

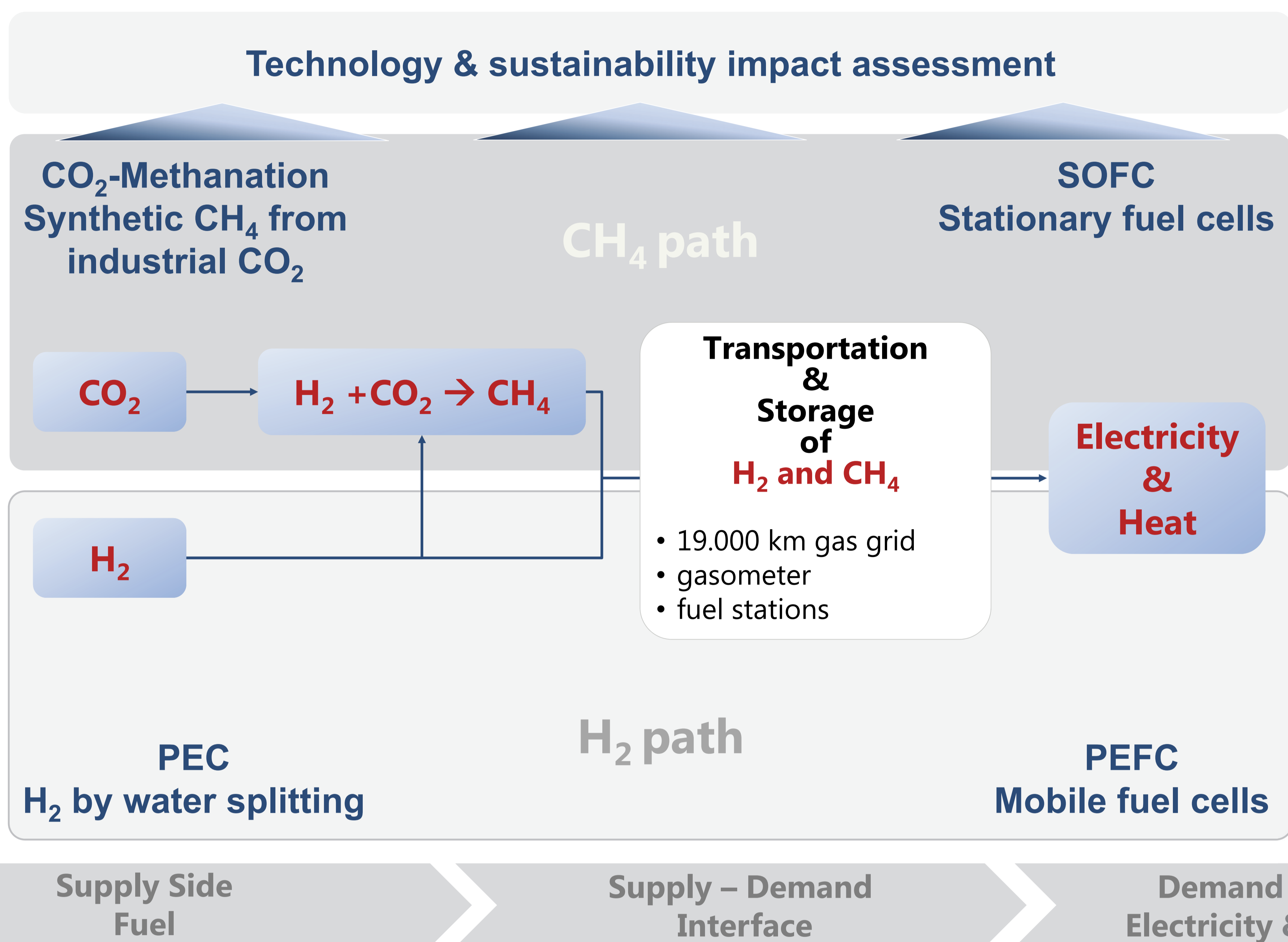
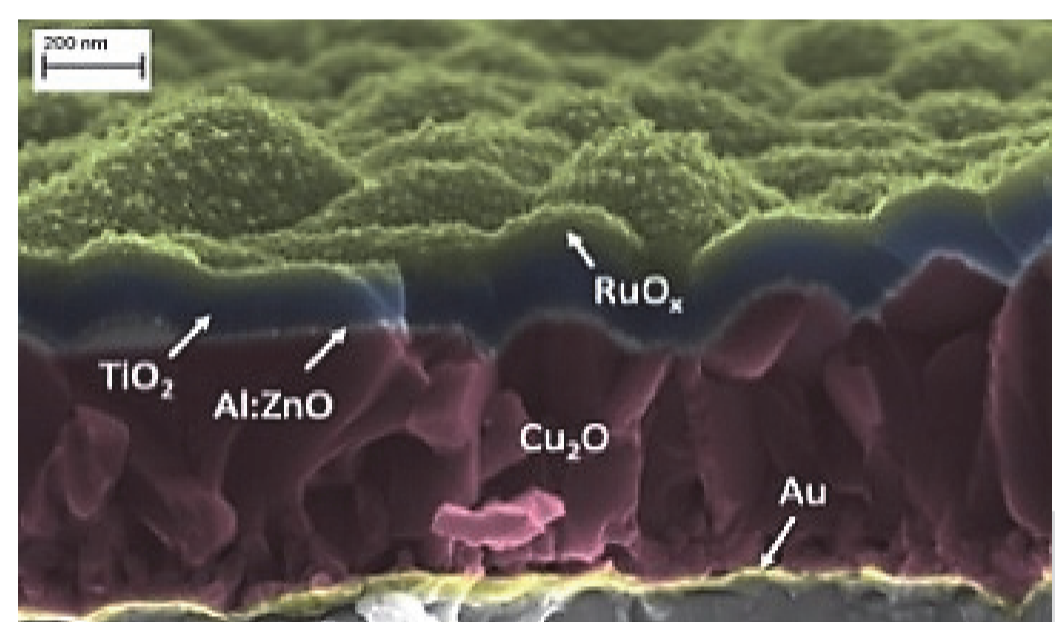
## Joint project: CO<sub>2</sub> Reduction & Reuse – Renewable Fuels for Efficient Electricity Production

