

Hydrogen Fuel Quality for Stationary Applications

- ISO/TC 197 started a new working group (14) to develop one or more international specifications for hydrogen fuel for stationary PEM fuel cells

WG14

Work Item: ISO 14687-3 *Hydrogen Fuel*
*— Product Specification — Part 3: Proton
exchange membrane (PEM) fuel cell
applications for stationary appliances*

Status:

The WG had its first meeting on 5-6 March 2010 in Tokyo, Japan.

Summary of Key Issues

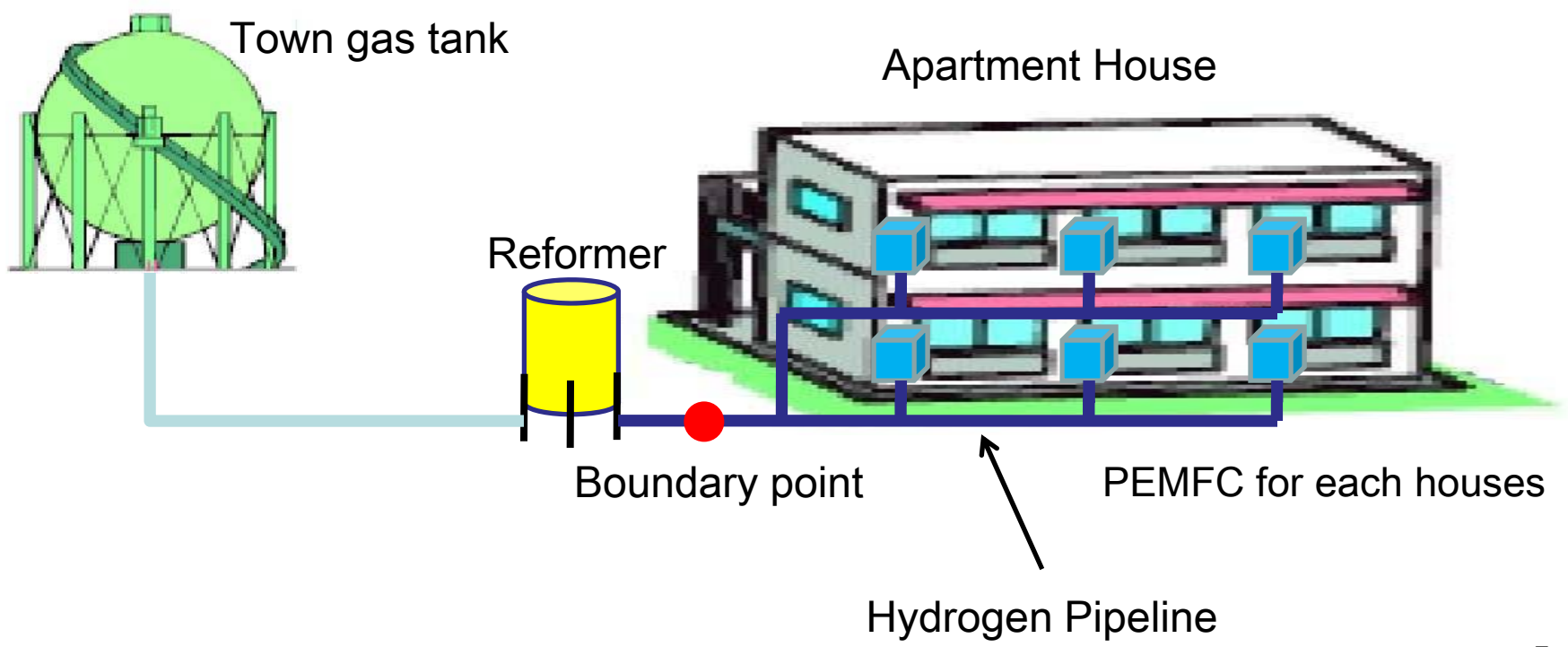
- Stationary PEM FCs do not require the same level of purity of hydrogen, although the constituents of the impurity are still important.
- Lengthy discussion of the merits of having all grades of hydrogen in a single document ultimately. Also to the need for an amendment to part 1 to exclude PEM FCs for stationary applications from the scope to part 1.
- Need to clarify what we call stationary application.
- Work on pipeline hydrogen 1st, then consider cylinder H₂ (remote power) applications
- Start work with 1-pass gas composition before discussing recycled.
- Start with systems assuming 40,000 hours of life, and then consider other lifetimes.
- Water content is to be reported, but not specified. The table is based on dry hydrogen – no water!

