TECHNOLOGY FACTSHEET

TNO

POST-COMBUSTION CO2											
ate of factsheet	12-8-2020										
uthor	Sam Lamboo										
ector	CCS										
TS / Non-ETS	ETS										
ype of Technology	CCS										
Description	In this factsheet a generic end-of-pipe solution to capture CO2 from flue gases after the combustion of solid fuels such as coal, solid biomass and municipal solid waste (MSW) in por plants is considered. Similar technology can be used for large boilers, but these are not the focus of the factsheet. Reference plants are solid fuel power plants without CCS ((ultra)supercritical coal/lignite, solid biomass, MSW, etc.). There are different requirements for flue gas cleaning and preparation for CO2 capture (dust filters, NOx removal, sulphu scrubbers, etc.) which will influence performance and costs. The performance and cost ranges are considered to be sufficiently close for the variety of solid fuels to group them together in a single factsheet. Post-combustion capture can be attached to an existing power plant or incorporated in the design of a new plant, the latter with potential for increased efficiency and lower total costs. The focus of this factsheet is add-on capture for a stand-alone plant, regardless of age or type of solid fuel, and therefore does not take into account potential efficiency gains cost reductions from integrated design of new plants.										
L level 2020	Post-combustion CCS generally e 2013). There are a variety of tech solvents, such as Mono-Ethanola default for this factsheet. After C By adopting amine technology, & consumption, hence net CO2 rec whether emissions from auxilliar TRL 9	hniques that can be amine (MEA), are th CO2 capture, a rege 85-95% of CO2 can l ductions achieved a	e used to separat le most commor neration step is de captured from re lower than th	te CO2 from th nplace techniq required to rel m the flue gas (ne capture rate	e flue gas, inclue for post-cor lease the CO2 a (IPCC, 2005). Er e. CO2 emissior	uding using sort nbustion captur and clean the so nergy requireme reduction rates	pents/solvents re for power pl lvent so it can ents for captur s for coal powe	, membranes an ants (IPCC 2005 be reused. e and compress	nd distillation n 5), therefore the sion of CO2 lead	nachinery. Che ey are conside d to higher fue	emical ered the el
	Commercial post-combustion CC	•	s have been avai	ilable for sever	al decades (IPC	CC 2005). As of 2	2019 there are	two operationa	al commercial c	coal power pla	ints with po
	combustion capture (Mantriprag	gaua et al 2019).									
ECHNICAL DIMENSIONS	- ·· ····										
nacity	Functional Uni					Va	lue and Range				
pacity	Mton CO2/yea	'		1.00			2.00	<u> </u>		5.60	
	EU	Gton CO2		Current			2030			2050	
tential				300.00			-			-	
			300.00	-	300.00	Min	-	Мах	Min	_	Max
arket share	0	%		-			-			-	
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pacity utlization factor								-	-		
	7,500-8,000										
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Energy in- and Outputs explanation for the regeneration of the solvent used for CO2 capture. The ratio of additional electricity and heat required depends on the plant design. It is here assumed that 40% of additional energy requirement is electricity and 60% heat (based on IEAGHG, 2013). The reported heat required for the regeneration of the solvent varies from 0.23-1 MWhth/ton CO2 captured (IEAGHG, 2013; Mantripragada, 2019). Additional electricity consumption

is approximately 0.17 MWh/ton CO2 captured (IEAGHG, 2013).

	Material	Unit	Current			2030			2050		
			-			-			-		
laterial flows		-	Min	_	Мах	Min	_	Мах	Min	_	Max
				-			-	1		-	
			Min	_	Max	Min	-	Мах	Min	-	Max
1aterial flows explanation									•		
MISSIONS (Non-fuel/energy-rela	ated emissions or emissions reduction	ns (e.g. CCS)									
	Substance		Current			2030			2050		
	CO2	ton/MWhe		-1.00			-			-	
			-1.57	-	-0.50	Min	-	Мах	Min	-	Мах
				-			-			-	
Emissions			Min	-	Max	Min	-	Мах	Min	-	Max
				-			-			-	
			Min	-	Max	Min	-	Мах	Min	-	Мах
				-			-			-	
			Min	-	Max	Min	-	Max	Min	-	Max
THER											
Parameter	Unit			Current			2030			2050	
			0.90			-			-		
Capture rate	% CO2 captured		0.85	-	0.95	Min	-	Max	Min	-	Max
				0.90			-			-	
olvent consumption	kg/ton CO2			0.90				-			
olvent consumption	kg/ton CO2		0.20	-	1.60	Min	-	Мах	Min	-	Мах
Solvent consumption	kg/ton CO2		0.20		1.60	Min	-	Max	Min	-	Max
Solvent consumption	kg/ton CO2		0.20 Min	_	1.60 Max	Min Min	- - -	Max Max	Min Min	- - -	Max Max
olvent consumption	kg/ton CO2			-			-			-	1
olvent consumption			Min Min	- - - -	Max Max	Min Min	- - - -	Max Max	Min Min	- - - -	Max Max
Solvent consumption	According to Rubin et al. (2015		Min Min n significant de	– – – – evelopments in	Max Max CO2 capture r	Min Min rates since the	- - - PCC Special F	Max Max Report on CCS fro	Min Min om 2005, who r	- - - -	Max Max
			Min Min n significant de	– – – – evelopments in	Max Max CO2 capture r	Min Min rates since the	- - - PCC Special F	Max Max Report on CCS fro	Min Min om 2005, who r	- - - -	Max Max
Solvent consumption	According to Rubin et al. (2015	e higher capture rates	Min Min n significant de s are technica	– – – – evelopments in Ily and econom	<i>Max</i> <i>Max</i> CO2 capture r ically feasible i	Min Min ates since the in some specifi	- - - PCC Special F c applications	Max Max Report on CCS fro 6 (IEAGHG, 2014)	Min Min om 2005, who r	- - - eported a ran	Max Max ge of 85-959
·	According to Rubin et al. (2015 the time. Some reports indicat	e higher capture rates	Min Min n significant de s are technica	– – – – evelopments in Ily and econom	<i>Max</i> <i>Max</i> CO2 capture r ically feasible i	Min Min ates since the in some specifi	- - - PCC Special F c applications	Max Max Report on CCS fro 6 (IEAGHG, 2014)	Min Min om 2005, who r	- - - eported a ran	Max Max ge of 85-959
·	According to Rubin et al. (2015 the time. Some reports indicat	e higher capture rates	Min Min n significant de s are technica	– – – – evelopments in Ily and econom	<i>Max</i> <i>Max</i> CO2 capture r ically feasible i	Min Min ates since the in some specifi	- - - PCC Special F c applications	Max Max Report on CCS fro 6 (IEAGHG, 2014)	Min Min om 2005, who r	- - - eported a ran	Max Max ge of 85-959
xplanation	According to Rubin et al. (2015 the time. Some reports indicat	e higher capture rates	<i>Min</i> <i>Min</i> n significant de s are technica I therefore req	– – – – evelopments in lly and econom juires replacem	<i>Max</i> <i>Max</i> CO2 capture r ically feasible i	Min Min ates since the in some specifi	- - - PCC Special F c applications	Max Max Report on CCS fro 6 (IEAGHG, 2014)	Min Min om 2005, who r	- - - eported a ran	Max Max ge of 85-959
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