### Overview



Conversion of exhaust CO<sub>2</sub> from cement plants with H<sub>2</sub> for the large scale production of synthetic CH<sub>4</sub> as storable energy carrier

Direct conversion of sunlight into renewable H<sub>2</sub> by photoelectrochemical water splitting



Electricity & heat from renewable CH<sub>4</sub> and H<sub>2</sub> for domestic applications

Electricity from renewable H<sub>2</sub> for mobile applications



### Main industrial partners

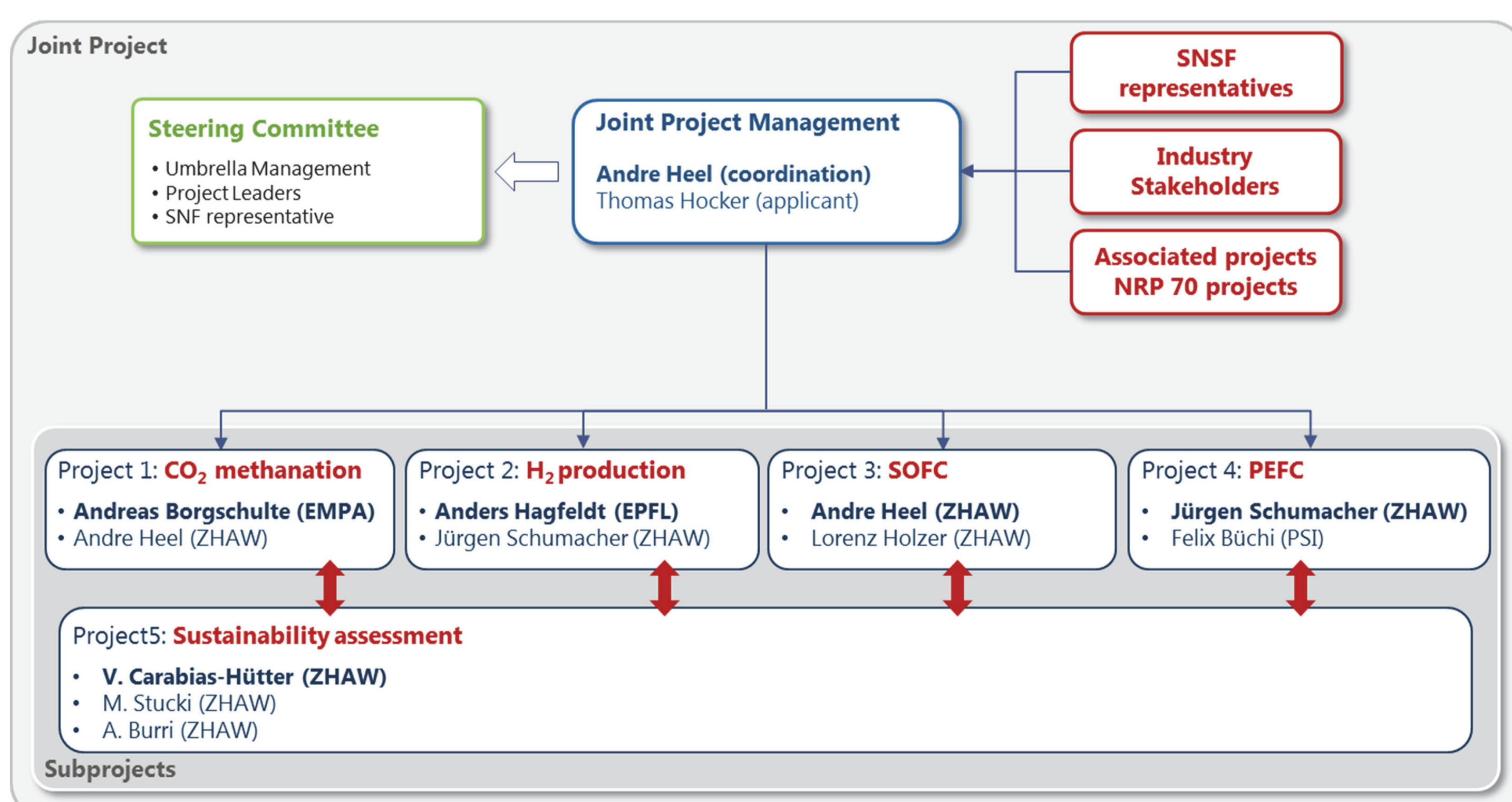


### Technical Objectives

- H<sub>2</sub> production from solar energy by photoelectrochemical water splitting
- Efficient catalytic methanation of CO<sub>2</sub> from cement industry
- Electricity supply from renewable H<sub>2</sub> for mobile applications
- Electricity & heat supply from renewable fuels with stationary fuel cells
- Sustainability and technology assessment of the value chain

### Subprojects

#### Organizational Chart and Subproject Interaction



Organizational chart with project partners, scientific responsibilities, interaction between research partners, industries, stakeholders, the programme coordination (SNSF) and other NRP 70 associated research projects.

