

# Joint Activity White Paper Power to X



## Motivation

Against the background of a growing share of intermittent renewable energy (wind and solar energy technologies), the challenges of grid balancing are expected to increase in future:

- Temporal balancing arises due to the inevitable mismatch between renewable electricity production and demand (day/night cycles, weather effects and seasonal differences).
- Spatial balancing is necessary resulting from a possible mismatch between locations of electricity production and consumption.

Energy conversion technologies with storage, such as Power-to-Product (P2X) technologies, represent potential solutions for this multi-dimensional balancing challenge and to enhance the energy system's flexibility.

## Objective

The objective of this project is to

- collect the major existing P2X knowledge and
- provide a synthesis and evaluation of P2X technology in the Swiss energy market.

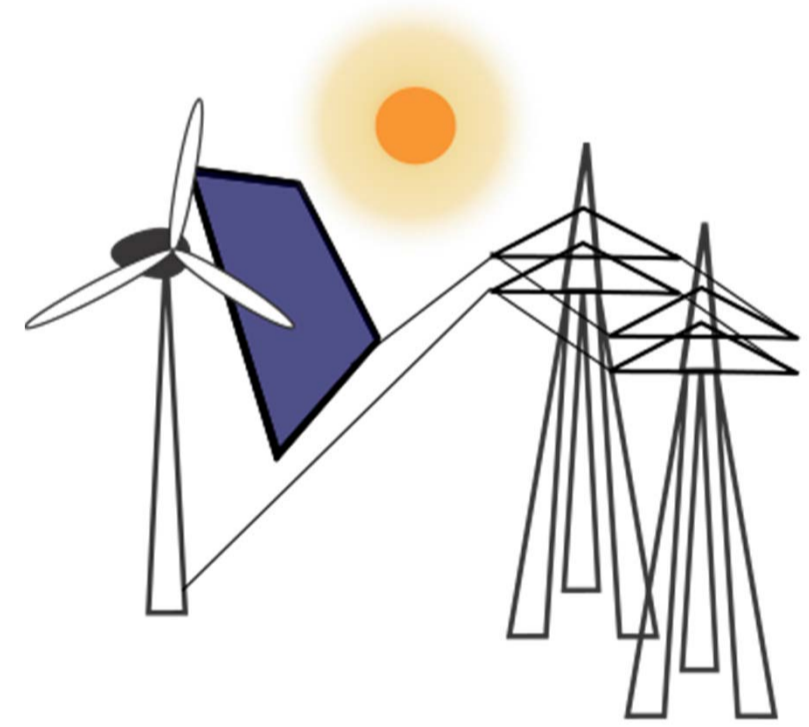
**Based on existing literature**, the project aims to derive a

- technical, economic,
  - environmental and
  - legal/regulatory
- assessment of P2X in the energy system, the gas market, the mobility sector and the electricity market. The result of this project is expected to serve as a guideline and support for policy makers on the role of P2X technology for achieving the envisaged emission targets and the power supply targets set under the Swiss Energy Strategy 2050.

## Structure

### Power System Perspective

- Present and future situation
- Grid stability
- Ancillary services
- Requirements for sizing and siting of P2X in electrical grids
- Techno-economic analysis with focus on market integration

