



GERG CEN Prenormative project

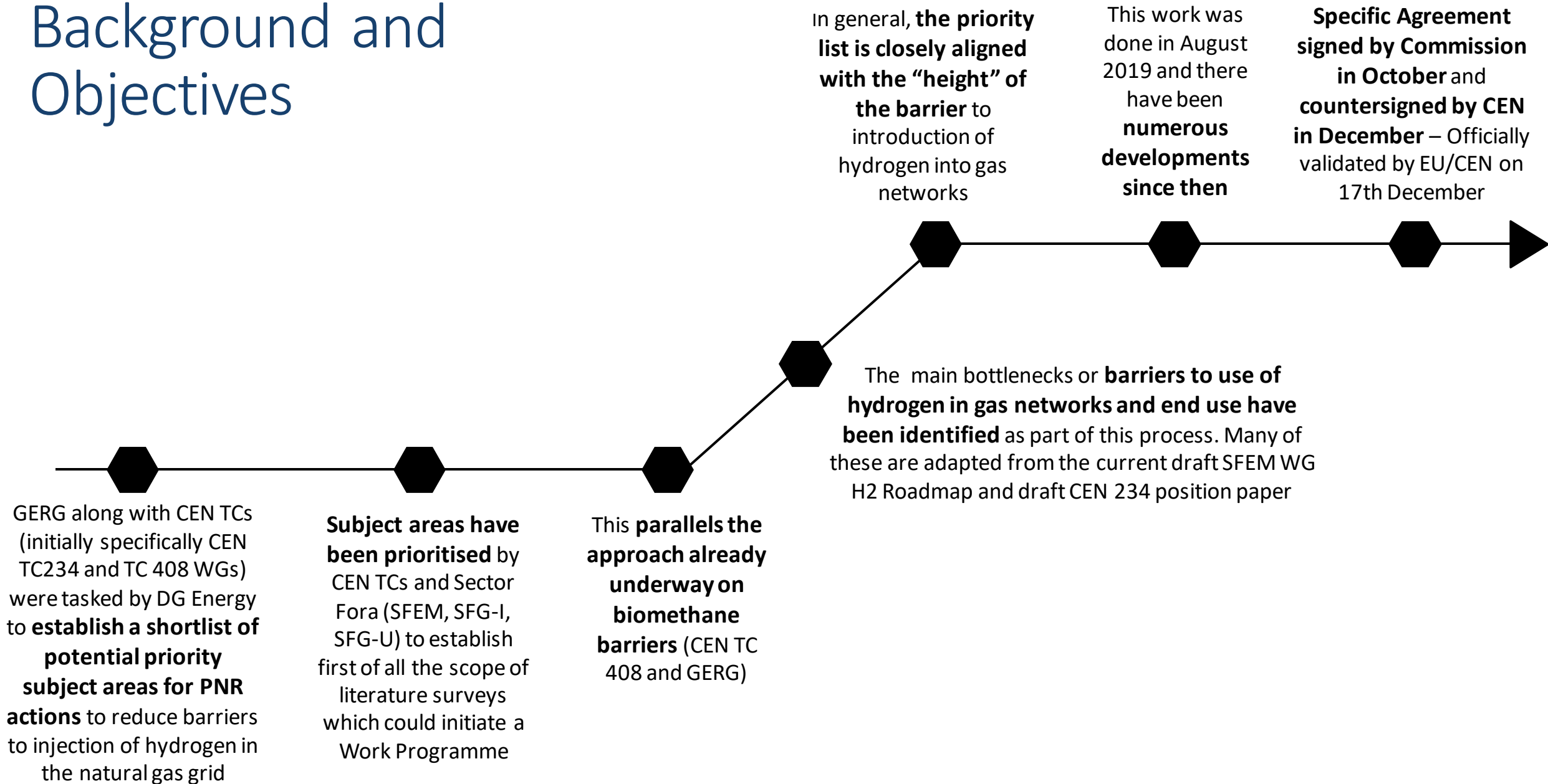
H2NG Gap analysis 2020

THYGA WORKSHOP WP4 – 30 MARCH 2021

GERG / CEN PNR Gap analysis 2020

	Priority / topic area	Lead Organisation
1	Safety	DNVGL
2	Gas Quality	GRT Gaz
3	Underground storage	DBI
4	Power Generation and Engines	DNVGL
5	Industry	Engie
6	Steel Pipes	GRT Gaz
7	Network Equipment	DBI
8	End use commercial and domestic	DGC
	Project administration on behalf of CEN (to be confirmed)	DIN
	Integration coordination, interfaces and transverse subject management	GERG

Background and Objectives



Objectives and Timescales

- Perform **detailed knowledge surveys** on the 8 priorities
- Develop a **detailed understanding of the state of the art** relating to hydrogen injection in the gas networks based on international information sources
- Understand **gaps in knowledge** and develop proposed plans for mitigation
- Develop **recommendations** which include planned PNR activities to lower or remove barriers
- Understand the **benefits of these actions versus business as usual** and to establish **costs of removal of barriers** wherever possible

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Scoping meeting and sign-off of scope	█											
Kick-off & working meeting		█										
Knowledge surveys			█	█	█							
Mid-Term & Working meeting						█						
Supervisory Board Draft Interim Report						◆						
Knowledge assessment						█	█	█	█			
Supervisory Board final interim + feedback								█	◆			
Required actions (PNR work program) benefits									█	█		
Final meeting and presentation to Supervisory Board												█
Draft version of the integrated report												◆



Contract Duration 12 months from October 1st, 2020, 14 months to report
 Interim statement milestone: 6 months (March 31st, 2021), 8 months to report



Data Assessment and Mitigation

- ❑ Use data set to **identify current knowledge status and gaps**
 - ❑ Use **traffic light system** to identify areas where **knowledge is sufficient** and where there are **gaps** for specific H2 to 100%
