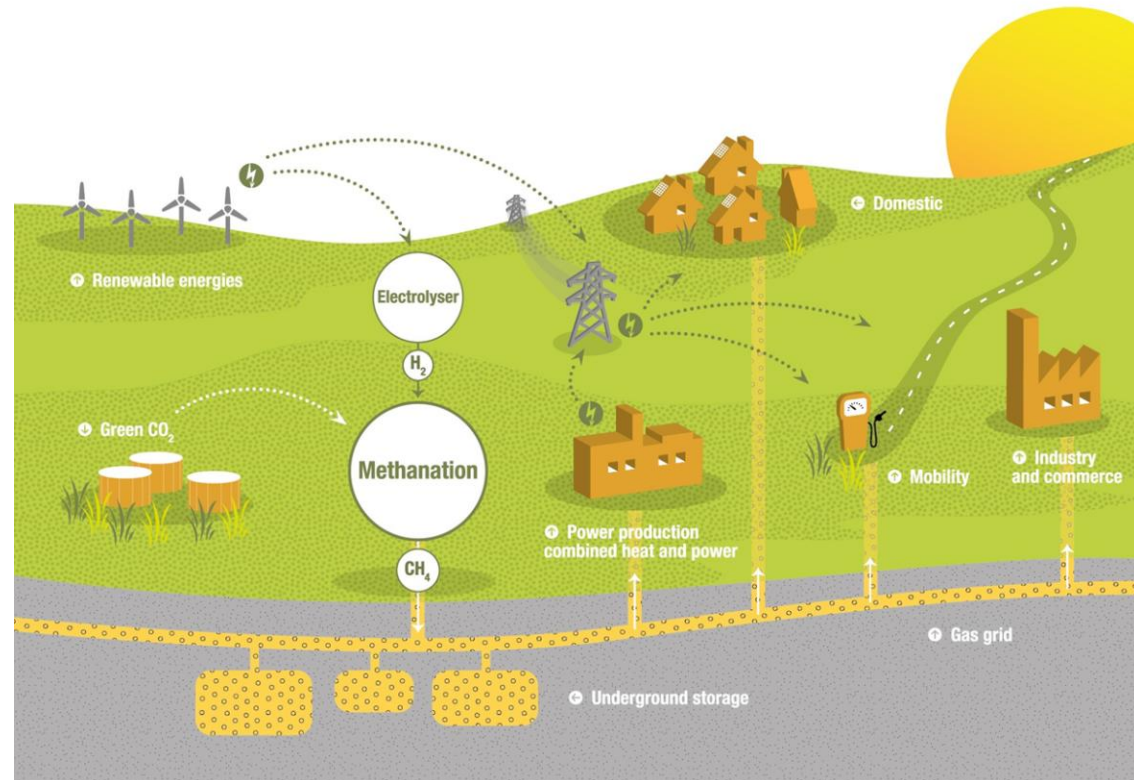


Demonstrating Opportunities for Power-to-Gas on European Level

Jachin Gorre
 Strommarkttreffen
 29.06.2018
 Agora Energiewende Berlin



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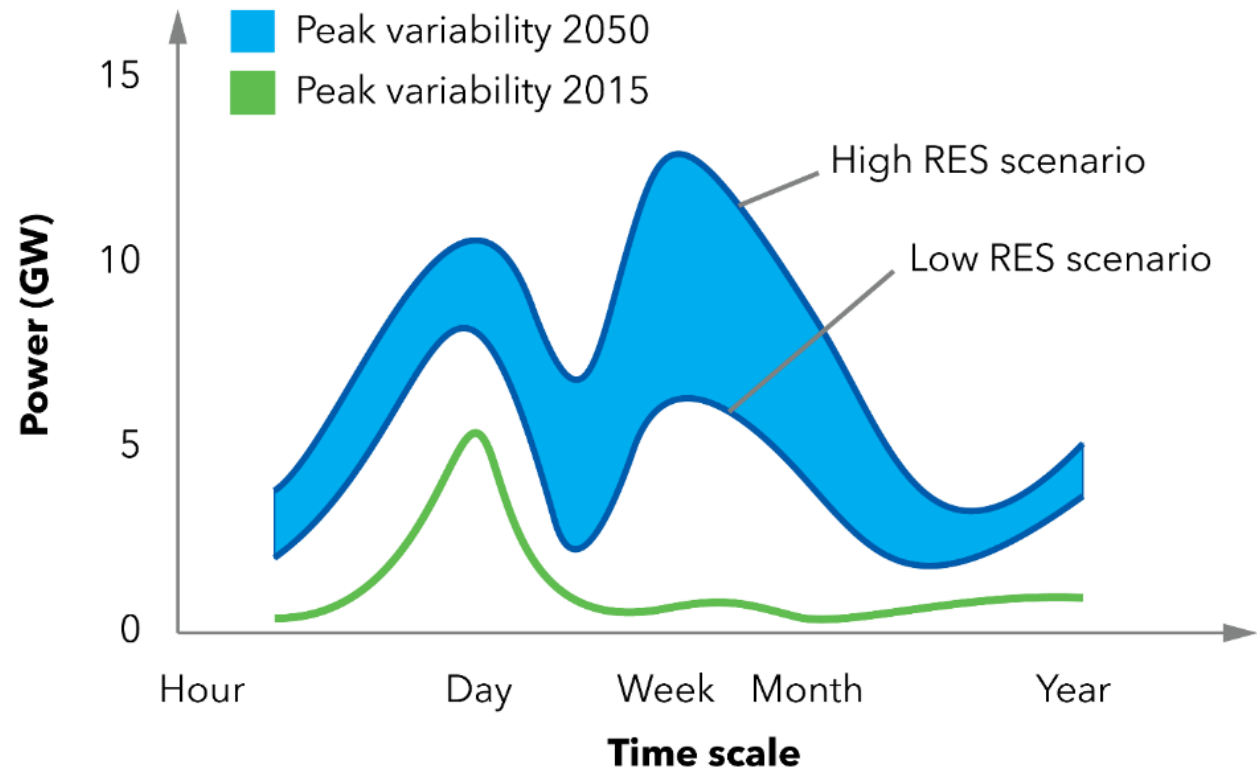
Under contract number 15.0333

STORE&G➔

Innovative large-scale energy **STORagE**
technologies & Power-to-**G**as concepts after
Optimisation

Why is long-term and large-scale power storage needed?

- Share of variable RES grows rapidly with fluctuating generation patterns
- Extreme variability in week/month range: “Dunkelflaute”
- High need for flexibility of the energy system



Source: DNV GL; Breakfast event; Power-to-gas – economic value and technological developments; 06.06.2018; <https://bit.ly/2JL0yZz>; Zugriff: 12.06.2018

STORE&GO: Project Targets

- Show **potential of Power-to-Gas**
- **Three demo sites** exhibit three different innovative methanation concepts
 - Catalytic honeycomb methanation
 - Modular milli-structured methanation
 - Biological methanation
- **Integrate and operate** in existing gas networks
- Achieve **operation \geq 24 months** (4.000 h)
- Increase **flexibility in operation**
- Constant **gas grid quality** (\geq 90 vol. % methane)
- Achieve **high efficiency** by using waste heat



