Electronic Supplementary Material (ESI) for Energy & Environmental Science.

Supplementary Materials
Mining Bitcoins with Carbon Capture and Renewable Energy for Carbon Neutrality Across States in the USA

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Table S 1. Economic parameters used in the optimization model and economic analysis.

Parameter	Symbol	Value	Unit	Ref.
Minimum penetration from power grid	PE_{MIN}^{GRID}	0	MW	
Maximum penetration from power grid	PE_{MAX}^{GRID}	100	MW	
Minimum penetration from green hydrogen grid	H_{MIN}^{REN}	0	kg	
Maximum penetration from green hydrogen grid	H_{MAX}^{REN}	2000	kg	
Cost of green hydrogen	C_H^{REN}	12	\$/kg	1
Number of years	NY	4	yr	2
Inflation rate	IR	0.045	-	2
Deionized water	$f_w.\pi_w$	10 kg/kg for 0.0112 \$	\$/kg-H_2	
KOH	$f_{KOH}.\pi_{KOH}$	0.0019 kg/kg for 2.8119 \$	\$/kg-H_2	3
Steam	$f_{N_2}.\pi_{N_2}$	0.11 kg/kg for 0.0112 \$	\$/kg-H_2	
Nitrogen	$f_S.\pi_S$	0.00029 kg/kg for 0.3117 \$	\$/kg-H_2	
Equipment lifetime	N^X	15	yr.	3
O&M of PV	OMC^{PV}	0	\$/MW	4
O&M of WT	OMC^{WT}	0	\$/MW	4
O&M of FC	OMC^{FC}	14	\$/MW	5
O&M of CCHP	OMC^{CCHP}	9	\$/MW	6
O&M of HP	OMC^{HP}	5	\$/MWh	7
O&M of BESS	OMC^{BESS}	30	\$/MWh	8
O&M of Hydrogen Tank	OMC^{HT}	1.54	\$/kg	9
BESS Degradation Cost	C^{DEG}	3.5	\$/MWh	10
Fixed operating cost of PV	$C^{FOC.PV}$	14,520	\$/MW	11,12
Fixed operating cost of WT	$C^{FOC.WT}$	25,300	\$/MW	12
Fixed operating cost of ELE	$C^{FOC.ELE}$	14,500	\$/MW	13
Fixed operating cost of FC	$C^{FOC.FC}$	13,400	\$/MW	5
Fixed operating cost of CCHP	$C^{FOC.CCHP}$	20,000	\$/MW	6
Fixed operating cost of HP	$C^{FOC.HP}$	7,270	\$/MW	14
Fixed operating cost of BESS	$C^{FOC.BESS}$	10,000	\$/MW	8
Fixed operating cost of Hydrogen Tank	$C^{FOC.HT}$	0.9	\$/kg	9
Cost of PV	C^{PV}	638,000	\$/MW	11,12
Cost of WT	C^{WT}	1,265,000	\$/MW	11,12
Cost of ELE	C^{ELE}	630,000	\$/MW	15
Cost of FC	C^{FC}	300,000	\$/MW	9
Cost of CCHP	C^{CCHP}	700,000	\$/MW	16
Cost of HP	C^{HP}	300,000	\$/MW	7
Cost of BESS	C^{BESS}	257,400	\$/MWh	12
Cost of HTANK	C^{HTANK}	50,000	\$/kg	9
DAC CAPEX HT/LT	C^{DAC}	204.6/132	\$/ton.CO_2	17,18
MeOH CAPEX	C^{MeOH}	845	\$/ton.MeOH	19
Fixed operating cost of DAC HT/LT	$C^{FOC.DAC}$	4.07/4.4 % of CAPEX	\$	18,20,21
Fixed operating cost of MeOH	$C^{FOC.MeOH}$	3% of CAPEX	\$	19
Penalty cost for CO_2 emissions	PC_{PE}^{CO2}	49	\$/ton.CO_2	22
Cost of Antminer	C^{Miner}	6,785*	\$	23

*Subject to high market variation

Table S 2. US state-wise CO_2 emissions from bitcoin mining, HT-DAC electrical and thermal demand, total CAPEX and OPEX, and net CO_2 emissions for the GOP HT-DAC carbon capture and storage and bitcoin mining.