 - ❑ Identify **mitigation actions to fill gaps and costs where possible**
 - ❑ Develop **Plans for PNR activities** focusing on **lowering barriers to standardization**
-
- ❑ **Final Integrated report due on 30th November 2021**



Priority 8

End use equipment

Consequences for End use equipment with H2 in NG

Partners

DGC (lead), DNVGL, DBI, Engie, KIWA

OBJECTIVES

- to establish a shortlist of potential priority subject areas for PNR actions to reduce barriers to injection of hydrogen in the natural gas grid.
- to develop a status review on the use of H2 and H2NG blends for End Use equipment above 20% H2 (including Rate of Change) including the state of the art and gaps for mitigation in a future PNR work programme
- to support the implementation of H2 and H2NG end-use products by reviewing existing standards, to clarify the need for amendments and the need for new standardisation

ISSUES TO BE ADDRESSED

- Safe operation of the end use equipment, including testing vs service conditions, certification and regulatory
- Environmental impact on end used equipment, including noise, comfort
- Energy efficiency of the end used equipment
- Overall performances of the end use equipment for the service it is designed for,

SCOPE

- Domestic and commercial uses of gas including forced draught burners and NGVs (but not NGV tanks covered by biomethane study). H & L gases.

EXPECTED OUTCOMES AND BENEFITS

- Details on the sensitivity of each segment and conclusion for each segment (Updated relevant information filling the knowledge gaps, including the bottlenecks to be addressed in order to manage safely the impact of H2 injection in End Use equipment)
- Limitation to the conclusion given
- Details on the regulations & standardisation that apply for each of the segments
- Recommendations of action to cover the areas where more work shall be done
- Conclusion about the standardization (Work Programme proposal for PNR actions including numerical simulations, research work, experimental testing and investigation for mitigating the impact of H2 injection in gas uses in End Use equipment)

