

5th Public Webinar | 21st APRIL 2022

PRHYDE-Protocol for heavy-duty hydrogen refuelling

Call Identifier FCH-04-2-2019:

Refuelling Protocols for Medium and Heavy-Duty Vehicles



This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under Grant Agreement No 874997. This Joint Undertaking receives support from the European Union's Horizon 2020 Research and Innovation programme, Hydrogen Europe and Hydrogen Europe Research.



**Co-funded by
the European Union**

Introduction

Martin Zerta / Ludwig-Bölkow-Systemtechnik

General remarks



- Please mute your microphone and set your video camera to “off” during the whole session.



- Please use the chat function to ask any questions. We will have three time slots to discuss your questions with the presenters



- Note: The meeting will be recorded. With your participation, you give your consent to the recording.

AGENDA, 5th Webinar, 21st APRIL 22



UTC	CET	Subject	Content
12:45	14:45	Join webinar	
13:00	15:00	Introduction	Introduction to PRHYDE Public deliverables available to date: see https://prhyde.eu/progress/
13:10	15:10	Presentation: WP3 Protocol development update: Refuelling approaches (Steve Mathison)	Presentation of approaches Framework conditions (D3.3)
13:40	15:40	Discussions (15 mins)	
13:55	15:55	Presentation: WP3 Protocol development update: Risk assessment (Claus Due Sinding)	Summary of key elements
14:45	16:45	Discussions (15 mins)	
15:00	17:00	Presentation: WP4 Update on modelling (Fouad Ammouri)	Model, and validation against testing to date
15:15	17:15	Presentation: WP5 Update on testing (Antonio Ruiz)	Test plan Next steps to develop refuelling approach understanding from testing
15:30	17:30	Remaining Questions / Discussion (25 mins)	
15:55	17:55	Closing remarks	
16:00	18:00	End	

Introduction

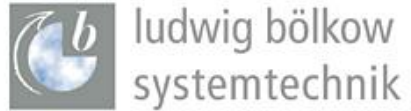


- *PRHYDE-Protocol for heavy-duty hydrogen refuelling*
Refuelling Protocols for Medium and Heavy-Duty Vehicles
- 01 JAN 2020 - 31 SEP 2022 (*project extension by nine months*)
- The PRHYDE project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under grant agreement No 874997. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme.

PRHYDE project partners



No.	Participant organisation name	Short name	Country
1	Ludwig-Bölkow-Systemtechnik GmbH (Coordinator)	LBST	DE
2	Zentrum für BrennstoffzellenTechnik GmbH	ZBT	DE
3	Air Liquide SA	AL	FR
4	Engie Lab CRIGEN	ENGIE	FR
5	Toyota Motor Europe NV	TME	BE
6	ITM Power (Trading) Limited	ITM	UK
7	NEL Hydrogen AS	NEL	DK
8	Shell Deutschland Oil GmbH	SHELL	DE
9	Commissariat à l'énergie atomique et aux énergies alternatives	CEA	FR
10	Nikola Motor Company	Nikola	USA



Linked third partners: MAN and Toyota North America. We also thank the following companies and institutions for their contribution to the project: National Renewable Energy Laboratory (NREL), National Technology & Engineering Solutions of Sandia, LLC (NTESS), Savannah River National Laboratory (SRNL), FirstElement Fuel, Hexagon Purus, Luxfer, LifuH2, Risktec, Daimler, Honda, TÜV SÜD Rail and Bennet Pump.

Work plan

WP2 – State-of-the-art & specification



WP3 – Protocol development

35MPa

WP4 – Simulations

50MPa

WP5 – Experimental validations

70MPa



WP6 – Recommendations and dissemination

WP7 – Project coordination

Iterative
process



WP2: Defining state-of-the-art on protocols, vehicles and component capabilities, gap analysis of current protocols, Specifying (new) tank categories, boundary conditions (flow temperature, connections etc.) target fueling times and quantities for the three pressure levels

Outcome: A detailed specification guiding the following protocol development and test efforts

WP3: Develop protocol approaches for the three pressure levels

Outcome: Protocol approaches for simulations (WP3) and test (WP4)

