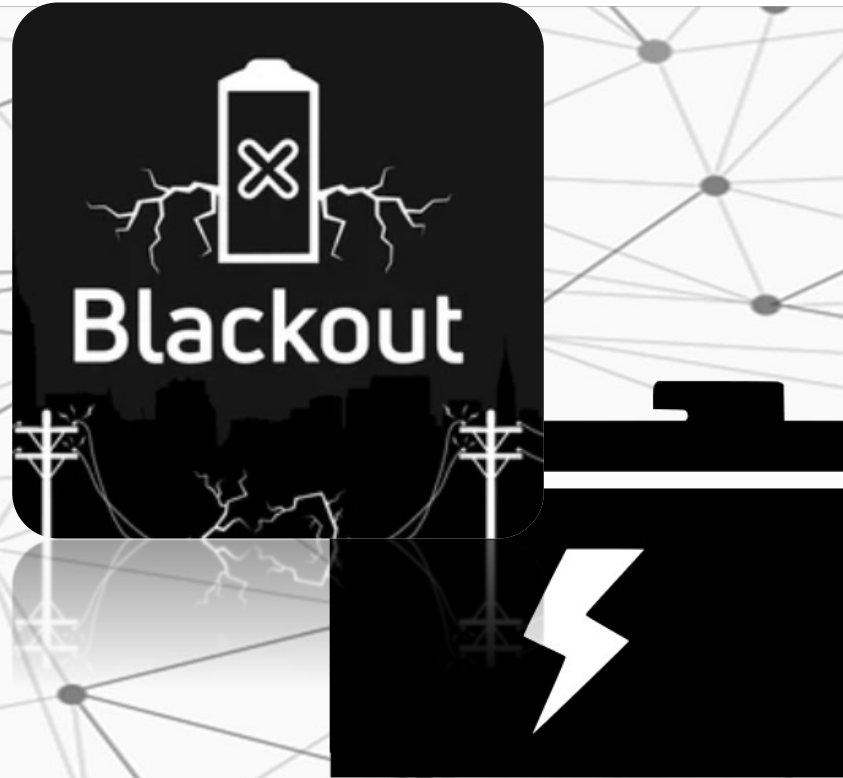
EPFL Lausanne, October 7, 2024 Dr Roland Bollin, FOCP



**EPFL**



# Project: Electricity self-sufficiency for disaster management



Goal: To provide power to civil protection partners in the event of a long-lasting blackout.



