KNOLL LEIBEL LLP
ATTORNEYS AT LAW

May 29, 2024

VIA U.S. MAIL & E-MAIL ONLY: ndpsc@nd.gov
Steve Kahl
Executive Secretary
North Dakota Public Service Commission
State Capitol
600 E Boulevard Ave, Dept 408
Bismarck, ND 58505-0480

RE: In the Matter of the Application of SCS Carbon Transport LLC for Certificate of Corridor Compatibility and Route Permit for the Midwest Carbon Express
Case No.: PU-22-391

Dear Mr. Kahl:

Enclosed for filing please find the following documents:

1. Landowner Intervenors' Hearing Exhibit 51; and
2. Declaration of Service.

This Exhibit is being filed with the North Dakota Public Service Commission (hereinafter "NDPSC") on behalf of the Intervenors represented by Knoll Leibel LLP. These Intervenors have a direct and substantial interest in these proceedings, as well as legal property rights which may be substantially affected by NDPCS' findings and conclusions.

Sincerely,

KNOLL LEIBEL LLP

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Enclosures

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Prefiled Landowner Intervenors' Hearing Exhibit 51
Knoll Leibel, LLP, on behalf of the Intervenors
Michael Joyner, Attorney

47 Countries Whose Electricity Generation in 2021 or 2022 was 50-100% Wind-Water-Solar (WWS) (Including 10 With 97.3-100% WWS Generation) and 12 U.S. States That Produced the Equivalent of 53-97% of the Electricity They Consumed With WWS in 2023

By Mark Z. Jacobson March 31, 2024

Table 1. (a) Population by country. (b) 2021 or 2022 electricity generation by country. (c) Percentage of the total electricity generated within a country that is generated by a WWS technology. All energy numbers are for 2021 unless specified with "('22)" after the country name.

	(a)	(b)	(c) Percentage of All Electricity Generated by WWS Technology					
	2021 Pop-ulation (millions)	Electricity generation (GWh/y)	Hydro-power (%)	Wind (%)	Geother mal (%)	Utility PV+CSP (%)	Tidal/ wave (%)	Total WWS (%)
1. Albania	**2.81**	8,963	99.54	0.00	0.00	0.46	0	100.00
2. Bhutan	**0.78**	11,000	100.00	0.00	0.00	0.00	0	100.00
3. Nepal	**29.7**	9,668	98.61	0.01	0.00	1.38	0	100.00
4. Paraguay	**7.22**	40,576	100.00	0.00	0.00	0.00	0	100.00
5. Iceland ('22)	**0.372**	20,003	70.96	0.02	29.00	0.00	0	99.99
6. Ethiopia	**117.9**	15,515	96.13	3.62	0.00	0.22	0	99.96
7. Congo, DR	**92.4**	13,190	99.55	0.00	0.00	0.23	0	99.78
8. Costa Rica ('22)	**5.14**	12,734	72.92	12.35	12.57	0.64	0	98.48
9. Norway ('22)	**5.41**	146,799	88.12	10.09	0.00	0.16	0	98.38
10. Namibia	**2.59**	1,507	64.23	1.46	0.00	31.59	0	97.28
11. Zambia	**18.9**	17,637	91.13	0.00	0.00	0.84	0	91.97
12. Uganda	**45.85**	5,184	89.51	0.00	0.00	2.41	0	91.92
13. Tajikistan	**9.75**	20,720	90.04	0.00	0.00	0.00	0	90.04
14. Kenya	**55**	12,376	29.69	16.04	40.70	1.35	0	87.78
15. Kyrgyzstan	**6.69**	15,138	85.59	0.00	0.00	0.00	0	85.59
16. New Zealand ('22)	**5.12**	44,697	58.75	6.41	19.11	0.58	0	84.86
17. Mozambique	**32.2**	18,863	82.00	0.00	0.00	0.37	0	82.37
18. Georgia	**10.8**	12,645	80.52	0.66	0.00	0.00	0	81.18
19. Ecuador	**17.9**	32,128	79.60	0.19	0.00	0.12	0	79.91
20. Brazil ('22)	**214.3**	675,383	63.24	12.09	0.00	4.46	0	79.79
21. Venezuela	**28.2**	82,566	79.54	0.11	0.00	0.01	0	79.66
22. Panama	**4.38**	12,107	68.90	4.38	0.00	4.84	0	78.12
23. Luxembourg ('22)	**0.639**	2,213	50.75	14.82	0.00	10.35	0	75.92
24. Angola	**33.9**	16,783	75.30	0.00	0.00	0.00	0	75.30
25. Lao, PR	**7.38**	44,915	73.24	0.00	0.00	0.14	0	73.38
26. Austria ('22)	**8.956**	69,219	56.66	10.47	0.00	5.48	0	72.61
27. Colombia ('22)	**51.52**	84,425	71.89	0.07	0.00	0.40	0	72.36
28. Zimbabwe	**15.99**	8,454	70.12	0.00	0.00	0.21	0	70.33
29. El Salvador	**6.52**	6,345	28.70	0.00	24.57	16.96	0	70.23