State	CO_2 Emissions	DAC		Total CAPEX	Total OPEX	Net CO_2 Emissions
		DAC P_e	DAC P_t			
	tons/year	MWh		$		tons/year
Alabama	53184.36	2.00	10.52	56,381,786	15,105,079	28,245.55
Alaska	73709.61	2.78	14.58	59,042,095	44,795,039	54,253.82
Arizona	52341.46	1.97	10.35	56,272,536	15,435,188	27,357.33
Arkansas	69596.09	2.62	13.77	58,508,935	16,469,772	48,367.29
California	33274.92	1.25	6.58	53,801,292	29,240,700	11,056.46
Colorado	82300.48	3.10	16.28	60,155,572	22,148,384	67,637.40
Connecticut	38768.94	1.46	7.67	54,513,381	28,687,706	15,008.94
Delaware	68020.64	2.56	13.46	58,304,739	19,655,493	46,202.29
District of Columbia	41483.12	1.56	8.21	54,865,169	18,317,216	17,184.03
Florida	63507.41	2.39	12.56	57,719,772	19,499,004	40,274.57
Georgia	52787.59	1.99	10.44	56,330,360	14,150,008	27,825.69
Hawaii	129611.17	4.88	25.64	66,287,584	87,413,348	167,751.72
Idaho	16304.21	0.61	3.23	51,601,692	10,938,754	2,654.49
Illinois	39640.94	1.49	7.84	54,626,401	14,622,250	15,691.70
Indiana	114278.20	4.31	22.61	64,300,253	24,941,971	130,409.40
Iowa	47609.92	1.79	9.42	55,659,274	15,833,184	22,634.82
Kansas	55256.40	2.08	10.93	56,650,346	18,174,804	30,489.29
Kentucky	129424.96	4.88	25.60	66,263,449	21,491,358	167,270.06
Louisiana	60735.97	2.29	12.02	57,360,561	13,403,949	36,836.13
Maine	16016.46	0.60	3.17	51,564,396	15,922,801	2,561.62
Maryland	42223.86	1.59	8.35	54,961,178	17,732,393	17,803.20
Massachusetts	52973.63	2.00	10.48	56,354,472	31,117,860	28,022.16
Michigan	68651.72	2.59	13.58	58,386,534	20,955,265	47,063.58
Minnesota	55518.47	2.09	10.98	56,684,314	20,277,511	30,779.19
Mississippi	65987.15	2.49	13.05	58,041,176	16,091,474	43,481.14
Missouri	125271.80	4.72	24.78	65,725,151	25,046,099	156,707.14
Montana	64925.96	2.45	12.84	57,903,632	14,442,775	42,093.87
Nebraska	86622.03	3.26	17.14	60,715,695	23,195,126	74,927.09
Nevada	52957.45	1.99	10.48	56,352,376	14,147,164	28,005.05
New Hampshire	16770.83	0.63	3.32	51,662,172	22,751,983	2,808.61
New Jersey	36768.72	1.39	7.27	54,254,128	21,468,618	13,500.16
New Mexico	86249.31	3.25	17.06	60,667,385	17,974,334	74,283.68
New York	28298.11	1.07	5.60	53,156,240	11,429,243	7,996.45
North Carolina	50670.44	1.91	10.02	56,055,953	15,427,217	25,638.44
North Dakota	98925.64	3.73	19.57	62,310,384	26,016,978	97,723.69
Ohio	92902.14	3.50	18.38	61,529,669	19,407,483	86,185.37
Oklahoma	47988.22	1.81	9.49	55,708,305	11,159,985	22,995.95
Oregon	24479.87	0.92	4.84	52,661,352	12,144,993	5,984.12
Pennsylvania	52613.53	1.98	10.41	56,307,799	15,547,324	27,642.48
Rhode Island	63012.32	2.37	12.47	57,655,603	40,161,125	39,649.07
South Carolina	37737.87	1.42	7.47	54,379,742	13,134,688	14,221.22
South Dakota	24673.36	0.93	4.88	52,686,431	15,329,514	6,079.09
Tennessee	42704.50	1.61	8.45	55,023,475	12,687,365	18,210.82
Texas	63326.60	2.39	12.53	57,696,337	14,487,863	40,045.57
Utah	119634.33	4.51	23.67	64,994,470	22,788,299	142,920.25
Vermont	192.36	0.01	0.04	49,513,410	16,427,106	0.37
Virginia	47469.44	1.79	9.39	55,641,066	15,691,008	22,501.44
Washington	15749.25	0.59	3.12	51,529,763	9,397,595	2,476.86
West Virginia	150668.28	5.68	29.81	69,016,829	27,272,747	226,686.56
Wisconsin	88639.33	3.34	17.54	60,977,159	24,291,932	78,457.60
Wyoming	134794.43	5.08	26.67	66,959,394	27,999,753	181,437.06

*DAC P_e, P_t corresponds to electrical and thermal power demand for the HT-DAC

Table S 3. US state-wise CO_2 emissions from bitcoin mining, LT-DAC electrical and thermal demand, total CAPEX and OPEX, and net CO_2 emissions for the GOP LT-DAC carbon capture and storage and bitcoin mining.

State	CO_2 Emissions	DAC		Total CAPEX	Total OPEX	Net CO_2 Emissions
		DAC P_e	DAC P_t			
	tons/year	MWh		$		tons/year
Alabama	53184.36	1.49	3.79	53,617,961	11,878,792	12,601.48
Alaska	73709.61	2.07	5.26	55,211,637	33,918,383	24,204.82
Arizona	52341.46	1.47	3.73	53,552,513	12,178,434	12,205.21
Arkansas	69596.09	1.95	4.97	54,892,244	12,376,193	21,578.60
California	33274.92	0.93	2.37	52,072,098	24,946,188	4,932.73
Colorado	82300.48	2.31	5.87	55,878,673	16,251,389	30,175.77
Connecticut	38768.94	1.09	2.77	52,498,680	23,974,336	6,696.09
Delaware	68020.64	1.91	4.85	54,769,918	14,900,555	20,612.70
District of Columbia	41483.12	1.16	2.96	52,709,421	15,056,463	7,666.49
Florida	63507.41	1.78	4.53	54,419,490	14,962,956	17,968.11
Georgia	52787.59	1.48	3.77	53,587,154	11,121,461	12,414.16
Hawaii	129611.17	3.64	9.25	59,552,096	59,765,731	74,840.79
Idaho	16304.21	0.46	1.16	50,754,413	9,936,537	1,184.28
Illinois	39640.94	1.11	2.83	52,566,386	12,043,270	7,000.70
Indiana	114278.20	3.21	8.15	58,361,572	17,226,194	58,180.88
Iowa	47609.92	1.34	3.40	53,185,135	12,698,142	10,098.31
Kansas	55256.40	1.55	3.94	53,778,843	14,266,248	13,602.50
Kentucky	129424.96	3.63	9.23	59,537,638	14,444,993	74,625.91
Louisiana	60735.97	1.71	4.33	54,204,303	10,260,916	16,434.08
Maine	16016.46	0.45	1.14	50,732,070	14,555,032	1,142.84
Maryland	42223.86	1.19	3.01	52,766,936	14,527,730	7,942.72
Massachusetts	52973.63	1.49	3.78	53,601,598	24,831,254	12,501.81
Michigan	68651.72	1.93	4.90	54,818,919	15,882,504	20,996.96
Minnesota	55518.47	1.56	3.96	53,799,192	15,942,074	13,731.84
Mississippi	65987.15	1.85	4.71	54,612,029	12,202,689	19,398.69
Missouri	125271.80	3.52	8.94	59,215,167	16,995,743	69,913.36
Montana	64925.96	1.82	4.63	54,529,633	10,949,237	18,779.77
Nebraska	86622.03	2.43	6.18	56,214,218	16,872,142	33,427.99
Nevada	52957.45	1.49	3.78	53,600,342	11,113,050	12,494.18
New Hampshire	16770.83	0.47	1.20	50,790,644	20,786,940	1,253.03
New Jersey	36768.72	1.03	2.62	52,343,373	18,004,522	6,022.97
New Mexico	86249.31	2.42	6.15	56,185,278	13,003,227	33,140.94
New York	28298.11	0.79	2.02	51,685,676	9,804,120	3,567.54
North Carolina	50670.44	1.42	3.62	53,422,768	12,238,483	11,438.34
North Dakota	98925.64	2.78	7.06	57,169,527	18,492,768	43,598.47
Ohio	92902.14	2.61	6.63	56,701,835	13,869,735	38,450.77
Oklahoma	47988.22	1.35	3.42	53,214,508	8,847,151	10,259.42
Oregon	24479.87	0.69	1.75	51,389,210	10,614,860	2,669.76
Pennsylvania	52613.53	1.48	3.75	53,573,638	12,258,497	12,332.42
Rhode Island	63012.32	1.77	4.50	54,381,049	31,226,150	17,689.05
South Carolina	37737.87	1.06	2.69	52,418,623	10,868,812	6,344.66
South Dakota	24673.36	0.69	1.76	51,404,233	13,441,188	2,712.13
Tennessee	42704.50	1.20	3.05	52,804,255	10,293,114	8,124.58
Texas	63326.60	1.78	4.52	54,405,451	11,034,609	17,865.94
Utah	119634.33	3.36	8.54	58,777,447	15,570,048	63,762.48
Vermont	192.36	0.01	0.01	49,503,413	16,407,418	0.16
Virginia	47469.44	1.33	3.39	53,174,227	12,587,364	10,038.80
Washington	15749.25	0.44	1.12	50,711,323	8,540,518	1,105.03
West Virginia	150668.28	4.23	10.75	61,187,068	17,897,899	101,134.00
Wisconsin	88639.33	2.49	6.32	56,370,850	17,609,826	35,003.10
Wyoming	134794.43	3.79	9.62	59,954,548	18,774,300	80,946.38