# Initialization: urban space, three work packages

Identification of users and their electricity needs

Identification of electricity producers in the study area

Analysis and special features of the electricity network



## Project basics

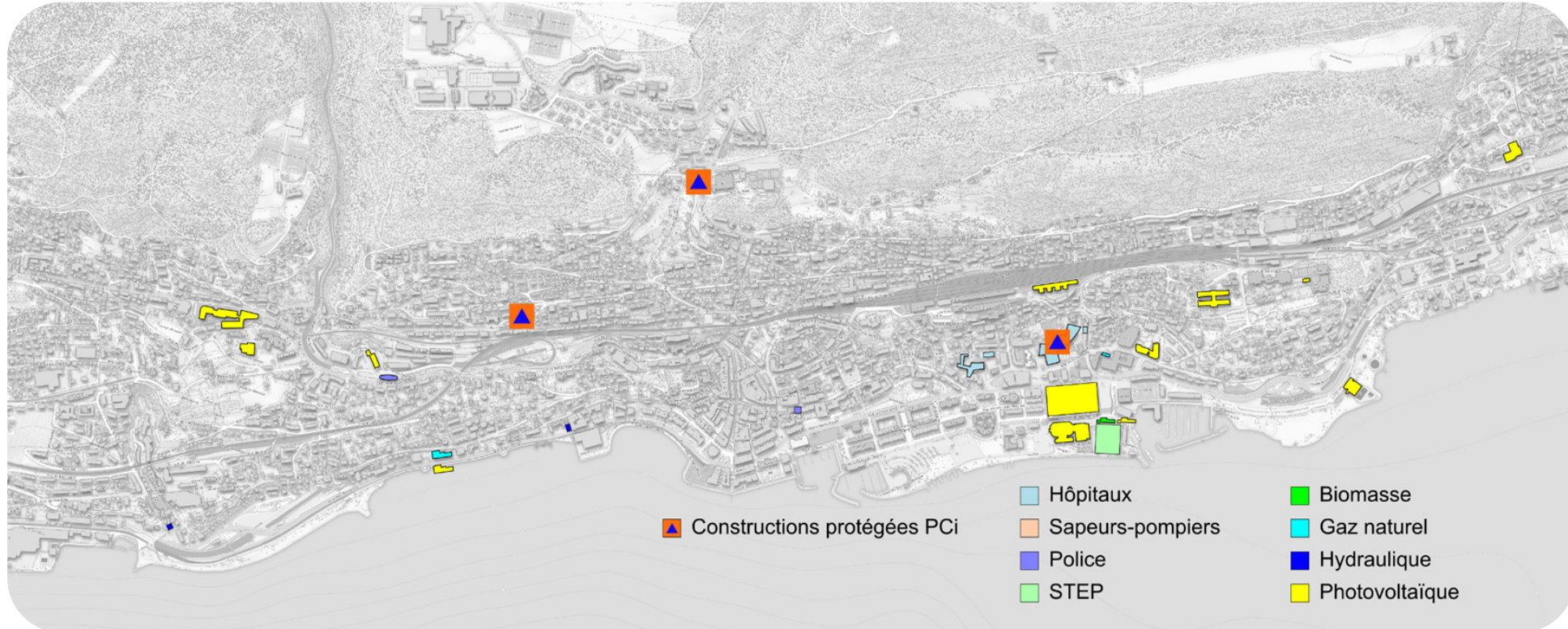
- ➔ 20 Users crisis management
- ➔ 20 Producers
- ➔ Use existing infrastructure
- ➔ Decentralized control