Differences between Stationary Appliance PEFC and FCV PEFC

	Stationary PEFC			FCV
Hydrogen Purity	60% ~ 95%	95 ~ 99.9% minimum	99.9% minimum	99.99%
Cell Pressure	Atmospheric			Pressurized (~ 2bar)
Fuel Utilization Factor	medium ca. 70 ~ 80%	high ca. 90%	high ca. 90%	very high 99.8%
Hydrogen Recycle	One-pass flow	Both case (1)One-pass Flow (2)Recycle Flow	Both case (1)One-pass Flow (2)Recycle Flow	Recycle Flow
System Flow Schematic				
Anode Exit Gas Treatment	Fuel for reformer burner	If 99.9%, the cycle of "anode exit close/open" or feed at a constant utilization rate of 98 % or so, for which any rapid load increases must be addressed Exit Gas Treatment: Combusted by a burner or exhausted out of system after diluted with air.		Hydrogen emission is diluted with air and exhausted out of system
Lifetime	Residential CHP: 40,000 ~ 90,000hrs, Remote Power:??			<10,000hrs

Applications of stationary PEMFC

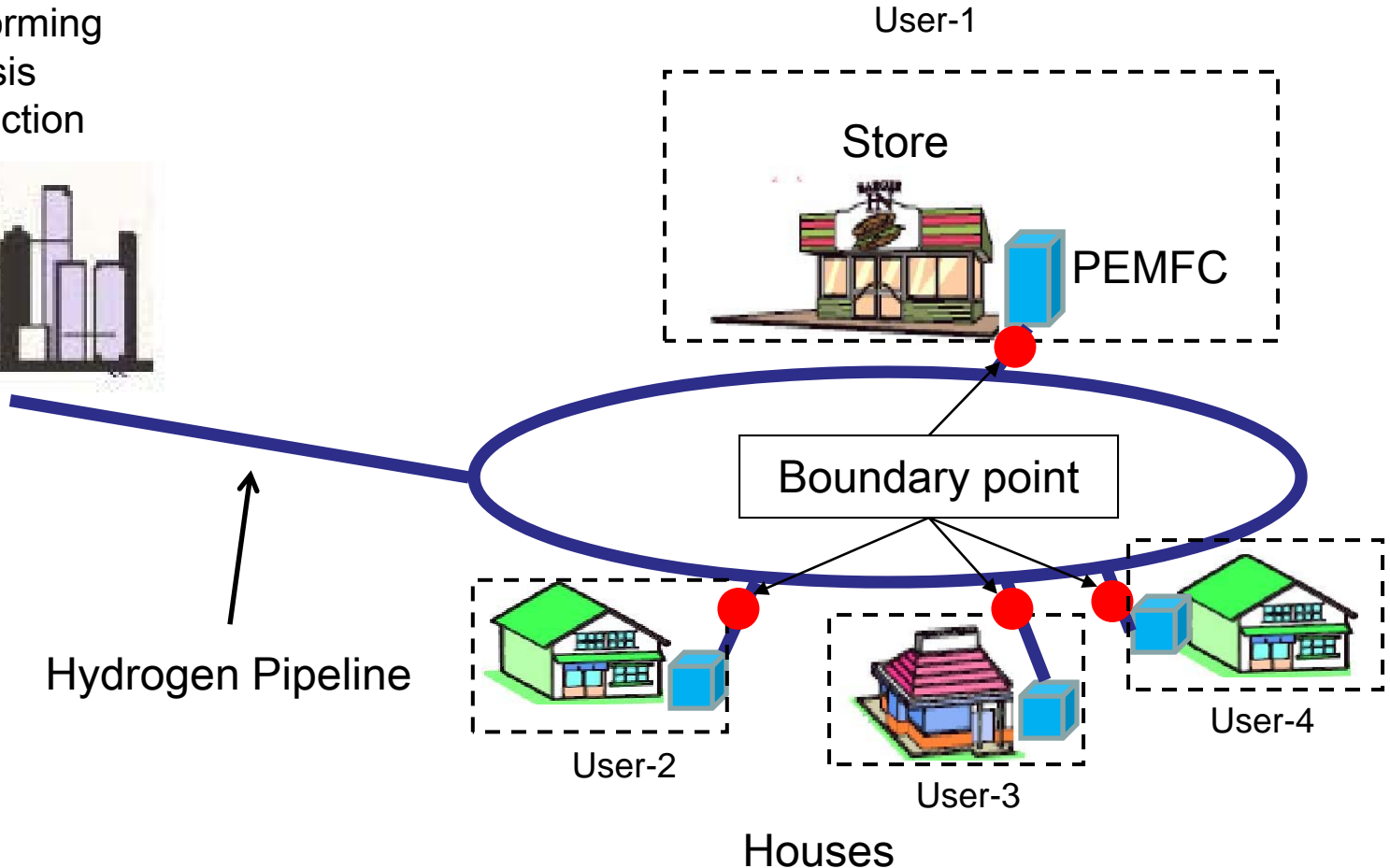
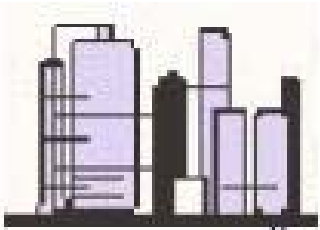
Local area H₂ pipeline network for residential CHP PEMFC