*DAC P_e, P_t corresponds to electrical and thermal power demand for the LT DAC

Table S 4. US state-wise HT-DAC electrical and thermal demand, total CAPEX and OPEX, and net capture for the GOP HT-DAC with MeOH as a product and bitcoin mining.

State	DAC		MeOH		ELE	Total CAPEX	Total OPEX	Net CO_2 Emissions
	P_e	P_t	P_e	P_t	P_e			
	MWh					($)		tons/year
Alabama	2.00	10.52	0.71	1.83	37.0	83,714,349	35,677,145	78,149.13
Alaska	2.78	14.58	0.98	2.54	51.0	96,829,617	122,727,457	123,416.51
Arizona	1.97	10.35	0.70	1.80	37.0	83,368,019	36,310,743	76,470.00
Arkansas	2.62	13.77	0.93	2.39	48.0	94,136,198	42,401,036	113,670.21
California	1.25	6.58	0.44	1.14	23.0	70,852,098	59,669,143	42,278.75
Colorado	3.10	16.28	1.09	2.83	57.0	102,365,947	60,962,601	144,861.02
Connecticut	1.46	7.67	0.52	1.33	27.0	74,447,158	61,902,276	51,386.35
Delaware	2.56	13.46	0.90	2.34	47.0	93,154,458	50,817,372	110,026.94
District of Columbia	1.56	8.21	0.55	1.43	29.0	76,231,195	40,104,799	56,108.18
Florida	2.39	12.56	0.84	2.18	44.0	90,296,810	49,338,406	99,864.40
Georgia	1.99	10.44	0.70	1.82	37.0	83,551,326	33,228,668	77,356.97
Hawaii	4.88	25.64	1.72	4.46	90.0	132,840,767	290,210,365	289,367.56
Idaho	0.61	3.23	0.22	0.56	12.0	60,200,577	17,345,121	17,952.95
Illinois	1.49	7.84	0.53	1.36	28.0	75,139,863	31,299,455	52,887.31
Indiana	4.31	22.61	1.52	3.93	79.0	122,862,152	75,192,999	237,638.12
Iowa	1.79	9.42	0.63	1.64	33.0	80,086,249	36,153,729	67,307.83
Kansas	2.08	10.93	0.73	1.90	39.0	85,234,547	43,842,593	82,337.08
Kentucky	4.88	25.60	1.72	4.45	90.0	132,764,260	65,347,327	288,711.19
Louisiana	2.29	12.02	0.81	2.09	42.0	88,489,243	32,720,649	93,825.48
Maine	0.60	3.17	0.21	0.55	12.0	60,082,346	25,171,977	17,590.07
Maryland	1.59	8.35	0.56	1.45	30.0	76,869,973	39,027,143	57,422.39
Massachusetts	2.00	10.48	0.70	1.82	37.0	83,627,763	75,318,211	77,728.00
Michigan	2.59	13.58	0.91	2.36	48.0	93,748,180	54,518,069	111,480.38
Minnesota	2.09	10.98	0.74	1.91	39.0	85,342,227	49,217,550	82,872.89
Mississippi	2.49	13.05	0.88	2.27	46.0	91,984,525	40,735,653	105,397.74
Missouri	4.72	24.78	1.67	4.31	87.0	130,054,553	76,985,968	274,251.29
Montana	2.45	12.84	0.86	2.23	45.0	91,214,081	36,123,599	103,014.74
Nebraska	3.26	17.14	1.15	2.98	60.0	105,144,840	64,945,264	156,205.67
Nevada	1.99	10.48	0.70	1.82	37.0	83,621,117	33,254,992	77,695.72
New Hampshire	0.63	3.32	0.22	0.58	12.0	60,392,300	36,546,927	18,544.90
New Jersey	1.39	7.27	0.49	1.26	26.0	73,290,888	45,207,386	48,000.73
New Mexico	3.25	17.06	1.15	2.97	60.0	104,991,697	49,324,126	155,212.52
New York	1.07	5.60	0.38	0.97	20.0	67,803,977	21,668,036	34,548.94
North Carolina	1.91	10.02	0.67	1.74	35.0	82,012,591	35,913,607	73,183.17
North Dakota	3.73	19.57	1.31	3.40	69.0	113,209,913	76,036,482	190,546.90
Ohio	3.50	18.38	1.23	3.20	64.0	109,062,881	54,589,102	173,356.66
Oklahoma	1.81	9.49	0.64	1.65	34.0	80,576,105	25,106,363	68,023.92
Oregon	0.92	4.84	0.33	0.84	17.0	65,231,880	21,960,714	28,953.91
Pennsylvania	1.98	10.41	0.70	1.81	37.0	83,479,806	36,648,237	77,010.43
Rhode Island	2.37	12.47	0.84	2.17	44.0	90,093,389	103,980,295	98,774.35
South Carolina	1.42	7.47	0.50	1.30	26.0	73,689,091	27,550,754	49,631.16
South Dakota	0.93	4.88	0.33	0.85	17.0	65,311,380	27,892,696	29,230.43
Tennessee	1.61	8.45	0.57	1.47	30.0	77,067,458	27,690,762	58,281.01
Texas	2.39	12.53	0.84	2.18	44.0	90,222,520	35,987,721	99,465.74
Utah	4.51	23.67	1.59	4.12	83.0	126,400,554	68,765,580	255,174.69
Vermont	0.01	0.04	0.00	0.01	1.0	49,901,938	16,558,670	180.86
Virginia	1.79	9.39	0.63	1.63	33.0	80,028,527	35,780,715	67,042.63
Washington	0.59	3.12	0.21	0.54	11.0	59,638,133	14,729,470	17,254.59
West Virginia	5.68	29.81	2.00	5.18	104.0	146,174,565	87,369,848	368,060.57
Wisconsin	3.34	17.54	1.18	3.05	62.0	106,642,546	68,649,153	161,629.04
Wyoming	5.08	26.67	1.79	4.64	93.0	135,973,715	88,233,213	307,916.42

