Supporting Information

Economic optimization design of CO2 pipeline transportation with booster stations

Mohammad Mohammadi[1], Farzad Hourfar[2], Ali Elkamel[1,3] and Yuri Leonenko[4,5,1*]

[1] Department of Chemical Engineering, University of Waterloo, Waterloo, N2L 3G1 Canada

[2] Control & Intelligent Processing Center of Excellence (CIPCE), School of Electrical & Computer Engineering, University of Tehran, Tehran, Iran

[3] Department of Chemical Engineering, Khalifa University, Abu Dhabi, UAE

[4] Department of Earth and Environmental Sciences, University of Waterloo, Waterloo, N2L 3G1

[5] Department of Geography and Environmental Management, University of Waterloo, Waterloo, N2L 3G1 Canada

Table S1: Parameters of the CO_2 hydrodynamic model.

Parameter	Physical Meaning	Unit
p	CO_2 pressure	MPa
ρ	CO_2 density	kgm^{-3}
ν	CO_2 flow velocity	ms^{-1}
$\dot{m}$	CO_2 mass flow-rate	kgs^{-1}
D	Pipeline internal diameter	m
f_F	Fanning frication factor	--
Re	Reynolds number	--
ε	Pipeline wall roughness	m
θ	Angle between pipeline and horizon	rad
z	Pipeline elevation	m
L	Pipeline length	km

* Corresponding author: leonenko@uwaterloo.ca

Table S2: Bivariate Table shows total annual cost (millions $) for a 500 km pipeline at varying values of diameter D and power of a pump W_p.

	Power of the Pump in MW									
Pipeline Diameter (m)	**W_p=1**	**W_p=2**	**W_p=3**	**W_p=4**	**W_p=5**	**W_p=6**	**W_p=7**	**W_p=8**	**W_p=9**	**W_p=10**
D=0.2	11.0	19.24	27.13	34.6	41.84	48.67	55.14	61.26	67.03	72.44
D=0.3	13.31	21.55	29.44	36.98	44.16	50.98	57.46	63.57	69.34	74.75
D=0.4	16.49	24.73	32.62	40.15	47.33	54.16	60.63	66.75	72.52	77.93
D=0.5	20.52	28.7	36.65	44.19	51.37	58.19	64.67	70.79	76.55	81.96
D=0.6	25.42	33.66	41.55	49.08	56.26	63.09	69.56	75.68	81.45	86.86
D=0.7	31.17	39.42	47.3	54.84	62.02	68.84	75.32	81.44	87.20	92.61
D=0.8	37.79	46.03	53.9	61.45	68.63	75.46	81.93	88.05	93.82	99.23
D=0.9	45.27	53.51	61.40	68.93	76.11	82.94	89.41	95.53	101.29	106.71
D=1.0	53.60	61.84	69.73	77.27	84.45	91.27	97.75	103.86	109.63	115.04

* Corresponding author: leonenko@uwaterloo.ca