WP4: Modeling and Simulations of tank systems/categories to determine flow/temperature/pressure aspects

Outcome: Simulation results in order to assess impact of different protocol approaches

WP5: Experimental validation of protocol approaches at HRS(s)

Outcome: Validation of technical feasibility of protocol approaches

WP6: Formulate recommendations for standardization forums and dissemination

Outcome: Specific recommendations that can help create international standards on HDV hydrogen fueling

Status: Public deliverables

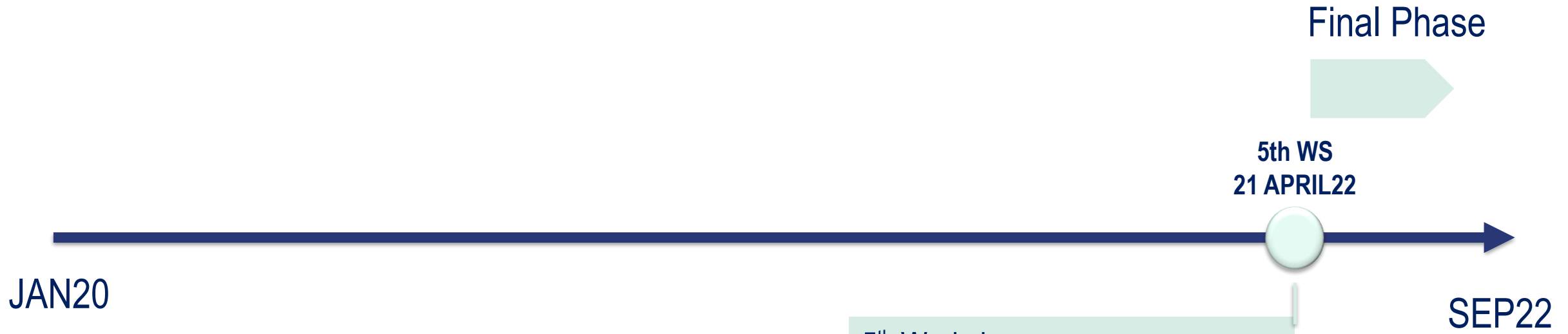
- Public deliverables available to date: see <https://prhyde.eu/progress/>



Document Number	Deliverable Title	Web Link
D2.1	Performance metrics for refuelling protocols for heavy duty hydrogen vehicles	Download
D2.2	State of the Art on Refuelling Risk Assessment	Download
D2.3	Gap analysis of existing heavy duty gaseous hydrogen vehicle refuelling protocols	Download
D2.4	Gap analysis of existing hardware used for heavy duty gaseous hydrogen vehicle refuelling	Download
D2.5	Analysis of existing non-gaseous on-board storage and refuelling	Download
D2.6	Requirements for a Future refuelling protocol	Download
D3.1	Report on the characteristics of the cases to be studied in the preliminary simulations	Download
D4.1	Report on preliminary simulations (revised)	Download
D6.3	Report on the external stakeholder engagements conducted at the start of the PRHYDE project - Surveys and Workshop 1	Download
D6.4	Report on the external stakeholder engagements conducted at the start of the PRHYDE project -Workshop 2	Download
D7.1	Kick-off Meeting	Download
D7.2	2nd Project meeting and Status Report	Download
D7.4	3rd Project Meeting and Status Report	Download



Timeline ...



- 5th Workshop:
- Refuelling Approaches
 - Risk Assessment
 - Update Modelling and Testing

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Timeline ... Outlook



Final Workshop (AUG/SEPT22):
Dissemination of final results from project,
and proposed next steps for protocol development & deployment

Next steps



- Further feedback and inputs requested from stakeholders:
 - E-mail list for PRHYDE stakeholders
(→ please send e-mail to info@prhyde.eu if you want to receive or not to receive info / news)
 - PRHYDE deliverables & presentation will be made available for comments / feedback
(→ to be downloaded from the PRHYDE website <https://prhyde.eu/progress/>)
- Further webinar / workshop at end of project

→ Please provide your comments / inputs any time to info@prhyde.eu

THANK YOU!



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Responsible person for
dissemination and
communication



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