Attachments (publishable Figures) to Final Publishable Report

FCH JU Grant Agreement number:	621210
Project acronym:	HELMETH
Project title:	Integrated High-Temperature Electrolysis and Methanation for Effective Power to Gas Conversion
Funding Scheme:	Collaborative project; Co-financed by the European Union's Seventh Framework Programme for the Fuel Cells and Hydrogen Joint Technology Initiative
Period covered:	from 01/10/2015 to 31/12/2017

Name, title and organisation of the scientific representative of the project's coordinator[1]:

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[1] The contact person of the coordinator as specified in Art. 8.1. of the grant agreement

Publishable Figures

Related to Executive summary

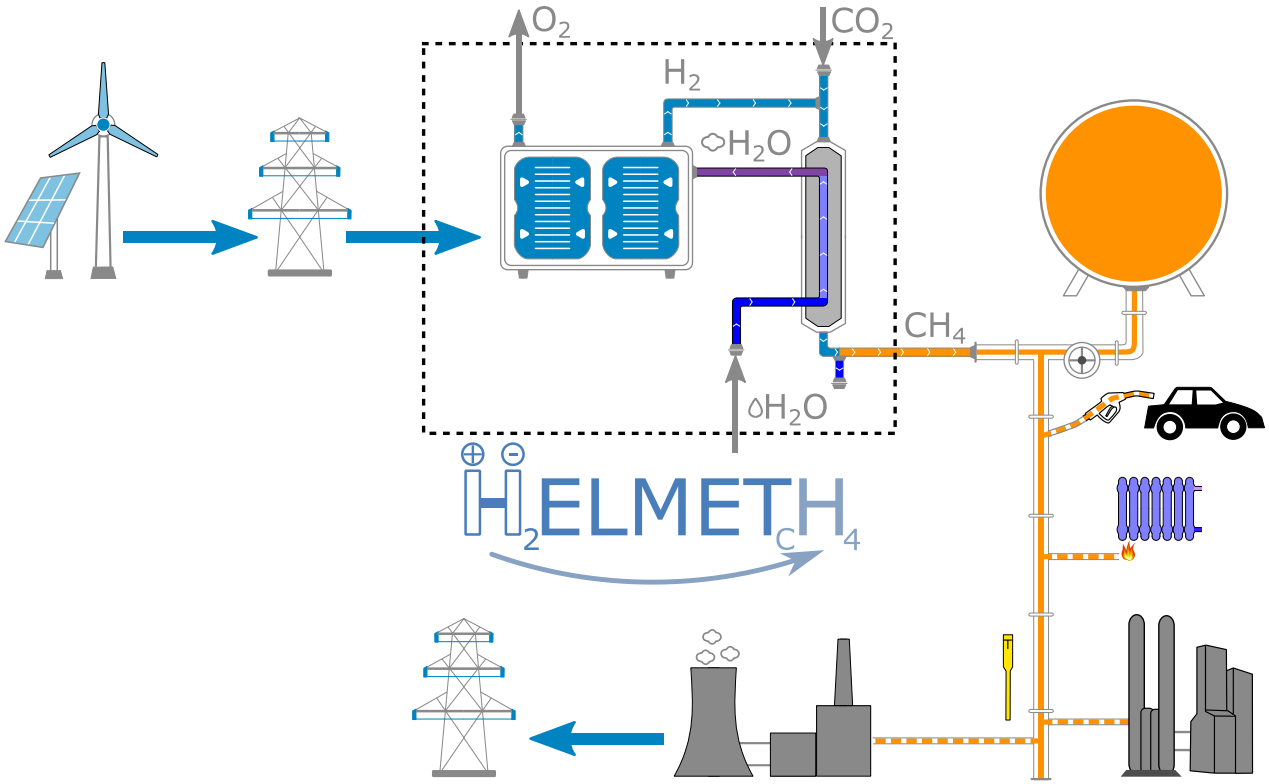

Figure 1: Schematic HELMETH PtG process, which enables an efficient conversion and storage of energy from fluctuating renewable sources

