

STEAM WETHANE KEFOR	RMING (SMR) FOR HYD	ROGEN F	RODUCT	ON WITI	H SYNGAS	CARBON	CAPTUR	E.				
Date of factsheet	27-7-2018											
Author	Jacob Janssen											
Sector	Hydrogen											
ETS / Non-ETS	ETS											
Type of Technology	SMR-based hydrogen production wit	h syngas CO2 c	anture									
Description				oroducing hydr	ogen from natu	ral gas. This is a	chieved in a pi	ocessing device	called a reform	ner which reac	ts steam at	
	Steam methane reforming (SMR) is a method that can be used for producing hydrogen from natural gas. This is achieved in a processing device called a reformer which reacts steam at high temperature with the gas. SMR uses the endothermic reaction											
	CH4 + H2O ⇌ CO + 3H2.											
	The reaction is carried out at an acti In this SMR plant, a COGEN plant is r MDEA increases the natural gas cons	unning to expo	rt a relatively sr	nall fraction of	the energy invo	lved to the elec		this case, captu	ring CO2 from ti	he shifted syng	gas using	
TRL level 2020	TRL 9 IEA (2017) reports 100.000 Nm3/h. a	at 10,8 MJ/Nm3	s, this translates	to a capacity o	of precisely 300	MW hydrogen	energy output.	Progress ratio i	s found in Thon	nas (2009)		
TECHNICAL DIMENSIONS												
	Functional Unit Value and Range											
Capacity	MW									300.0		
			300.00 -						300.00			
Potential	MW	NL					unlimited					
					-		-				-	
Market share	%			Min			-			Max		
Capacity utlization factor		1	1					1.0	0			
Unit of Activity	PJ/year											
Technical lifetime (years)	- 1 / · · ·							25.0	00			
Full-load running hours per year	 							8,322				
Progress ratio								0.9	5			
Hourly profile	No	+ 10 0 841/81			· f	N 40 A / househouse as a		D	a face of the Theory	(2000)		
Explanation	IEA (2017) reports 100.000 Nm3/h. a	it 10,8 MJ/Nm3	, this translates	то а сарасіту с	or precisely 300	ivivv nyarogen (energy output.	Progress ratio	s round in Thorr	ias (2009).		
COSTS												
Year of Euro	2015											
	Euro per Functional Ur	nit		Current			2030			2050		
Investment costs per year	mln. € / MW				0.88			0.88			0.88	
			0.88	-	1.16	0.88	-	1.16	0.88	-	1.16	
Other costs per year	mln. € / MW			_	-		_	-			- I	
	mln. € / MW		Min	-	Max	Min	-	Max	Min		Max	
Fixed operational costs per year	min. € / ivivv				0.03			0.03				
(excl. fuel costs)	1		0.03	-	0.07	0.03	-	0.07	0.03	-		
	mln. € / MW		0.03	-	0.07 0.25	0.03	=		0.03	-		
(exci. fuel costs) Variable costs per year	·		0.25	-	0.25 0.25	0.25	-	0.07 0.25 0.25	0.25	-	0.25	
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Variable costs per year Costs explanation ENERGY IN- AND OUTPUTS Energy carriers (per unit of main output) Energy in- and Outputs explanation MATERIAL FLOWS (OPTIONAL)	Data in NTNU (2016) is based on a di a higher (per kg H2 output) value for of the CAPEX costs. Conventional ple scale plant. Due to lack of data, ther costs include here raw water make-tosts include here gas fields. Energy carrier Moin output: Hydrogen Electricity Natural gas resource (gas fields) Production of hydrogen; 10^5 Nm3/(2017) and NTNU (2016) and scaled efficiency of 0,96. A plant with an aw utilization rate.	units (such as SM. Unit PJ PJ PJ PJ A give 10,8*10' accordingly. The erage power of	0.25 nt, and the nur sts, which can a MR) benefit from assumption here d chemicals. Co: -1.00 -0.03 1.47 Min 5*24*365*0,95 ee NTNU study r 300*0,95 MW	bers here are t least in part t economy of s the same sca t developmen Current	0.25 ccaled to represse explained by cale, so you can ling factor can be ts are taken related to the control of	0.25 sent the same si the use of data use a scale-up e applied to thi ative to base ye. -1.00 -0.03 1.47 Min or is to account of 0,82, but ba umbers are sca	ze plant as in I for a smaller s factor of 0.8 (S s plant, includi ar, and are fou 2030 for active runr sed on their ov led by 8,99 to p	0.07 0.25 0.25 0.25 EA (2017). All cozze plant. In the innort et al., 20 ng its CCS comp nd in Vita (2018 -1.00 -1.00 -0.03 0.00 1.47 1.47 - Max ing Mours per y vn reported valigive a per PJ res	0.25 osts excluding fuse figures, the Coop on when estimmonent. All value of the Coop of t	rel costs. Sinno PEX costs ama ating the cost is absed on LH capture are inc 2050	0.07 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	

	Substance	Unit		Current		2030			2050		
	CO2	Mton			-0.04	-0.04			-0.04		
			-0.04	-	-0.04	-0.04	-	-0.04	-0.04	-	-0.04
								-			-
Emissions			Min	-	Max	Min	-	Max	Min	-	Max
					-			-			-
			Min	-	Max	Min	-	Max	Min	-	Max
								-			-
			Min	-	Max	Min	-	Max	Min	-	Max

correct for utilization percentage.

OTHER

ſ			Current			2030			2050	
Other				-			-			-
		Min	-	Max	Min	-	Max	Min	-	Max

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