CGES
Coalition for Green Energy & Storage

EPFL ETH zürich PAUL SCHERRER INSTITUT PSI Empa Materials Science and Technology

Addressing the energy crisis in a sustainable way

Faced with a combined energy and climate crisis, Switzerland must act to transform its energy system. With partners and donors from science and industry, ETH Zurich and EPFL together with PSI and Empa are setting up an ambitious initiative to develop scalable solutions for a climate neutral and independent energy system.

The challenge: A combined energy and climate crisis

While renewables are key in enabling the energy transition, there is a decorrelation between production and demand. There is significantly more electricity supply from renewable sources in the sunny summer months - where demand is low - than in the winter - where the situation is reversed. This leads to a so-called "**seasonal energy gap**"., which calls for the pressing need for effective seasonal energy storage.

Enhanced seasonal and transfer capacities would mitigate important risks linked to the energy crisis. For example, a power shortage in Switzerland is estimated to cost 100 billion CHF. Switzerland is also strongly relying on import from neighboring countries.

Mitigating **climate change** and increasingly volatile geopolitical stresses require a radical shift away from fossil fuels. In parralel, energy provision needs to respond to the needs of Switzerland's population to grow by **between 1 and 3 million persons in the next 30 years**.

The proposed solutions to address these challenges could contribute to the **future decentralized conversion, storage and transportation of low-carbon energy** across the globe.

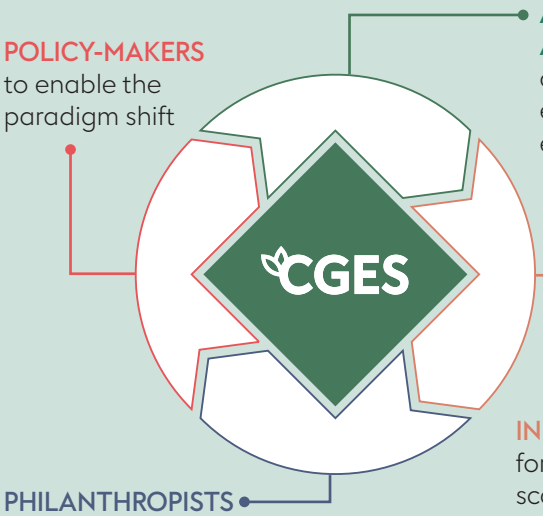
7 TWh
OF SEASONAL ELECTRICITY GAP CORRESPONDS TO 70 MIO TESLA MODEL S

100
BCHF ESTIMATED COST OF A POWER SHORTAGE IN SWITZERLAND

Coalition

In order to **reach our goals and leverage numerous existing efforts in the field** we need to join forces and bring together experts in the energy transition.

We believe a coalition is needed, including:



ETH Zurich and EPFL value-add

As energy science powerhouses for Switzerland and worldwide, ETH Zurich, EPFL and the other institutions of the ETH domain have the expertise to tackle this huge challenge.

We we will develop several so-called "catapults" in Switzerland **to test and demonstrate cutting-edge technologies**, and to then scale them rapidly.

EPFL and ETHZ currently count:

150 RESEARCH GROUPS ACTIVE IN THE FIELD OF ENERGY

460 RESEARCHERS ACTIVE IN THE FIELDS OF ENERGY STORAGE AND CARBON CAPTURE

4 START-UPS FROM THE LABS ARE ACTIVE IN THE FIELDS OF GREEN ENERGY STORAGE AND CARBON CAPTURE

Project goals and objectives

Setting up an ambitious infrastructure to assess and demonstrate how Switzerland can achieve an efficient, climate neutral energy system:

- Build seasonal storage demonstrators to advance Swiss technology research & competencies.
- Leverage and develop current infrastructure and use of existing knowledge to develop promising emerging technologies to be brought at scale within a few years to raise efficiency and cut costs.

Activities

We aim to build **"catapults"** that will bring all actors together to accelerate development and champion the challenge around specific fields.

Specific fields, for example:

- Seasonal storage and transportation
- Carbon capture and storage technologies
- Supply security
- Combined with **Power-to-X technologies**.

Each catapult is foreseen to include:

- Medium- to large-scale demonstrators
- R&D Platforms for optimization and cost reduction of the technologies, possibly using demonstrators' infrastructure

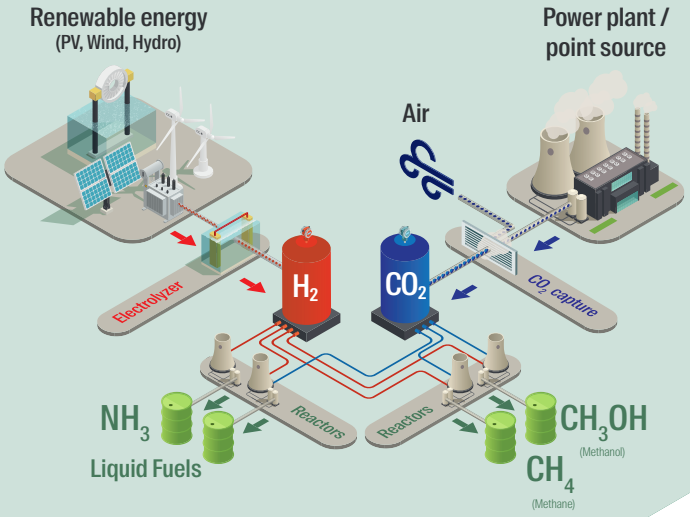
Catapults should lead to scalable technologies that can ideally be used to fill the seasonal electricity gap.

Power-to-X (P2X)

Central contributions are expected from P2X technologies, i.e. **turning electricity into carbon-neutral synthetic fuels and gases such as green hydrogen (H_2) and methane (CH_4), including cases for carbon (CO_2) capture** and utilization and the integration in the Swiss electricity grid.

Through use of renewable energy and CO_2 reutilisation, **P2X unlocks carbon neutral solutions**.

P2X is one of the **only solutions for long-term renewable energy storage**.



Timeline

May 2023:
Bringing together interested partners

June 8-9 2023:
Announcement and presentation at the Swiss Economic Forum

End 2023:
Creation of the coalition

Early 2024:
Start of the projects

2028:
Demonstrators up and running

Next steps

- Build-up a coalition of engaged industrial and scientific partners as well as policy makers willing to **actively contribute to the Coalition for Green Energy and Seasonal Storage** to solve the above-mentioned challenges
- Define, together with all coalition partners, the specific projects that will be set up at scale within 5 years

Estimated budget

Phase 1: **100 MCHF**

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Invitation to partner

ETH Zurich and EPFL invite you to join this coalition. We look forward to your commitment. Please contact us at:

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