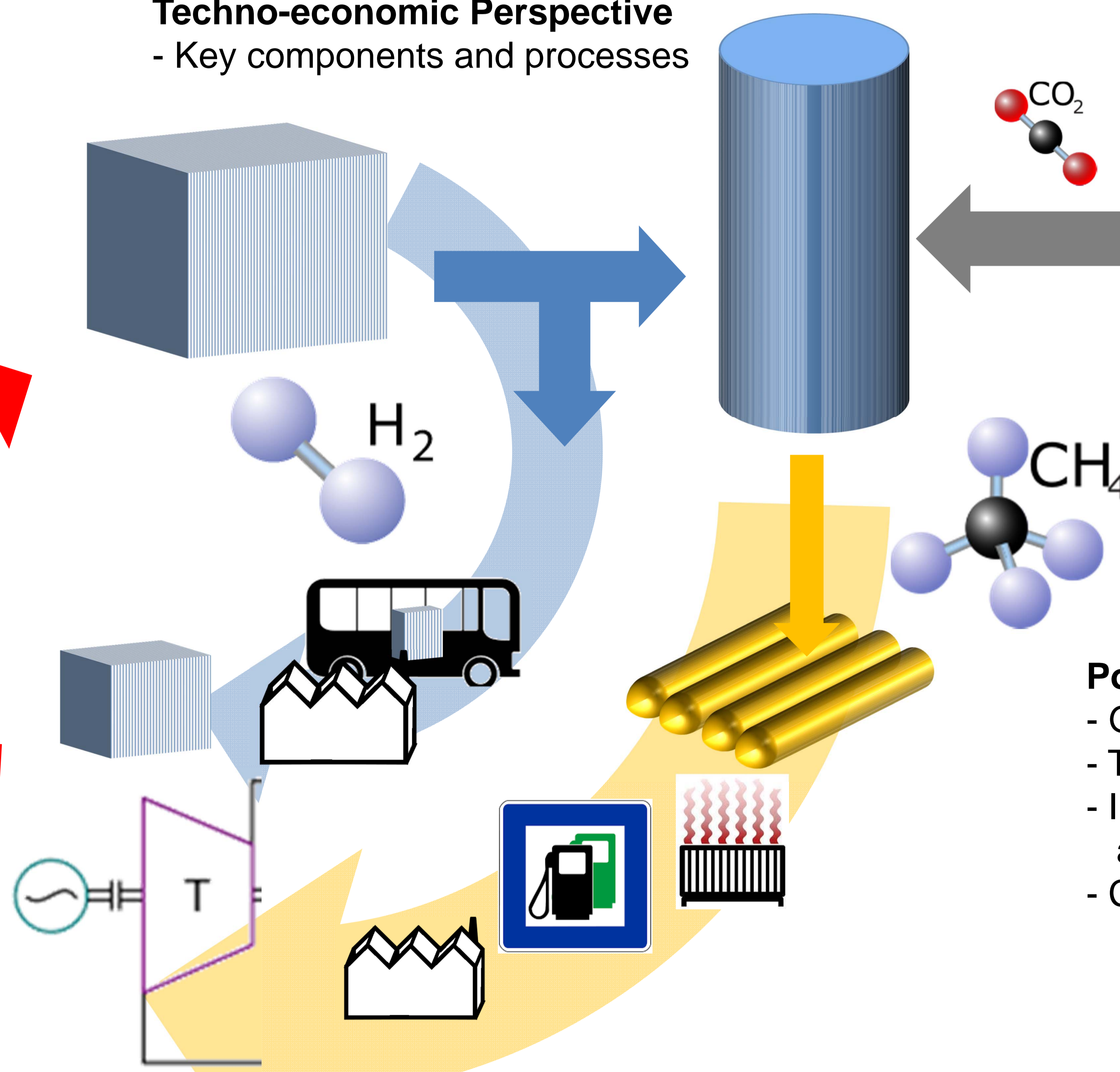


### Technology Overview

- P2X pathways

### Techno-economic Perspective

- Key components and processes



### CO<sub>2</sub> Sources and Markets

- Biogenic
- Industrial
- Direct Air capture

### Power Market Analysis

- Gaseous fuels CH<sub>4</sub>, H<sub>2</sub>
- Transport sector
- Industry sector H<sub>2</sub>, CH<sub>4</sub> as feedstock
- Combined revenues

### Regulatory Perspective

- Law affecting all P2X systems
- Law affecting P2X in the markets
  - Electricity
  - Transport
  - Heating
- Innovation policy

### Environmental Perspective

- LCA (incl. use of product as relevant and possible)
- Compare P2X with conventional technology

## Collaboration Partners