STORE&GO: Project Targets

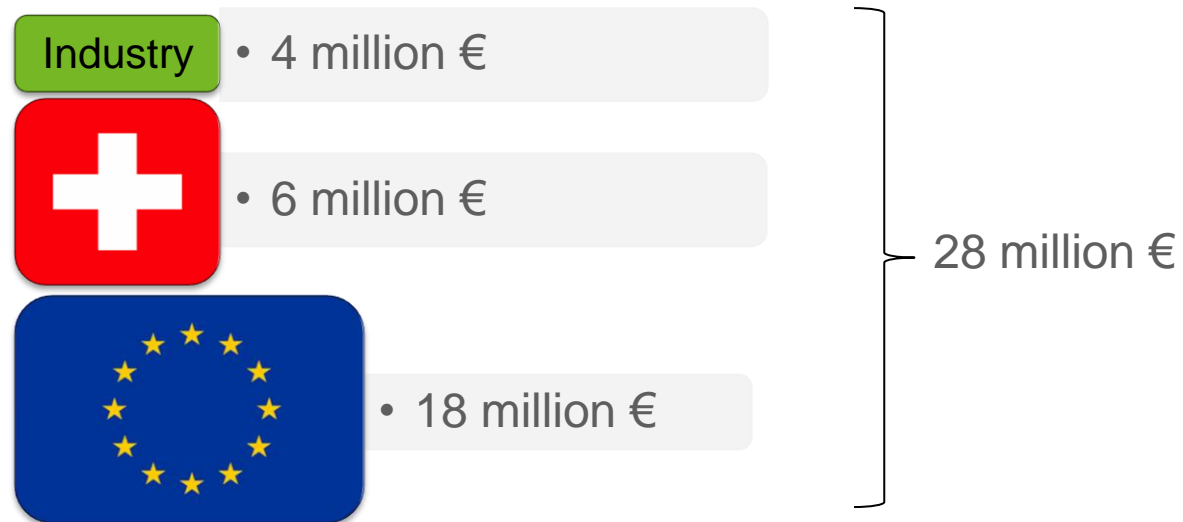
- Decrease **capital costs** for large plants by $\geq 15\%$
- Analyse value chains
- Consider legal and regulatory framework
- Derive political recommendations
- Identify **business cases**



Key Data



27 European project partners



Project Structure

Management & Coordination *WP 1*

Demonstration Site
PtG concept I *WP 2*
Falkenhagen, DE

Demonstration Site
PtG concept II *WP 3*
Solothurn, CH

Demonstration Site
PtG concept III *WP 4*
Troia, IT

Cross-cutting activities *WP 5 – WP 8*

Dissemination *WP 9*

Cross-cutting-Activities WP5 – WP9

- Techno-economic analysis of storage demonstration operation
 - Environmental impacts
 - Optimized Operation schemes for gas grids
 - Economic analysis
- Integration of PtG concepts in electricity grid management and power supply
 - Opportunities and options for PtG in the power system
 - Impact analysis of PtG
- Reducing barriers
 - Licensing modalities
 - Regulatory regimes
 - Analysis on future technology options and on techno-economic optimization
- Market uptake
 - Analysis of future demand of ‘green gases’
 - Potentials across the EU
 - Economic costs and benefits of the PtG large-scale storage option

27 Project Partners

The map shows three demo sites in Europe: Falkenhagen (Germany), Solothurn (Switzerland), and Troia (Italy). Each site is marked with a red circle and a blue dot, and connected to a green callout box. The map is surrounded by logos of 27 project partners, including:

- Top Left:** POLITECNICO DI TORINO, rijksuniversiteit groningen, HSR HOCHSCHULE FÜR TECHNIK RAPPERSWIL, gwi, Hanze Hogeschool Groningen University of Applied Sciences.
- Top Right:** KIT Karlsruhe Institute of Technology, uni per, thyssenkrupp.
- Middle Left:** ENERGY DELTA INSTITUTE SHARING THE ENERGY OF KNOWLEDGE, ECN, DBI GUT Gas- und Umwelttechnik GmbH, ENERGIE INSTITUT an der Johannes Kepler Universität Linz, DVGW.
- Middle Right:** POLITECNICO DI TORINO, BFP, CLIMEWORKS.
- Bottom Left:** EPFL ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE, Empa, Electrochaea, regio energie solothurn, HSR HOCHSCHULE FÜR TECHNIK RAPPERSWIL, SVGW SSIGE.
- Bottom Right:** POLITECNICO DI TORINO, ENGINEERING, litem ce2 tech, iren, ATMOSTAT ALCCEN, HYSYTECH.