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30. Canada ('22)	**38.3**	656,110	60.80	5.72	0.00	1.06	0	67.58
31. Uruguay	**3.49**	15,995	32.97	31.20	0.00	3.02	0	67.19
32. Korea, DPR	**25.9**	25,566	62.97	0.00	0.00	0.26	0	63.23
33. Croatia	3.899	15,212	47.52	13.56	0.59	0.98	0	62.65
34. Cameroon	**27.2**	7,940	61.80	0.00	0.00	0.58	0	62.38
35. Sudan	**45.66**	17,563	62.34	0.00	0.00	0.00	0	62.34
36. Sweden ('22)	**10.4**	173,195	40.59	19.10	0.00	1.13	0	60.83
37. Peru	**33.72**	56,774	56.17	3.21	0.00	1.41	0	60.79
38. Denmark ('22)	**5.86**	34,976	0.05	53.96	0.00	6.30	0	60.31
39. Lithuania ('22)	**2.8**	4,780	21.34	31.63	0.00	7.15	0	60.13
40. Latvia ('22)	**1.884**	4,990	55.09	3.81	0.00	0.82	0	59.72
41. Cambodia	**16.59**	10,158	52.39	0.00	0.00	6.33	0	58.72
42. Switzerland ('22)	**8.7**	65,029	52.03	0.23	0.00	5.66	0	57.92
43. Rwanda	**13.46**	977	55.78	0.00	0.00	1.84	0	57.63
44. Honduras	**10.28**	11,121	33.85	6.97	3.13	10.25	0	54.20
45. Portugal ('22)	10.33	48,614	18.07	27.29	0.40	7.14	0	52.90
46. Eswatini	**1.192**	579	52.50	0.00	0.00	0.17	0	52.68
47. Chile ('22)	19.49	87,729	23.29	10.11	0.53	16.14	0	50.06
Total >50% WWS	**1,117**	2,699,061	61.62	8.71	0.88	2.75	0	73.95
World ('21)	**7,888.**	**28,519,666**	**15.47**	**6.54**	**0.33**	**3.63**	**0.0034**	**25.97**
China	**1,412**	8,634,175	15.51	7.60	0.00	3.79	0	26.90
United States ('22)	**331.9**	4,501,875	6.36	9.77	0.44	4.19	0	20.75
Japan ('22)	**125.7**	1,012,884	9.19	0.95	0.29	9.36	0	19.79
India	**1,408**	1,635,167	9.93	4.72	0.00	4.62	0	19.27
Russia	**143.4**	1,159,418	18.66	0.29	0.04	0.19	0	19.18

Source: IEA (2024), except for Bhutan, which is from IRENA (2023) . Updated from Jacobson (2020). Data do not include rooftop (distributed) PV.

Table 2. (a) Population by country or state. (b) 2023 electricity consumption by U.S. states and 2020 electricity consumption by Scotland. (c) Percentage of the total electricity consumed that is produced in 2022 (for Scotland) or 2023 (for U.S. states) by WWS if no WWS electricity was exported (the equivalent percent of electricity consumed that is produced by WWS). (d) January 2024 residential electricity price rank by state (1 = state with lowest electricity price).

	(a)	**(b)**	**(c) % Consumed Electricity From WWS if no WWS Exports**							**(d)**
	2023 Population (million)	Electricity consumption (GWh/y)	Hydro-power (%)	Wind (%)	Geo-thermal (%)	Utility PV + CSP (%)	Roof PV (%)	Tidal/ wave (%)	Total WWS (%)	Electricity price rank
Scotland (2020/22)	**5.46**	32,518	15.94	85.37	0	1.21	--	0.03	102.56	
1. South Dakota ('23)	**0.919**	13,472	26.45	69.69	0	0.35	0.03	0	96.52	10
2. Montana ('23)	**1.13**	15,467	49.63	29.49	0	1.55	0.49	0	81.17	13
3. Iowa ('23)	**3.21**	54,796	1.37	76.41	0	0.95	0.71	0	79.44	12
4. Wash. State ('23)	**7.95**	88,702	68.59	8.57	0	0.41	0.58	0	78.15	8
5. Oregon ('23)	**4.23**	53,982	45.99	16.06	0.39	3.49	0.95	0	66.89	25
6. Kansas ('23)	**2.94**	41,419	0.03	66.30	0	0.20	0.31	0	66.84	18
7. New Mexico ('23)	**2.11**	28,696	0.41	51.92	0.13	8.79	2.45	0	63.69	24
8. Maine ('23)	**1.40**	11,231	27.25	21.82	0	5.18	5.40	0	59.67	45
9. Oklahoma ('23)	**4.05**	68,805	2.70	54.84	0	0.11	0.24	0	57.89	9
10. Wyoming ('23)	**0.584**	16,833	3.77	52.77	0	1.03	0.17	0	57.74	7
11. North Dakota ('23)	**0.784**	28,647	5.05	51.27	0	0	0.01	0	56.32	2