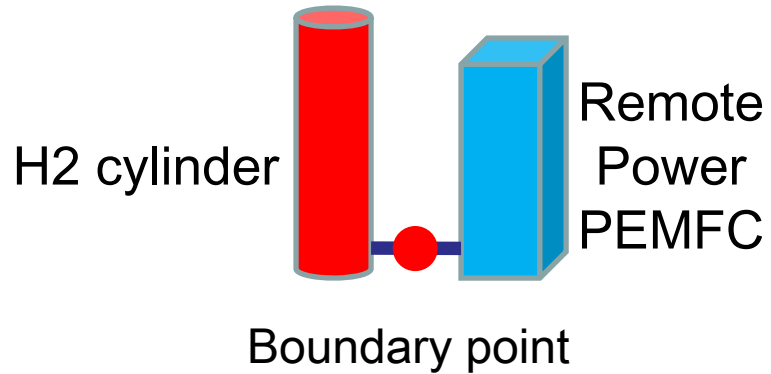
Large area H2 pipeline network for residential CHP PEMFC

Hydrogen Production Plant

Gas Reforming
Electrolysis
By-Production



H2 cylinder supply for remote power PEMFC



(Example) set at mountain-top



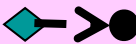


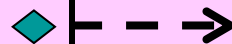







Comments and Resolutions



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Schedule for standardization of ISO/TC197WG14 (ISO14687-3)

Mar.5,2010

Year 2009	2010		2011		2012		2013
NWIP (circulation) 3 months  20,Nov.	Plenary meeting  (16, May)		CD (circulation) 3 months  (Mar.) (Jun.)	DIS (circulation) 5 months  (Dec.) (May)	FDIS (circulation) 2 months  (Dec.)	IS issue  (Feb.) (Apr.)	
	1st meeting  5 Mar.	2nd meeting  (Sep.)	 (Jan.)	 (Sep.)	 (Sep.)		