LIST OF TABLE CAPTIONS

Notes: [a]) In FB configuration; [b]) At capsule permeability of 3260 barrer and capsule thickness of 10 μm; [c]) Average value at the loading range and operating conditions used; [d]) at 60 °C

Table S1

Parameter	**CFB No HI**	**CFB HI**
Number of units of MBHE heater	0	8
Number of units of MBHE cooler	8	8
MBHE heater height (m)	n/a	9.9
MBHE heater length & width (m)	n/a	4.9
MBHE cooler height (m)	10.9	10.9
MBHE cooler length & width (m)	5.8	4.9
Overall heat transfer coefficient in the regenerator ($W/m^2.K$)	304	
Recycled-CO_2 stream flowrate (% of stripped-CO_2 flowrate)	20	
Recycled-CO_2 stream superficial velocity (m/s)	0.1	
Tube diameter (m)	0.019	
Tube arrangement	Square	
Tube pitch	1.5	

Table S2

Properties	Relevant process units	Applicable Range	Reference source	Ref
Absorption enthalpy	Absorber, regenerator	Temperature = 40-120 °C	Empirical equation	1
Absorption rate	Absorber, regenerator	T = 40-120 °C Concentration = 1-30 %-wt.	Empirical equation	2
Equivalent CO_2 partial pressure in solution	Absorber, regenerator	Loading = 0-1 mole/mole Concentration = 30 %-wt. Temperature = 25-120 °C	Empirical equation	1
Solution density	Absorber, regenerator, HE	Temperature = 40-120 °C	Experimental work	2
Solution heat capacity	Absorber, HE, regenerator	Temperature = 40-120 °C	Experimental work	3
Solution viscosity	Absorber, regenerator	Temperature = 40-120 °C	Experimental work	2
Water vapor pressure	Regenerator	T = 40-120 °C	Empirical equation	1

Table S3

Parameter	Input parameters	This paper	Output from reference
Sensible heat duty of Na_2CO_3 30 % [a] (MJ/kg $CO_{2,c}$)	Loadings Concentration Temperature	0.85	0.84 [4]
Water vaporization duty of Na_2CO_3 30 % [a] (MJ/kg $CO_{2,c}$)	Loadings Concentration Temperature	0.13	0.13 [5]
Mass transfer rate of membrane resistance [b] (kmole/m^2.s.Pa)	Permeability Thickness Capsule diameter	$1.1x10^{-7}$	$1.1x10^{-7}$ [5]
Overall absorption rate of Na_2CO_3 30 % [c] (kmole/m^2.s.Pa)	Loadings Concentration Temperature	$2.0x10^{-8}$	$2.0x10^{-8}$ [5]
Specific surface area for 500 µm capsule (m^2/m^3)	Capsule diameter Void fraction	7440	7440 [5]
PCO_2 at rich loading of MEA = 0.46 (kPa) [d]	Loadings Concentration Temperature	1.25	1.25 [1]
PCO_2 at lean loading of MEA = 0.23 (kPa) [d]	Loadings Concentration Temperature	0.06	0.06 [1]
Average void fraction of fixed-bed	Void fraction	0.38	0.38 [6]
Average void fraction of bubbling-bed	Void fraction	0.50	0.45-0.55 [6]
Average void fraction of CFB	Void fraction	0.91	0.80-0.95 [6]

Supplementary Reference

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