Figure 2: Final HELMETH prototype, consisting of the methanation module (left container) coupled to electrolyser module (right container)

Related to WP1

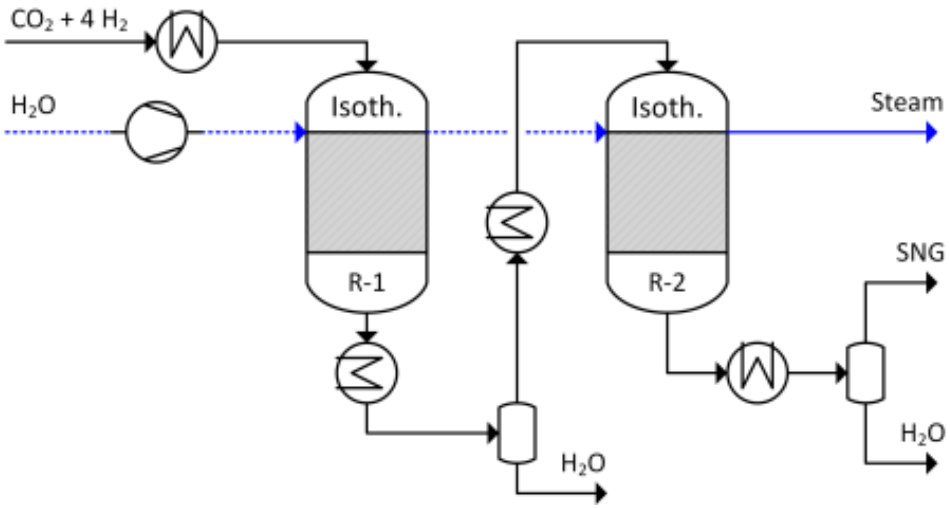

Figure 3: Schematic HELMETH CO2-methanation process (simplified)