*DAC P_e, P_t corresponds to electrical and thermal power demand for HT-DAC

Table S 5. U.S. state-wise LT DAC electrical and thermal demand, Total CAPEX and OPEX, and net capture for the GOP LT DAC with MeOH as a product and bitcoin mining.

State	DAC		MeOH		ELE	Total CAPEX	Total OPEX	Net CO_2 Emissions
	P_e	P_t	P_e	P_t	P_e			
	MWh					$		tons/year
Alabama	1.49	3.79	0.71	1.83	37.0	80,950,523	32,889,719	62,505.06
Alaska	2.07	5.26	0.98	2.54	51.0	92,999,159	112,459,030	93,367.50
Arizona	1.47	3.73	0.70	1.80	37.0	80,647,997	33,485,893	61,317.88
Arkansas	1.95	4.97	0.93	2.39	48.0	90,519,506	38,881,742	86,881.51
California	0.93	2.37	0.44	1.14	23.0	69,122,905	55,649,207	36,155.02
Colorado	2.31	5.87	1.09	2.83	57.0	98,089,047	55,744,724	107,399.38
Connecticut	1.09	2.77	0.52	1.33	27.0	72,432,457	57,508,815	43,073.50
Delaware	1.91	4.85	0.90	2.34	47.0	89,619,638	46,623,719	84,437.35
District of Columbia	1.16	2.96	0.55	1.43	29.0	74,075,447	37,186,352	46,590.64
Florida	1.78	4.53	0.84	2.18	44.0	86,996,528	45,326,401	77,557.94
Georgia	1.48	3.77	0.70	1.82	37.0	80,808,120	30,635,708	61,945.44
Hawaii	3.64	9.25	1.72	4.46	90.0	126,105,279	263,632,259	196,456.64
Idaho	0.46	1.16	0.22	0.56	12.0	59,353,298	16,477,440	16,482.73
Illinois	1.11	2.83	0.53	1.36	28.0	73,079,847	29,047,580	44,196.31
Indiana	3.21	8.15	1.52	3.93	79.0	116,923,470	68,420,210	165,409.60
Iowa	1.34	3.40	0.63	1.64	33.0	77,612,110	33,411,550	54,771.32
Kansas	1.55	3.94	0.73	1.90	39.0	82,363,044	40,389,996	65,450.30
Kentucky	3.63	9.23	1.72	4.45	90.0	126,038,448	59,368,936	196,067.03
Louisiana	1.71	4.33	0.81	2.09	42.0	85,332,984	30,078,790	73,423.43
Maine	0.45	1.14	0.21	0.55	12.0	59,250,021	23,936,370	16,171.29
Maryland	1.19	3.01	0.56	1.45	30.0	74,675,731	36,170,898	47,561.92
Massachusetts	1.49	3.78	0.70	1.82	37.0	80,874,889	69,468,726	62,207.66
Michigan	1.93	4.90	0.91	2.36	48.0	90,180,565	50,011,801	85,413.76
Minnesota	1.56	3.96	0.74	1.91	39.0	82,457,105	45,340,234	65,825.54
Mississippi	1.85	4.71	0.88	2.27	46.0	88,555,379	37,391,373	81,315.29
Missouri	3.52	8.94	1.67	4.31	87.0	123,544,568	69,969,315	187,457.52
Montana	1.82	4.63	0.86	2.23	45.0	87,840,081	33,165,809	79,700.64
Nebraska	2.43	6.18	1.15	2.98	60.0	100,643,363	59,337,058	114,706.57
Nevada	1.49	3.78	0.70	1.82	37.0	80,869,084	30,657,866	62,184.85
New Hampshire	0.47	1.20	0.22	0.58	12.0	59,520,772	34,720,272	16,989.32
New Jersey	1.03	2.62	0.49	1.26	26.0	71,380,133	42,046,694	40,523.53
New Mexico	2.42	6.15	1.15	2.97	60.0	100,509,589	45,064,722	114,069.79
New York	0.79	2.02	0.38	0.97	20.0	66,333,412	20,276,420	30,120.03
North Carolina	1.42	3.62	0.67	1.74	35.0	79,379,406	33,142,990	58,983.07
North Dakota	2.78	7.06	1.31	3.40	69.0	108,069,056	69,328,576	136,421.68
Ohio	2.61	6.63	1.23	3.20	64.0	104,235,047	49,817,953	125,622.05
Oklahoma	1.35	3.42	0.64	1.65	34.0	78,082,307	23,189,513	55,287.39
Oregon	0.69	1.75	0.33	0.84	17.0	63,959,738	20,632,581	25,639.54
Pennsylvania	1.48	3.75	0.70	1.81	37.0	80,745,645	33,793,560	61,700.38
Rhode Island	1.77	4.50	0.84	2.17	44.0	86,818,835	95,565,278	76,814.33
South Carolina	1.06	2.69	0.50	1.30	26.0	71,727,972	25,596,279	41,754.60
South Dakota	0.69	1.76	0.33	0.85	17.0	64,029,182	26,207,966	25,863.46
Tennessee	1.20	3.05	0.57	1.47	30.0	74,848,238	25,648,896	48,194.77
Texas	1.78	4.52	0.84	2.18	44.0	86,931,634	33,057,019	77,286.11
Utah	3.36	8.54	1.59	4.12	83.0	120,183,531	62,534,514	176,016.92
Vermont	0.01	0.01	0.00	0.01	1.0	49,891,942	16,540,569	180.66
Virginia	1.33	3.39	0.63	1.63	33.0	77,561,688	33,068,774	54,579.99
Washington	0.44	1.12	0.21	0.54	11.0	58,819,694	14,002,350	15,882.76
West Virginia	4.23	10.75	2.00	5.18	104.0	138,344,805	79,238,268	242,508.01
Wisconsin	2.49	6.32	1.18	3.05	62.0	102,036,237	62,698,471	118,174.53
Wyoming	3.79	9.62	1.79	4.64	93.0	128,968,870	80,120,041	207,425.74