Priority 8 End use equipment above 20%



Workplan

Work to be done

- Review/survey of the available information & identify the current knowledge
- Consolidate and select/extract the relevant information as literature survey to be reported
- Review/survey of the standards in the field of energy in buildings

Delivery scope

- The main deliverable will be a **final report** that will include the items described under “Expected outcomes and benefits” (*previous slide*)

Priority 8 End use equipment above 20%



Collaborative element

- Adhoc meetings (so far we had two meetings and plan to have about 1 meeting by month)
- Project lead will prepare a report to be reviewed by all participants
- Work (literature and analyse) is shared among partners

Transverse Elements

- Coordination to ensure sufficient coverage of the subject and to avoid duplication of work with
 - Priority 4 (Power production) regarding NGV
 - Priority 1 (Safety)
 - Priority 2 (Gas quality)
 - Coordination with Priority 5 (Industry)
 - Etc.

Data Sources Expected

- Participants existing own knowledge
- Literature review
- Coordination with THyGA project
- Contact to industry partners outside GERG

Main Challenges and gaps

- Variety and consistency of existing data based on differing test protocols and manufacturers info
- Large range of existing appliances requiring a development of a methodology for comparison

Work method

Using **partners expertise** to analyse the main documents not yet used in THyGA

Using a **matrix** summarize findings

Brainstorming with the industry to define PNR needs

Litterature work

- **Analyse the (about 240) references** gathered so far, using as much as possible THyGA results but extend to aspect not treated (wider scope; PRN aspects; new references)

- Establish an **overview of relevant standards**

Main challenge: how to best use the allocated resources to get to the goals?

Priority 8 End use equipment above 20%

SEGMENT = NGV or APPLIANCE TYPE + BURNER TYPE + STANDARD

Population

Expertise Available by appliance

Aspect to be covered (reference review): safety, emissions etc...

Expertise Available by topic

TRCA Seq. No.	Section 1: HYG& requirements and population data					Req. category	Total Population	Expertise identified (meeting 01) and from 'initial' pool	Expertise identified (meeting 01) and from 'initial' pool	Section 2: IMPACT OF H2										CONCLUSIONS				
	Appliance type	Category	Burner type	Standard	Other					Flame detection system	Flame stability system	Delayed ignition	Other influence on the CE	Tightness	Material compatibility	Overall safety assessment	Overall ergonomic assessment	Regulatory compliance	Other		Common safety	Health	Acoustic	Weight of the flame
111	BOILERS	Open flame	Partial	EN 12201		partial permit	43,588	Demarcated commercial (Pietro, Jose, Philippe, Patrick, Stéphane), DNV	DNV	DNV														
112	BOILERS	Room sealed	Full	EN 12201		permit	2,892	Isola gas reactor, condensing boilers, HG fuel cells, atmospheric heating appliances, DNV																
113	BOILERS	Room sealed	Full	EN 12201		permit	452																	
114	BOILERS	Room sealed	Full	EN 12201		permit	25,333																	
115	BOILERS	Room sealed	Full	EN 12201		permit	4,972																	
116	BOILERS	Room sealed	Full	EN 12201		permit	4,284																	
117	BOILERS	Condensing	Full	EN 12201		permit	2,328																	
118	BOILERS	Room sealed	Full	EN 12201		permit	56,492																	
119	BOILERS	Room sealed	Full	EN 12201		permit	4,428																	
120	BOILERS	Room sealed	Full	EN 12201		permit	1,428																	
211	WATER HEATERS	Room sealed	Full	EN 12201		partial permit	63242																	
212	WATER HEATERS	Room sealed	Full	EN 12201		partial permit	38736																	
213	WATER HEATERS	Room sealed	Full	EN 12201		partial permit	5337																	
214	WATER HEATERS	Room sealed	Full	EN 12201		partial permit	2292																	
311	COOKERS	Single burner	Single burner	EN 504	Deep level	partial permit	32,574	Demarcated commercial (Pietro, Jose, Philippe, Patrick, Stéphane), DNV																
312	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
313	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
314	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
315	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
316	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
317	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
318	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
319	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
320	COOKERS	Single burner	Single burner	EN 504	Drop level	partial permit	32,574																	
411	CATERING	Commercial	Commercial	EN 289-2-1	Type D open	no?	288																	
412	CATERING	Commercial	Commercial	EN 289-2-1	Type C closed	no?	288																	
413	CATERING	Commercial	Commercial	EN 289-2-2	Type D open	no?	38																	
414	CATERING	Commercial	Commercial	EN 289-2-2	Type C closed	no?	38																	
415	CATERING	Commercial	Commercial	EN 289-2-3 and EN 289-2-4	Type D open	no?																		
416	CATERING	Commercial	Commercial	EN 289-2-3 and EN 289-2-4	Type D open	no?																		
417	CATERING	Commercial	Commercial	EN 289-2-7	Type D open	no?																		
418	CATERING	Commercial	Commercial	EN 289-2-8	Type C closed	no?																		
419	CATERING	Commercial	Commercial	EN 289-2-9	Type D/C	no?	75																	
420	CATERING	Commercial	Commercial	EN 289-2-11	no?	no?																		