Related to WP2

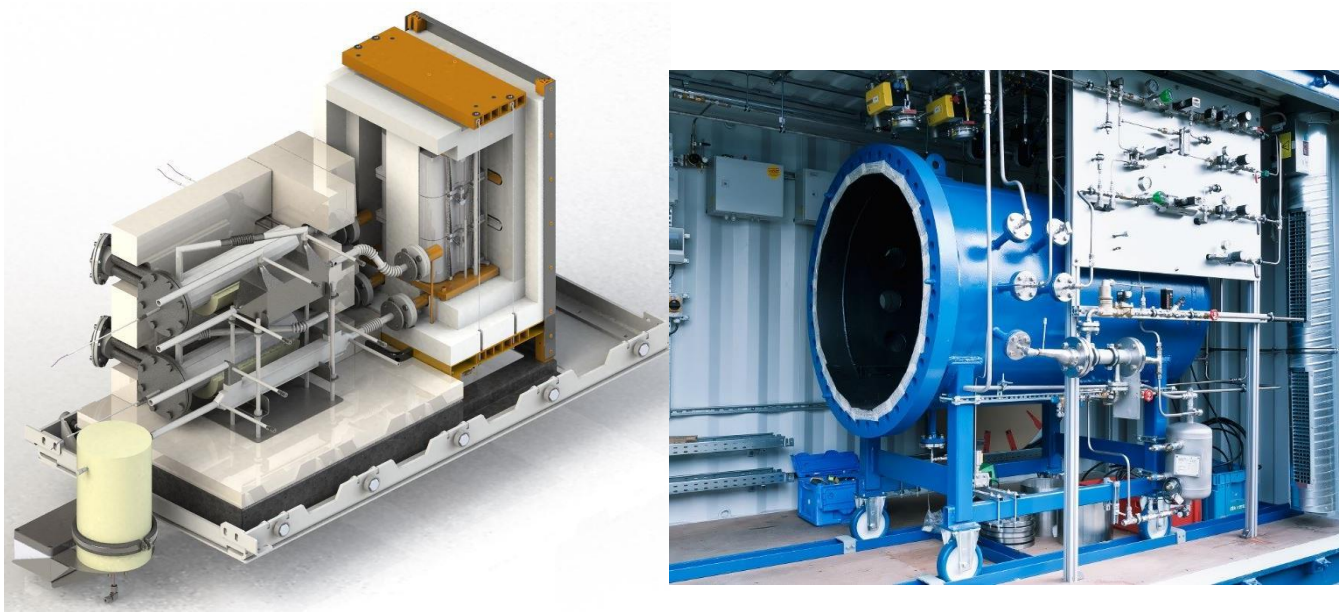

Figure 4: 3D model of the hotbox (left) and pressure vessel as installed in the container (right)