# Users and producers in Neuchâtel

Hes·SO

haute école  
neuchâtel berne jura **arc** ingénierie  
www.he-arc.ch

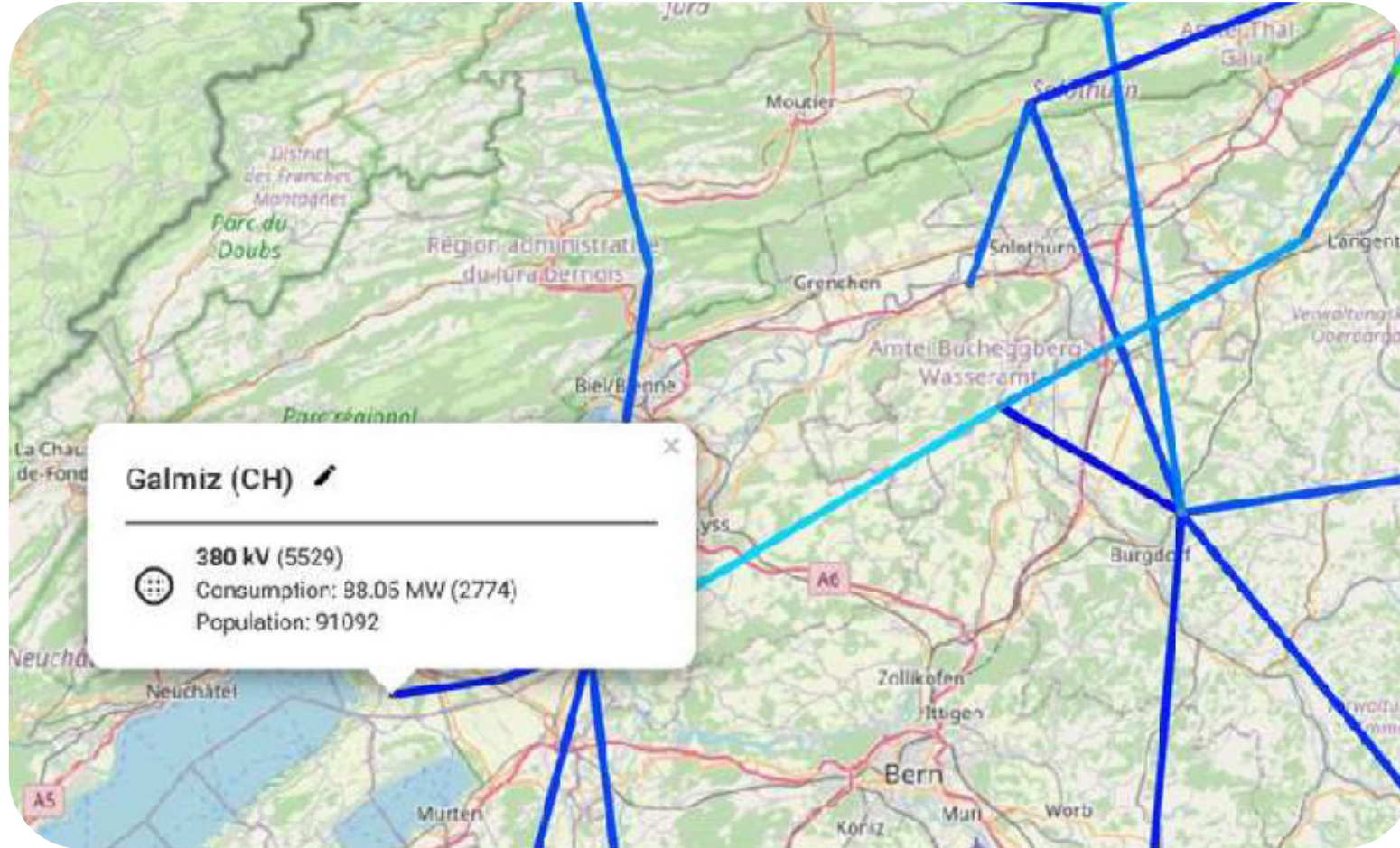


## production plants and shelters

4 different types: hydroelectric (2), biomass (1), natural gas (1) and photovoltaic and shelters as self-sufficient energy supply systems