12. California ('23)	**39.0**	238,240	13.38	6.25	4.60	17.09	11.80	0	53.12	48
13. Nevada ('23)	**3.19**	38,349	3.40	0.76	11.20	25.38	4.41	0	45.15	35
14. Colorado ('23)	**5.88**	56,363	2.35	28.40	0	6.40	3.02	0	40.17	29
15. Idaho ('23)	**1.90**	25,509	26.45	9.11	0.34	3.34	0.93	0	40.17	3
16. Nebraska ('23)	**1.98**	33,447	2.54	35.73	0	0.25	0.15	0	38.66	1
17. Vermont ('23)	**0.648**	5,350	22.04	6.36	0	3.74	4.47	0	36.60	41
18. Hawaii ('23)	**1.44**	8,888	1.00	7.23	3.92	7.25	15.85	0	35.25	50
19. Texas ('23)	**30.5**	486,787	0.18	24.62	0	5.63	0.89	0	31.31	28
20. New York ('23)	**19.6**	139,061	19.92	3.53	0	1.78	2.86	0	28.08	42
21. Minnesota ('23)	**5.74**	66,482	1.08	22.06	0	3.00	0.49	0	26.63	26
United States ('23)	**331.9**	**3,861,342**	**6.21**	**11.01**	**0.43**	**4.26**	**1.91**	**0**	**23.82**	

Sources: Scottish Government (2023, 2021) for Scotland; and EIA (2024a) for U.S. states. Updated from Jacobson (2020). Price rank by state from EIA (2024b)

22-3 for U.S. states include Q4 2022 and Q1, Q2, Q3 2023. Roof PV is distributed (non-utility) PV.

References

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IRENA (International Renewable Energy Agency), 2023, https://www.irena.org/-/media/Files/IRENA/Agency/Statistics/Statistical_Profiles/Asia/Bhutan_Asia_RE_SP.pdf

Jacobson, M.Z., *100 Clean, Renewable Energy and Storage for Everything*, Cambridge University Press, New York, 427 pp., 2020, https://web.stanford.edu/group/efmh/jacobson/WWSBook/WWSBook.html

Scottish Government (2023, 2021). WWS electricity generation for Scotland is for 2022 and from https://scotland.shinyapps.io/Energy/?Section=RenLowCarbon&Subsection=RenElec&Chart=RenElecGen. Total electricity consumption in Scotland though is from 2020 until 2022 or 2021 data can be obtained, and from https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2018/10/quarterly-energy-statistics-bulletins/documents/energy-statistics-summary---december-2021/energy-statistics-summary---december-2021/govscot%3Adocument/Scotland%2BEnergy%2BStats%2BQ3%2B2021.pdf

STATE OF NORTH DAKOTA
PUBLIC SERVICE COMMISSION

IN THE MATTER OF THE APPLICATION OF SCS CARBON TRANSPORT LLC FOR A CERTIFICATE OF CORRIDOR COMPATIBILITY AND ROUTE PERMIT FOR THE MIDWEST CARBON EXPRESS PROJECT IN BURLEIGH, CASS, DICKEY, EMMONS, LOGAN, MCINTOSH, MORTON, OLIVER, RICHLAND AND SARGENT COUNTIES, NORTH DAKOTA	Case No. PU-22-391 **DECLARATION OF SERVICE**

[1] Rosanne Ogden declares that I am of legal age and not a party to this action, and that I served the following document(s):

1. Landowner Intervenors' Hearing Exhibits 51; and
2. Declaration of Service.

[2] On May 29, 2024, by sending a true and correct copy thereof by electronic means only to the following email addresses, to wit:

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[3] and by mailing the originals and seven (7) copies of said documents to the North address listed below, to the following:

Steve Kahl
Executive Secretary
North Dakota Public Service Commission
State Capitol
600 E Boulevard Ave, Dept 408
Bismarck, ND 58505-0480

[4] The addresses of each party served are the last reasonably ascertainable e-mail address and office address of such party.

[5] I declare, under penalty of perjury under the law of North Dakota, that the foregoing is true and correct.

Signed on the 29th day of May, 2024 at Bismarck, North Dakota.

Rosanne Ogden

Rosanne Ogden