Figure 5: Final HELMETH HEX prototype made by DMLS

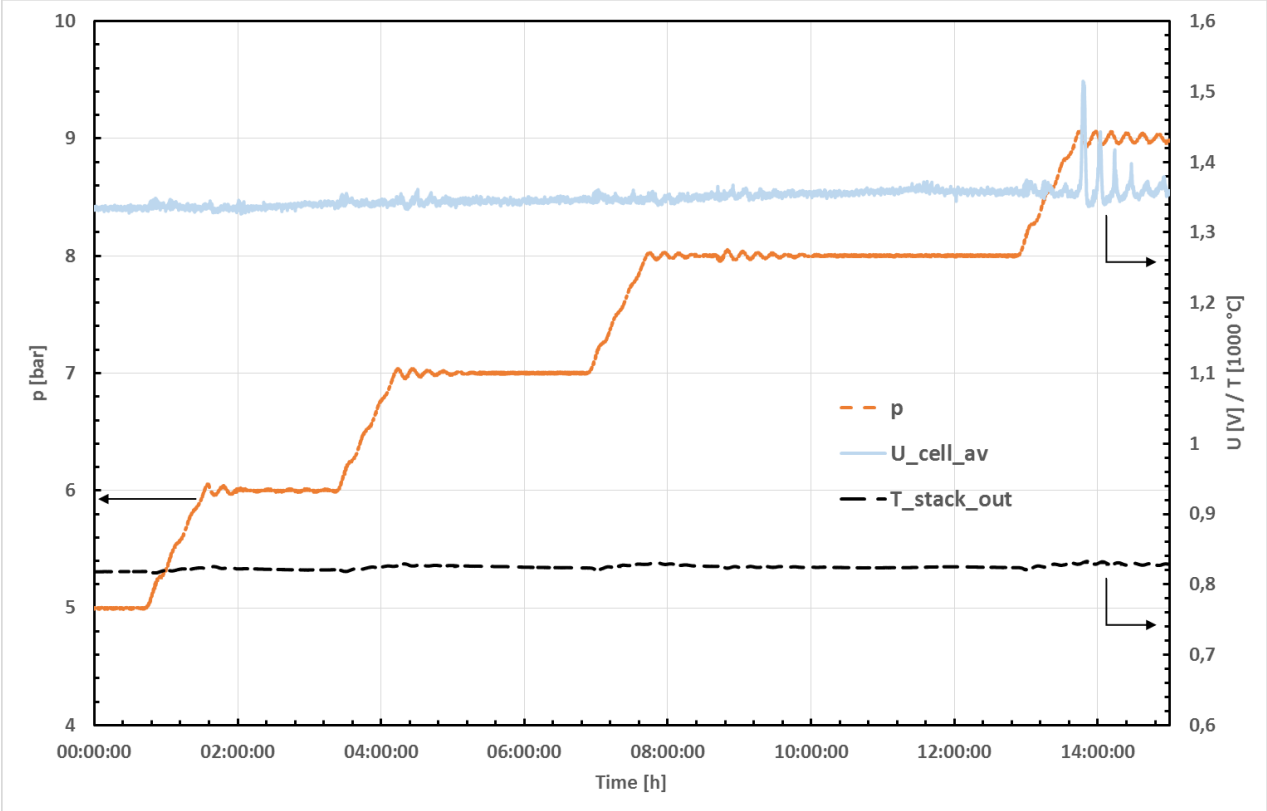

Figure 6: Increase of pressure at constant current and flow rates

Related to WP3

	Objective	Result	
Item	**Value**	**Value**	**Comment**
Multi-step methanation module			Fulfilled
Stable and pressurized steam supply			Fulfilled
Modulation	20-100 % load	20-100+ % load	Excelled
Stand-by operation		Hot stand-by	Fulfilled
SNG feed-in quality			
CH_4	≥ 92.5 Vol.-%	≥ 97 Vol.-%	Excelled
CO_2	≤ 2.5 Vol.-%	≤ 1 Vol.-%	Excelled
H_2	≤ 5 Vol.-%	≤ 2 Vol.-%	Excelled
Feed-in pressure range	> 10 bar	10 – 30 bar	Excelled
Max. SNG production	30-60 kW	12-60+ kW	Excelled

Figure 7: Comparison of methanation module objectives vs. results

Related to WP4

Figure 8: Coupled PtG plant (left container: methanation; right container: electrolyser)

