Electronic Supplementary Material

Carbon capture for decarbonisation of energy-intensive industries: a comparative review of techno-economic feasibility of solid looping cycles

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Table A1. Input data for calculation of equivalent energy consumption: thermal energy of fuel *(Q_{LHV})*, thermal energy of steam *(Q_{th})* and electrical energy *(P_e)*. The values are presented as the difference between the plant with CO_2 capture and the reference plant, respectively.

Reference			Thermal energy of fuel /($MJ_{th}/kgCO_2$)	Thermal energy of steam /($MJ_{th}/kgCO_2$)	Electrical energy[a] /($MJ_{el}/kgCO_2$)
		Iron and Steel			
Ho et al. [83]	Amine scrubbing (Monoethanolamine): Blast furnace flue ga				1.51
	Amine scrubbing (Monoethanolamine): Corex iron production flue gas				1.41
	Physical absorption: Shifted blast furnace flue gas				1.08
	Physical absorption: Shifted corex flue gas				0.55
Ho et al. [88]	VPSA: Blast furnace flue gas				1.04
	Amine scrubbing (Monoethanolamine): TGRBF				1.44
	VPSA: TGRBF				0.93
	Amine scrubbing (Monoethanolamine): Hismelt				1.50
	VPSA: Hismelt				1.08
	VPSA: Corex				0.82
Tsupari et al. [42]	Amine scrubbing (Monoethanolamine)	Layout 1			0.23
		Layout 2			1.27
		Layout 3			1.20
		Layout 4			1.96
		Layout 5			1.88
	Amine scrubbing (Advanced amine)	Layout 1			0.26
		Layout 2			1.09
		Layout 3			1.04
		Layout 4			1.86
		Layout 5			1.86
	Amine scrubbing (Low-temperature regeneration amine, “Low-T”)	Layout 1			0.32
		Layout 2			1.07
		Layout 3			1.01
		Layout 4			1.86
		Layout 5			1.86
Garðarsdóttir et al. [90]	Amine scrubbing (Monoethanolamine)			3.60	0.37
Cormos et al. [91]	Amine scrubbing (Monoethanolamine)		-0.60		-0.44
	Calcium looping		2.52		0.57
Tian et al. [19]	Calcium looping		2.80		

[a] Minus sign represents an output compared with the reference

		Cement			
Barker et al. [98]	Amine scrubbing (Monoethanolamine)		6.01		-0.38
	Oxy-fuel combustion		0.07		0.79
Ho et al. [83]	Amine scrubbing (Monoethanolamine)				1.50
Atsonios et al. [101]	Amine scrubbing (Monoethanolamine)		3.57		0.38
	Calcium looping		6.18		-1.46
Zhou et al. [103]	Amine scrubbing (Monoethanolamine) + CHP		9.47		-0.62
	Amine scrubbing (Monoethanolamine) + imported utilities			3.7	0.54
	Oxy-fuel combustion		0.80		0.54
Gardarsdottir et al. [26]	Amine scrubbing (Monoethanolamine)			3.65	0.54
	Oxy-fuel combustion		0.15		0.70
Markewitz et al. [104].	Amine scrubbing (Monoethanolamine) + imported utilities			3.60	0.41
	Amine scrubbing (Monoethanolamine) + imported utilities			3.50	0.41
	Amine scrubbing (Monoethanolamine) + steam produced on-site			3.80	0.44
	Amine scrubbing (Monoethanolamine) + CHP			3.80	0.44
Cormos et al. [91]	Amine scrubbing (Monoethanolamine)		5.97		-0.52
	Calcium looping		4.97		-0.51
Romeo et al. [107]	Calcium looping		0.71		
Rodríguez et al. [46]	Calcium looping		1.51		-0.11
	Oxy-fuel combustion		1.20		-0.01
Diego et al. [108]	Calcium looping (94 % capture rate)		3.09		-0.69
	Calcium looping (58 % capture rate)		0.19		0.44
De Lena et al. [20]	Calcium looping (100% integration)		2.19		0.15
	Calcium looping (50% integration)		3.34		-0.23
	Calcium looping (20% integration)		4.37		-0.69
		Petroleum refining industry			
van Straelen et al. [110].	Amine scrubbing (Monoethanolamine)		4.86		-0.51
Ho et al. [83]	Amine scrubbing (Monoethanolamine)				1.59
Berghout et al. [113][b]	Refinery 1	Amine scrubbing (Monoethanolamine) Post-		2.40(ST)/1.60(LT)	0.35(ST)/0.37(LT)
		Amine scrubbing (Monoethanolamine) Pre-			0.54
		Oxy-fuel combustion			1.31(ST)/1.00(LT)
	Refinery 2	Amine scrubbing (Monoethanolamine) Post-		2.74(ST)/2.05(LT)	0.43(ST)/0.47(LT)
		Amine scrubbing (Monoethanolamine) Pre-			0.50
		Oxy-fuel combustion			1.19 (ST)/0.88(LT)
	Chemical	Amine scrubbing (Monoethanolamine) Post-		3.25(ST)/2.00(LT)	0.50(ST)/0.50(LT)
	Plant 1	Amine scrubbing (Monoethanolamine) Pre-			0.50
		Oxy-fuel combustion			1.25(ST)/1.00(LT)
	Chemical	Amine scrubbing (Monoethanolamine) Post-		3.60(ST)/1.89(LT)	
	Plant 2	Oxy-fuel combustion			1.79 (ST)/2.38(LT)

	Steam Reforming H2 plant	Amine scrubbing (Monoethanolamine) Post- Amine scrubbing (Monoethanolamine) Pre-		3.0(ST)/2.13(LT) 2.00	1.13(ST)/1.13(LT) 0.40
Fernández-Dacosta et al. [114]	Amine scrubbing (Mixture of methyl diethanolamine and piperazine)			3.00	0.31
		Pulp and Paper			
Hektor and Berntsson [118]	Amine scrubbing (Monoethanolamine): configuration 1		4.02		-0.27
	Amine scrubbing (Monoethanolamine): configuration 2		4.50		-2.48
	Amine scrubbing (Monoethanolamine): configuration 3				1.09
	Amine scrubbing (Monoethanolamine): configuration 4		3.09		-0.09
	Amine scrubbing (Monoethanolamine): configuration 5		1.30		-1.42
McGrail et al. [3].	Amine scrubbing (Monoethanolamine):		2.18		
Onarheim et al. [43]	Pulp plant	Amine scrubbing (Monoethanolamine): configuration 1			1.12
		Amine scrubbing (Monoethanolamine): configuration 2			1.06
		Amine scrubbing (Monoethanolamine): configuration 3			0.94
		Amine scrubbing (Monoethanolamine): configuration 4			1.17
		Amine scrubbing (Monoethanolamine): configuration 5			1.12
		Amine scrubbing (Monoethanolamine): configuration 6			1.37
	Pulp and paper plant	Amine scrubbing (Monoethanolamine): configuration 1		3.07	0.90
		Amine scrubbing (Monoethanolamine): configuration 2			1.11
		Amine scrubbing (Monoethanolamine): configuration 3			1.01
		Amine scrubbing (Monoethanolamine): configuration 4		3.07	0.80
		Amine scrubbing (Monoethanolamine): configuration 5		3.05	0.83
		Amine scrubbing (Monoethanolamine): configuration 6		3.05	0.72
Garðarsdóttir et al. [90]	Amine scrubbing (Monoethanolamine)			3.75	0.39
Santos et al. [21].	Calcium looping		5.09		-0.63