### Energy Turnaround

#### Our Vision

**Reduction** of locally available large scale amounts of energetic “value-free” but unfavourable CO<sub>2</sub> emissions from cement plants:

- 2.6 million tons of CO<sub>2</sub> per year
- 7% of Swiss CO<sub>2</sub> emissions

**Renewable H<sub>2</sub> production and catalytic conversion and valorization of industrial CO<sub>2</sub> to CH<sub>4</sub>** would allow storage of excess energy as synthetic fuels in the Swiss natural gas grid. Moreover, it is focused on a replacement of conventional combustion technologies by highly efficient mobile & stationary fuel cell technologies and grant access to renewable or biogenic resources, to further reduce CO<sub>2</sub> emissions.

#### Our Contribution

This joint project meets and contributes to the key aspects of the «Swiss Energy Turnaround» concept. It covers an **energy value chain** from the supply (provider) to the consumer (demand) side for:

- **Replacement of fossil fuels**
- **Reduction of climate relevant emissions (CO<sub>2</sub>)**
- **Technologies with substantial improved efficiency**
- **Access to unused or neglected resources**

### Contact

Dr. Andre Heel  
IMPE – Institute of Materials and Process Engineering  
ZHAW – School of Engineering

e-mail andre.heel@zhaw.ch  
phone +41 (0)58 934 4703