Related to WP5

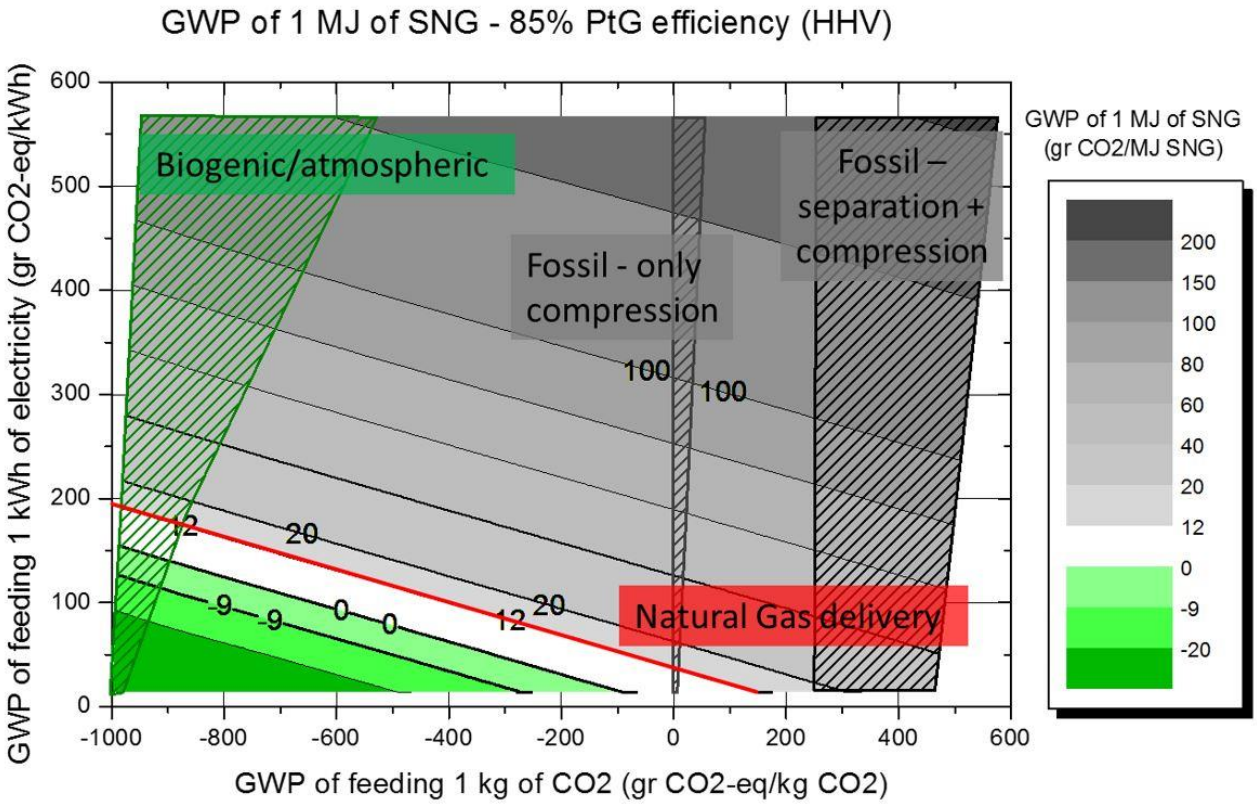

Figure 9: "Carbon map" of the HELMETH concept system operation

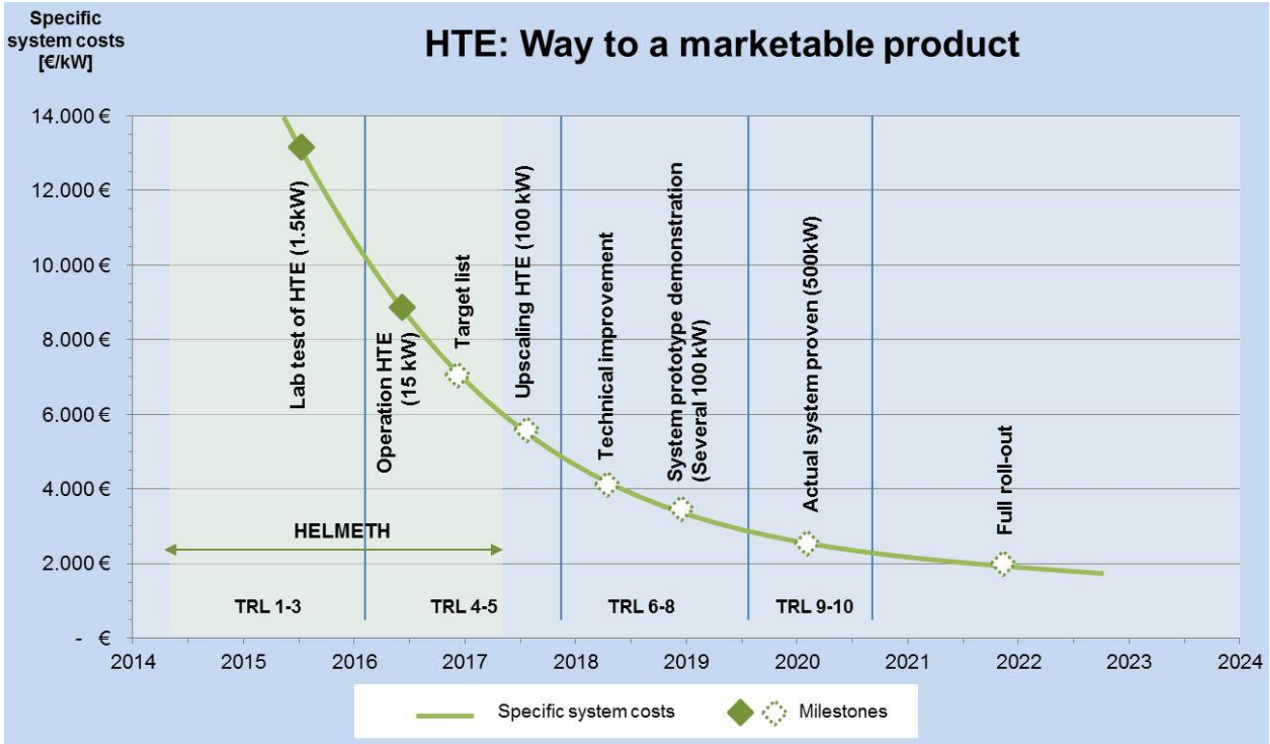

Figure 10: Development Steps for HT electrolysis on its way to a marketable product