Additional callouts on the map include "Cross-cutting activities" in a green box near the top center and "Demo Site Solothurn" in a green box near the bottom left.

Demonstration Site Falkenhagen, Germany

- isothermal catalytic honeycomb and structured wall reactors for methanation
- integration into long distance natural gas transmission grid
- CO₂ from bioethanol plant
- wind power rich region



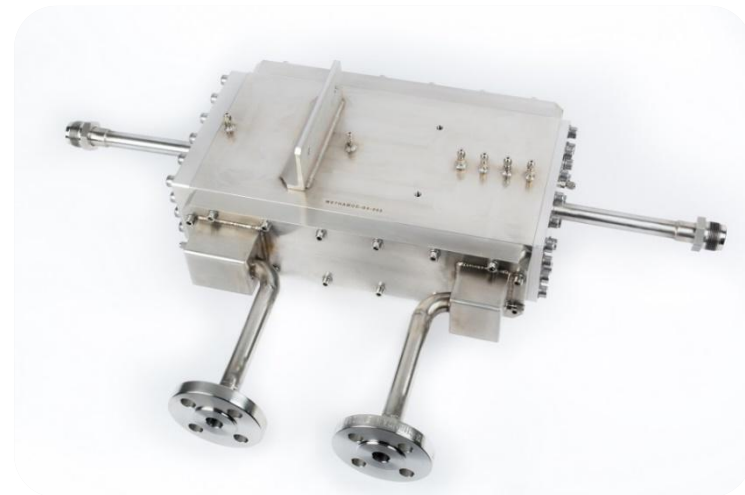
Demonstration Site Solothurn, Switzerland

- ➔ biological methanation
- ➔ integration into municipal gas distribution grid
- ➔ CO₂ from waste water treatment plant
- ➔ mainly photovoltaics



Demonstration Site Troia, Italy

- mainly photovoltaics
- integration into regional gas distribution grid
- modular milli-structured catalytic methanation reactors
- CO₂ from atmosphere

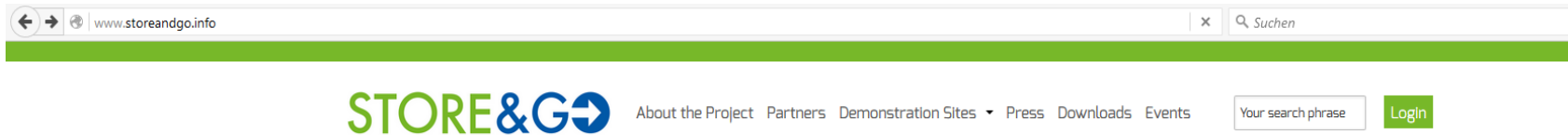


First public results

- D7.2 - European Legislative and Regulatory Framework on Power-to-Gas
- D8.1 - Exploring the future for green gases
- D6.1 - Report on opportunities and options for PtG in the power system

- Applied Energy - Calculation and analysis of efficiencies and annual performances of PtG systems
- Scale-Up of Innovative Honeycomb Reactors for Power-to-Gas Applications – The Project Store&Go
- Green methane: speeding up a cost-efficient energy transition

Dissemination and Public Relations



Find us on:

- ➔ <http://www.storeandgo.info>
- ➔ **LinkedIn** group
“Power-to-Gas in Europe:
STORE&GO and beyond”
- ➔  @STOREandGOEU

Thank you for your attention!

Key - Advantages

- ➔ **Storing** surplus of renewable **energy**
- ➔ Creating a **flexible energy system**
- ➔ **Connectivity through PtG** (Sector coupling)
- ➔ Usage of the already **existing gas infrastructure**
- ➔ **Versatile usage of gas**
- ➔ **Balancing** and **backing up the electricity grid**