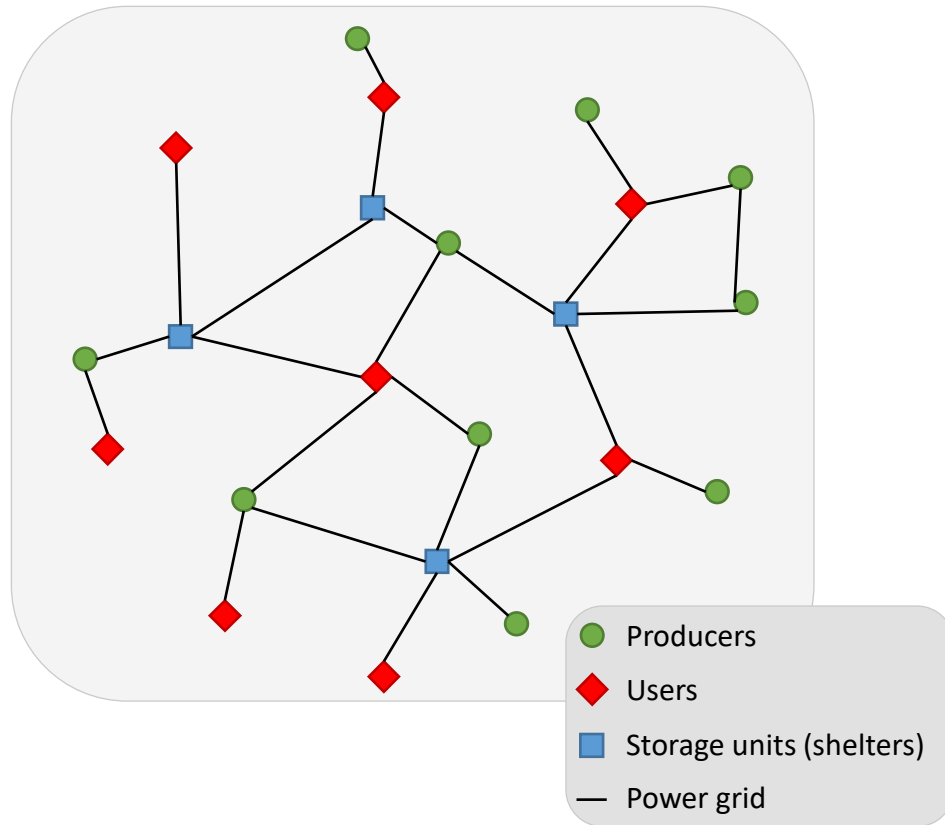


# Network analysis





# Concept idea



## Basics

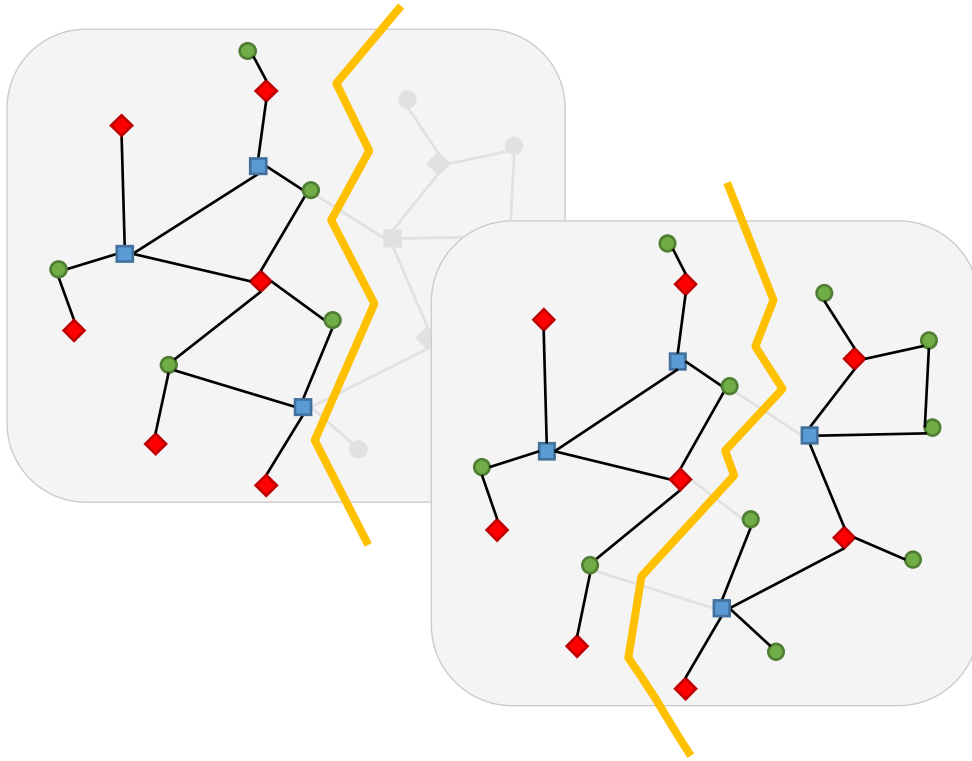
- The sum of energy available to the storage units must be stored in each unit.
- Inspired by communication in mobile networks.
- If the unit controlling the system is no longer able to perform its service, the next unit in the hierarchy takes over the leading role.

Producers, users or storage units must be able to be integrated into the system dynamically (without major adjustments).

- A picture of the network status must be available with very low latency.
- An AI must should control the system: Tasks
  - ✓ Identifying the state of the network
  - ✓ Summarizing what is available
  - ✓ Making forecasts of consumption and production
  - ✓ Adjusting performance



# System robustness and next steps



*It must be possible to partially damage or cut the network into several pieces and still be able to function.*

## ***Next steps***

***Database: consumption, production, electrical network***

1. Commissioning
2. Business model operation peace times
3. Basic scenarios
4. Control modules