TECHNOLOGY FACTSHEET

HYDROGEN PIPELINE

Date of factsheet	43425
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Sector	Hydrogen
ETS / Non-ETS	non-ETS
Type of Technology	Hydrogen pipeline - Transmission
Description	Used to transport hydrogen. Pipelines come in a very high variety of diameters, lengths and pressures. We assume a 100 km pipeline with a throughput of 50k Nm3/hour. This is a middle value of the tested values in Yang and Ogden (2007) who take "The transport distance is varied from 25 to 500 km and the flow of hydrogen from 2000 to 100,000 kg/day." Costs are including compression.
TRL level 2020	TRL 9
	Mature technology

TECHNICAL DIMENSIONS

	Functional Unit		Value and Range		
Capacity	MW				*209,017.00*
			209,017.00	-	*209,017.00*
Potential	MW	NL		*unlimited*	
			-	-	-
Market share	%				-
			Min	-	*Max*
Capacity utlization factor	1				
Unit of Activity	PJ/year				
Technical lifetime (years)	40				
Full-load running hours per year	8,760				
Progress ratio	1				
Hourly profile	No				
Explanation	Capacity based on stated assumptions and conversion factors as found in IEA (2017). Lifetime from Yang and Ogden (2017).				

COSTS

Year of Euro	2015

	Euro per Functional Unit	Current			2030			2050		
Investment costs per year	mln. € / MW			0.40			0.40			0.40
		0.40	-	0.40	0.40	-	0.40	0.40	-	0.40
Other costs per year	mln. € / MW			-			-			-
		Min	-	*Max*	*Min*	-	*Max*	*Min*	-	*Max*
Fixed operational costs per year (excl. fuel costs)	mln. € / MW			0.02			0.02			0.02
		0.02	-	0.02	0.02	-	0.02	0.02	-	0.02
Variable costs per year	mln. € / MW			-			-			-
		Min	-	*Max*	*Min*	-	*Max*	*Min*	-	*Max*
Costs explanation	In Vita (2018) cost data is given in euro/kW output. They report investment costs of 723 euro/kW for uncompressed hydrogen gas (10 bar) and 178 for compressed hydrogen gas (60 bar). Assuming a 100 km pipeline with a throughput of 50*10^3 Nm3/hour, the total cost of a transmission network pipeline would be 100*,6*10^6/(,5*10^5*365*24*10,8) (euro/(MJ/year)) ~= 400 euro/kW. This serves as a sense-check that the numbers here can correspond to the numbers in Vita (2018). Cost for uncompressed hydrogen are higher as the cost is per unit of kW H2 out. As uncompressed hydrogen moves slower, it is more expensive.									

ENERGY IN- AND OUTPUTS

	Energy carrier	Unit	Current			2030			2050		
Energy carriers (per unit of main output)	*Main output:* Hydrogen	PJ			1.00			1.00			1.00
			1.00	-	1.00	1.00	-	1.00	1.00	-	1.00
	Hydrogen	PJ			-1.00			-1.00			-1.00
			-1.00	-	-1.00	-1.00	-	-1.00	-1.00	-	-1.00
	Electricity	PJ			0.04			0.04			0.04
			0.03	-	0.05	0.03	-	0.05	0.03	-	0.05
		PJ			-			-			-
			Min	-	*Max*	*Min*	-	*Max*	*Min*	-	*Max*
Energy in- and Outputs explanation	Including compression. Körner (2015) reports efficiencies of 95% including compression, Yang en Ogden (2007) mention efficiency losses of 2-3%.										

MATERIAL FLOWS (OPTIONAL)

	Material	Unit	Current			2030			2050		
Material flows					-			-			-
			Min	-	*Max*	*Min*	-	*Max*	*Min*	-	*Max*
					-			-			-
			Min	-	*Max*	*Min*	-	*Max*	*Min*	-	*Max*
Material flows explanation											

EMISSIONS (Non-fuel/energy-related emissions or emissions reductions (e.g. CCS)												
Emissions	Substance	Unit	Current			2030			2050			
			-			-			-			
			Min	-	Max	Min	-	Max	Min	-	Max	
			-			-			-			
			Min	-	Max	Min	-	Max	Min	-	Max	
			-			-			-			
			Min	-	Max	Min	-	Max	Min	-	Max	
			-			-			-			
			Min	-	Max	Min	-	Max	Min	-	Max	
Emissions explanation	0											
OTHER												
Other			Current			2030			2050			
			-			-			-			
			Min	-	Max	Min	-	Max	Min	-	Max	

REFERENCES AND SOURCES

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