*DAC and MeOH P_e, P_t corresponds to electrical and thermal power demand for the LT DAC, respectively.

Table S 6. US state-wise HRPP HT-DAC emissions from mining, grid resource mix (%), total CAPEX and OPEX, and net CO_2 capture with CO_2 capture and storage and bitcoin mining.

State	Emissions From Mining	Resource Mix in Grid (%)		Total CAPEX	Total OPEX	Net CO_2 Emissions
	(tons/yr)	Renewables	Fossil Fuels	($)		(tons/yr.)
Alabama	43,345.26	0.12	0.88	64,624,256	21,277,805	0.00
Alaska	60,810.43	0.29	0.71	70,065,390	40,496,584	0.00
Arizona	40,564.63	0.12	0.88	62,453,404	19,370,442	0.00
Arkansas	57,207.98	0.11	0.89	68,213,280	25,955,199	0.00
California	26,320.46	0.43	0.57	60,693,290	25,227,285	0.00
Colorado	65,181.98	0.31	0.69	66,541,516	29,410,941	0.00
Connecticut	32,294.53	0.05	0.95	63,968,688	27,406,864	0.00
Delaware	55,572.86	0.03	0.97	69,947,010	26,899,064	0.00
District Of Columbia	34,057.64	0.39	0.61	65,957,260	21,364,899	0.00
Florida	50,742.42	0.05	0.95	64,738,310	24,808,310	0.00
Georgia	42,863.53	0.12	0.88	64,691,585	20,853,252	0.00
Hawaii	99,670.99	0.18	0.82	78,276,039	59,031,681	0.00
Idaho	13,043.37	0.76	0.24	57,805,295	11,650,742	0.00
Illinois	32,307.36	0.10	0.90	66,207,756	18,506,834	0.00
Indiana	94,622.35	0.08	0.92	77,069,161	39,924,708	0.00
Iowa	39,087.75	0.59	0.41	67,716,739	20,938,558	0.00
Kansas	45,199.73	0.44	0.56	67,692,592	23,618,250	0.00
Kentucky	107,552.14	0.08	0.92	79,385,737	42,312,655	0.00
Louisiana	48,831.72	0.03	0.97	66,097,493	21,447,953	0.00
Maine	13,309.68	0.78	0.22	60,002,884	15,748,938	0.00
Maryland	34,792.46	0.09	0.91	64,588,211	21,271,985	0.00
Massachusetts	40,948.61	0.22	0.78	72,566,821	27,859,337	0.00
Michigan	56,980.93	0.09	0.91	72,746,355	28,358,733	0.00
Minnesota	45,358.59	0.28	0.72	68,752,402	24,716,710	0.00
Mississippi	53,977.49	0.03	0.97	66,827,933	24,495,945	0.00
Missouri	103,349.24	0.08	0.92	77,410,021	41,907,317	0.00
Montana	53,563.91	0.59	0.41	68,459,387	24,177,862	0.00
Nebraska	69,817.36	0.29	0.71	70,940,956	31,331,460	0.00
Nevada	41,412.73	0.29	0.71	62,580,231	19,467,908	0.00
New Hampshire	13,835.94	0.16	0.84	60,060,041	20,579,809	0.00
New Jersey	30,444.50	0.04	0.96	64,067,573	22,443,802	0.00
New Mexico	66,670.72	0.27	0.73	68,496,785	27,044,966	0.00
New York	23,600.63	0.29	0.71	62,169,496	15,047,359	0.00
North Carolina	41,195.07	0.15	0.85	65,002,672	20,925,479	0.00
North Dakota	80,426.54	0.38	0.62	76,259,183	35,547,459	0.00
Ohio	77,108.78	0.03	0.97	76,156,512	32,870,406	0.00
Oklahoma	36,663.00	0.40	0.60	70,131,975	16,595,840	0.00
Oregon	19,339.10	0.68	0.32	60,008,310	13,730,409	0.00
Pennsylvania	43,984.91	0.04	0.96	66,109,672	22,677,081	0.00
Rhode Island	51,985.16	0.07	0.93	68,842,536	36,648,970	0.00
South Carolina	30,718.63	0.07	0.93	62,606,023	17,055,733	0.00
South Dakota	18,973.82	0.81	0.19	65,417,747	15,299,585	0.00
Tennessee	35,316.63	0.17	0.83	63,844,006	18,461,424	0.00
Texas	50,407.97	0.22	0.78	65,825,230	21,998,725	0.00
Utah	94,032.58	0.13	0.87	72,882,656	36,650,357	0.00
Vermont	162.74	1.00	0.00	56,883,674	14,266,452	0.00
Virginia	38,877.47	0.06	0.94	65,825,367	20,714,704	0.00
Washington	12,961.64	0.75	0.25	60,362,148	10,839,329	0.00
West Virginia	126,260.02	0.06	0.94	84,072,057	49,977,902	0.00
Wisconsin	73,216.08	0.09	0.91	74,901,386	33,776,633	0.00
Wyoming	99,882.67	0.16	0.84	85,694,918	37,835,379	0.00