MATRIX TOOL (to be filled in)

List of aspects we are looking at (not exhaustive)

Section 1: Segmentation	Section 2: Impact of H2	Section 3: Mitigation
THyGA Segn. No.	Safe operation of the end use equipment	Controls & sensors
Appliance type	Flame detection systems	
Category	Flame stability for example flashback	
Burner type	Delayed ignition	
Standard	Other influence on the CE approval scheme (GAR)	Section 4: Prenormative aspects identified
Other	Tightness	
Burner type	Material compatibility	
Total Appliance Population	Overall safety sensitivity evaluation	Section 5: Testing
	Overall experience from the field	
	regulatory issues – influence on the CE approval scheme	
	Other	
	Overall performances for the service it is designed for	
	Components ageing	
	Heating time	
	Reduction of power	
	Aspect of the flamme	
	Quantity of condensate and possible impact	
	Occurrence of engine knock	
	Other	
	Environmental impact	
	Emissions (NOx, soot, etc.) caused by hydrogen admixture	
	Noise	
	Other	
	Energy efficiency	
	Heating efficiency	
	Other	

Standards identified (input THyGA)

EN 15502	EN 16905
EN 26	EN 12309
EN 89	EN 12752-1 and -2
EN 30-x	EN 416
EN 203-2	EN 419
EN 613	EN 17082
EN 13278 + EN 509	EN 1518
EN 14829	+ more
EN 50465	

Priority 8 End use equipment above 20%

NEXT STEPS

Sharing the references review work

240 documents !

Getting the documents

End of March

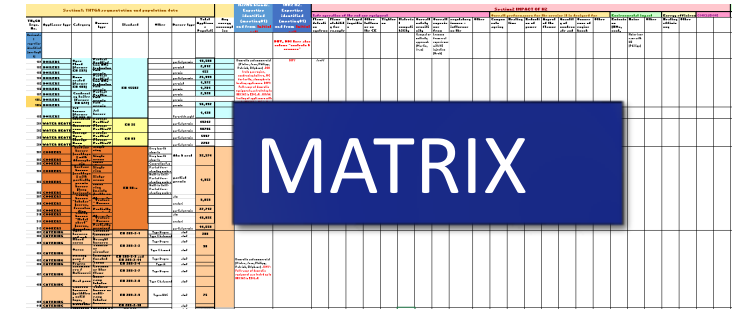
Review AND updating of the literature list

Cross cutting topics

Coordination
WP1 and WP7 about **inner piping**,
Sensors etc.

Updating the main reference list GERG

Integrating the knowledge gained in the lit. into the **matrix** including:
1- The learnings about sensitivity to H2
2- The learnings about possible R&D needs



MATRIX

Analyse

End of April

Brainstorming sessions with the industry & TCs (by segments)

May?

Reporting