Table S 7 US state-wise HRPP LT-DAC emissions from mining, grid resource mix (%), total CAPEX and OPEX, and net CO_2 capture with CO_2 as a product and bitcoin mining.

State	Emissions From Mining	Resource Mix in Grid (%)		Total CAPEX	Total OPEX	Net CO_2 Emissions
	(tons/yr)	Renewables	Fossil Fuels	($)		(tons/yr.)
Alabama	43,345.26	0.12	0.88	61,257,994	13,859,601	0.00
Alaska	60,810.43	0.29	0.71	64,236,395	29,915,589	0.00
Arizona	40,564.63	0.12	0.88	59,130,922	12,824,679	0.00
Arkansas	57,207.98	0.11	0.89	62,831,321	16,064,651	0.00
California	26,320.46	0.43	0.57	58,766,649	20,821,757	0.00
Colorado	65,181.98	0.31	0.69	61,327,559	18,553,334	0.00
Connecticut	32,294.53	0.05	0.95	60,344,910	21,865,609	0.00
Delaware	55,572.86	0.03	0.97	64,188,217	17,450,395	0.00
District Of Columbia	34,057.64	0.39	0.61	61,939,921	15,580,809	0.00
Florida	50,742.42	0.05	0.95	60,962,334	16,208,258	0.00
Georgia	42,863.53	0.12	0.88	62,123,153	13,217,267	0.00
Hawaii	99,670.99	0.18	0.82	69,524,341	42,469,017	0.00
Idaho	13,043.37	0.76	0.24	56,835,171	9,390,999	0.00
Illinois	32,307.36	0.10	0.90	61,953,916	13,192,364	0.00
Indiana	94,622.35	0.08	0.92	69,540,043	23,179,487	0.00
Iowa	39,087.75	0.59	0.41	63,359,780	14,363,854	0.00
Kansas	45,199.73	0.44	0.56	62,227,716	15,951,286	0.00
Kentucky	107,552.14	0.08	0.92	70,261,304	23,333,457	0.00
Louisiana	48,831.72	0.03	0.97	61,365,017	13,363,159	0.00
Maine	13,309.68	0.78	0.22	59,463,089	13,284,435	0.00
Maryland	34,792.46	0.09	0.91	62,198,117	15,004,732	0.00
Massachusetts	40,948.61	0.22	0.78	67,864,238	21,117,569	0.00
Michigan	56,980.93	0.09	0.91	66,986,381	18,327,969	0.00
Minnesota	45,358.59	0.28	0.72	63,651,925	17,088,347	0.00
Mississippi	53,977.49	0.03	0.97	62,341,667	15,204,764	0.00
Missouri	103,349.24	0.08	0.92	67,949,958	24,031,903	0.00
Montana	53,563.91	0.59	0.41	64,386,122	14,780,697	0.00
Nebraska	69,817.36	0.29	0.71	64,468,961	19,584,480	0.00
Nevada	41,412.73	0.29	0.71	59,502,479	12,548,932	0.00
New Hampshire	13,835.94	0.16	0.84	59,389,870	18,013,769	0.00
New Jersey	30,444.50	0.04	0.96	60,488,551	17,316,932	0.00
New Mexico	66,670.72	0.27	0.73	62,102,211	16,243,990	0.00
New York	23,600.63	0.29	0.71	59,576,478	10,966,275	0.00
North Carolina	41,195.07	0.15	0.85	61,317,222	13,852,794	0.00
North Dakota	80,426.54	0.38	0.62	67,211,147	21,950,610	0.00
Ohio	77,108.78	0.03	0.97	68,646,549	19,352,223	0.00
Oklahoma	36,663.00	0.40	0.60	66,039,392	10,548,040	0.00
Oregon	19,339.10	0.68	0.32	59,425,869	10,204,433	0.00
Pennsylvania	43,984.91	0.04	0.96	62,084,201	14,926,544	0.00
Rhode Island	51,985.16	0.07	0.93	63,676,401	27,698,873	0.00
South Carolina	30,718.63	0.07	0.93	59,659,063	11,833,117	0.00
South Dakota	18,973.82	0.81	0.19	63,791,221	12,141,788	0.00
Tennessee	35,316.63	0.17	0.83	60,354,633	12,406,331	0.00
Texas	50,407.97	0.22	0.78	61,837,812	13,594,312	0.00
Utah	94,032.58	0.13	0.87	64,767,188	21,209,224	0.00
Vermont	162.74	1.00	0.00	56,877,402	14,232,938	0.00
Virginia	38,877.47	0.06	0.94	62,255,776	14,005,151	0.00
Washington	12,961.64	0.75	0.25	58,646,593	8,748,987	0.00
West Virginia	126,260.02	0.06	0.94	72,606,865	27,679,153	0.00
Wisconsin	73,216.08	0.09	0.91	66,885,332	21,173,335	0.00
Wyoming	99,882.67	0.16	0.84	75,066,529	21,914,773	0.00

Table S 8. US state-wise HRPP HT-DAC emissions from mining, grid resource mix (%), total CAPEX and OPEX, and net CO_2 capture with MeOH as a product and bitcoin mining.

State	Emissions From Mining	Resource Mix in Grid (%)		Total CAPEX	Total OPEX	Net CO_2 Emissions
	(tons/yr)	Renewables	Fossil Fuels	($)		(tons/yr.)
Alabama	43,345.26	0.12	0.88	98,471,383	78,408,299	40,671.42
Alaska	60,810.43	0.29	0.71	121,684,015	121,396,249	57,059.21
Arizona	40,564.63	0.12	0.88	92,040,952	70,015,347	38,062.32
Arkansas	57,207.98	0.11	0.89	115,236,132	101,782,165	53,679.00
California	26,320.46	0.43	0.57	80,784,373	58,735,521	24,696.83
Colorado	65,181.98	0.31	0.69	116,528,929	112,068,116	61,161.10
Connecticut	32,294.53	0.05	0.95	90,465,721	70,713,199	30,302.38
Delaware	55,572.86	0.03	0.97	119,049,169	99,889,702	52,144.74
District Of Columbia	34,057.64	0.39	0.61	96,193,619	66,619,123	31,956.73
Florida	50,742.42	0.05	0.95	103,486,341	89,900,575	47,612.27
Georgia	42,863.53	0.12	0.88	99,905,619	76,932,560	40,219.40
Hawaii	99,670.99	0.18	0.82	158,795,916	182,767,651	93,522.58
Idaho	13,043.37	0.76	0.24	68,274,984	28,500,012	12,238.76
Illinois	32,307.36	0.10	0.90	95,886,303	61,216,826	30,314.42
Indiana	94,622.35	0.08	0.92	157,233,494	166,246,660	88,785.38
Iowa	39,087.75	0.59	0.41	100,756,457	73,118,326	36,676.54
Kansas	45,199.73	0.44	0.56	104,529,358	83,222,156	42,411.50
Kentucky	107,552.14	0.08	0.92	165,443,672	188,258,385	100,917.57
Louisiana	48,831.72	0.03	0.97	104,350,187	84,976,356	45,819.44
Maine	13,309.68	0.78	0.22	71,794,787	33,692,971	12,488.64
Maryland	34,792.46	0.09	0.91	95,314,186	67,297,087	32,646.22
Massachusetts	40,948.61	0.22	0.78	114,803,584	79,493,808	38,422.62
Michigan	56,980.93	0.09	0.91	126,070,149	104,985,543	53,465.95
Minnesota	45,358.59	0.28	0.72	107,693,710	84,900,651	42,560.56
Mississippi	53,977.49	0.03	0.97	109,852,838	95,307,154	50,647.78
Missouri	103,349.24	0.08	0.92	163,624,019	179,094,238	96,973.93
Montana	53,563.91	0.59	0.41	113,780,936	95,238,330	50,259.72
Nebraska	69,817.36	0.29	0.71	126,627,211	121,899,486	65,510.54
Nevada	41,412.73	0.29	0.71	94,981,809	71,583,823	38,858.10
New Hampshire	13,835.94	0.16	0.84	72,542,117	39,036,537	12,982.44
New Jersey	30,444.50	0.04	0.96	88,820,926	63,199,213	28,566.47
New Mexico	66,670.72	0.27	0.73	117,009,946	110,265,224	62,558.00
New York	23,600.63	0.29	0.71	82,677,220	46,748,331	22,144.78
North Carolina	41,195.07	0.15	0.85	97,744,274	75,247,855	38,653.87
North Dakota	80,426.54	0.38	0.62	160,515,646	140,927,248	75,465.27
Ohio	77,108.78	0.03	0.97	143,541,607	136,336,953	72,352.17
Oklahoma	36,663.00	0.40	0.60	107,912,657	61,923,923	34,401.37
Oregon	19,339.10	0.68	0.32	75,995,165	38,490,536	18,146.13
Pennsylvania	43,984.91	0.04	0.96	105,214,087	81,626,394	41,271.61
Rhode Island	51,985.16	0.07	0.93	112,809,243	105,963,109	48,778.35
South Carolina	30,718.63	0.07	0.93	86,788,600	57,332,101	28,823.69
South Dakota	18,973.82	0.81	0.19	85,929,667	38,896,047	17,803.38
Tennessee	35,316.63	0.17	0.83	93,018,225	65,589,669	33,138.05
Texas	50,407.97	0.22	0.78	104,401,119	86,623,464	47,298.46
Utah	94,032.58	0.13	0.87	145,255,976	156,120,529	88,231.99
Vermont	162.74	1.00	0.00	56,933,702	14,758,542	152.70
Virginia	38,877.47	0.06	0.94	97,735,591	72,285,766	36,479.24
Washington	12,961.64	0.75	0.25	72,835,874	28,238,221	12,162.07
West Virginia	126,260.02	0.06	0.94	172,442,071	228,737,986	118,471.41
Wisconsin	73,216.08	0.09	0.91	138,695,739	131,299,348	68,699.60
Wyoming	99,882.67	0.16	0.84	190,448,393	156,926,878	93,721.21

Table S 9. US state-wise HRPP LT-DAC emissions from mining, grid resource mix (%), total CAPEX and OPEX, and net CO_2 capture with MeOH as a product and bitcoin mining.

State	Emissions From Mining	Resource Mix in Grid (%)		Total CAPEX	Total OPEX	Net CO_2 Emissions
	(tons/yr)	Renewables	Fossil Fuels	($)		(tons/yr.)
Alabama	43,345.26	0.12	0.88	94,239,755	70,875,683	40,671.42
Alaska	60,810.43	0.29	0.71	115,308,189	110,615,738	57,059.21
Arizona	40,564.63	0.12	0.88	88,069,329	63,333,145	38,062.32
Arkansas	57,207.98	0.11	0.89	109,443,977	91,729,275	53,679.00
California	26,320.46	0.43	0.57	78,159,400	54,217,932	24,696.83
Colorado	65,181.98	0.31	0.69	110,582,347	101,012,409	61,161.10
Connecticut	32,294.53	0.05	0.95	87,682,001	64,900,686	30,302.38
Delaware	55,572.86	0.03	0.97	113,297,380	90,141,146	52,144.74
District Of Columbia	34,057.64	0.39	0.61	93,037,997	60,439,844	31,956.73
Florida	50,742.42	0.05	0.95	98,863,471	81,173,485	47,612.27
Georgia	42,863.53	0.12	0.88	95,692,556	69,577,690	40,219.40
Hawaii	99,670.99	0.18	0.82	147,198,135	166,044,685	93,522.58
Idaho	13,043.37	0.76	0.24	66,800,141	26,165,751	12,238.76
Illinois	32,307.36	0.10	0.90	91,899,221	55,504,939	30,314.42
Indiana	94,622.35	0.08	0.92	146,977,907	149,555,421	88,785.38
Iowa	39,087.75	0.59	0.41	96,538,539	66,049,815	36,676.54
Kansas	45,199.73	0.44	0.56	100,587,227	75,155,492	42,411.50
Kentucky	107,552.14	0.08	0.92	159,098,290	166,796,000	100,917.57
Louisiana	48,831.72	0.03	0.97	99,299,102	76,716,427	45,819.44
Maine	13,309.68	0.78	0.22	70,495,472	31,204,569	12,488.64
Maryland	34,792.46	0.09	0.91	91,442,603	61,179,324	32,646.22
Massachusetts	40,948.61	0.22	0.78	109,482,329	72,625,318	38,422.62
Michigan	56,980.93	0.09	0.91	119,736,801	94,838,550	53,465.95
Minnesota	45,358.59	0.28	0.72	102,780,402	76,845,168	42,560.56
Mississippi	53,977.49	0.03	0.97	104,501,204	85,835,538	50,647.78
Missouri	103,349.24	0.08	0.92	153,265,395	160,519,031	96,973.93
Montana	53,563.91	0.59	0.41	108,106,569	85,759,229	50,259.72
Nebraska	69,817.36	0.29	0.71	119,304,429	109,911,577	65,510.54
Nevada	41,412.73	0.29	0.71	91,140,680	64,584,910	38,858.10
New Hampshire	13,835.94	0.16	0.84	70,398,243	36,617,875	12,982.44
New Jersey	30,444.50	0.04	0.96	86,108,504	57,793,541	28,566.47
New Mexico	66,670.72	0.27	0.73	112,441,364	99,037,011	62,558.00
New York	23,600.63	0.29	0.71	79,590,135	42,616,455	22,144.78
North Carolina	41,195.07	0.15	0.85	93,546,320	68,043,256	38,653.87
North Dakota	80,426.54	0.38	0.62	147,571,573	126,835,217	75,465.27
Ohio	77,108.78	0.03	0.97	136,300,207	122,588,890	72,352.17
Oklahoma	36,663.00	0.40	0.60	103,165,305	55,777,187	34,401.37
Oregon	19,339.10	0.68	0.32	74,815,888	35,171,894	18,146.13
Pennsylvania	43,984.91	0.04	0.96	100,619,135	73,781,525	41,271.61
Rhode Island	51,985.16	0.07	0.93	107,032,541	96,779,441	48,778.35
South Carolina	30,718.63	0.07	0.93	83,594,553	52,117,381	28,823.69
South Dakota	18,973.82	0.81	0.19	82,460,651	35,791,909	17,803.38
Tennessee	35,316.63	0.17	0.83	88,928,654	59,392,708	33,138.05
Texas	50,407.97	0.22	0.78	99,631,887	78,074,777	47,298.46
Utah	94,032.58	0.13	0.87	137,236,374	139,979,492	88,231.99
Vermont	162.74	1.00	0.00	56,528,878	14,725,028	152.70
Virginia	38,877.47	0.06	0.94	93,213,647	65,400,629	36,479.24
Washington	12,961.64	0.75	0.25	70,474,823	25,926,261	12,162.07
West Virginia	126,260.02	0.06	0.94	170,004,512	202,186,575	118,471.41
Wisconsin	73,216.08	0.09	0.91	131,476,639	118,199,517	68,699.60
Wyoming	99,882.67	0.16	0.84	177,286,051	141,003,504	93,721.21

Table S 10. Sensitivity parameters were used in the study to evaluate the impact of change in the efficiency of DAC, economic parameters, and the CAPEX & OPEX of the equipment.

Parameter	% Decrease/ Minimum	Base	% Increase /Maximum
CAPEX			
Solar ($/MW) [11,12]	456,300	638,000	701,800
Wind ($/MW) [11,12]	1,170,000	1,265,000	1,391,500
BESS ($/MW)[12]	128,700	257,400	283,140
ELE ($/MW)[12]	567,000	630,000	693,000
FC ($/MW)[9]	270,000	300,000	330,000
HP ($/MW)[7]	270,000	300,000	330,000
DAC HT/LT ($/$CO_2$) [17,18]	139/125	204.6/132	388/244
MeOH ($/ton MeOH) [19]	761.0031	845.559	930.1149
Fixed and Variable Cost			
Hydrogen cost	10.8	12	13.2
Solar Fixed cost ($/MW.yr) [12]	12,402	14,520	15,972
Wind Fixed Cost ($/MW.yr) [12]	23,400	25,300	27,830
BESS Fixed Cost ($/MW.yr) [12]	2,574	3,608	3,968.8
FC OPEX ($/MWh) [9]	12,060	13,400	1,4740
HP OPEX ($/MWh) [7]	10.0%	5.0	10.0
DAC OPEX (% of CAPEX) [17,18]	10.0%	4.07/4.4	10.0%
Other Parameter			
Interest Rate (%)[24,25]	4.0	4.5	20.0
DAC P_e HT/LT (MWh_e)[17,21]	0.30/0.17	0.33/0.25	0.50/0.31
DAC P_t HT/LT (MWh_t)[17,21]	1.46/0.60	1.73/0.63	2.25/1.53

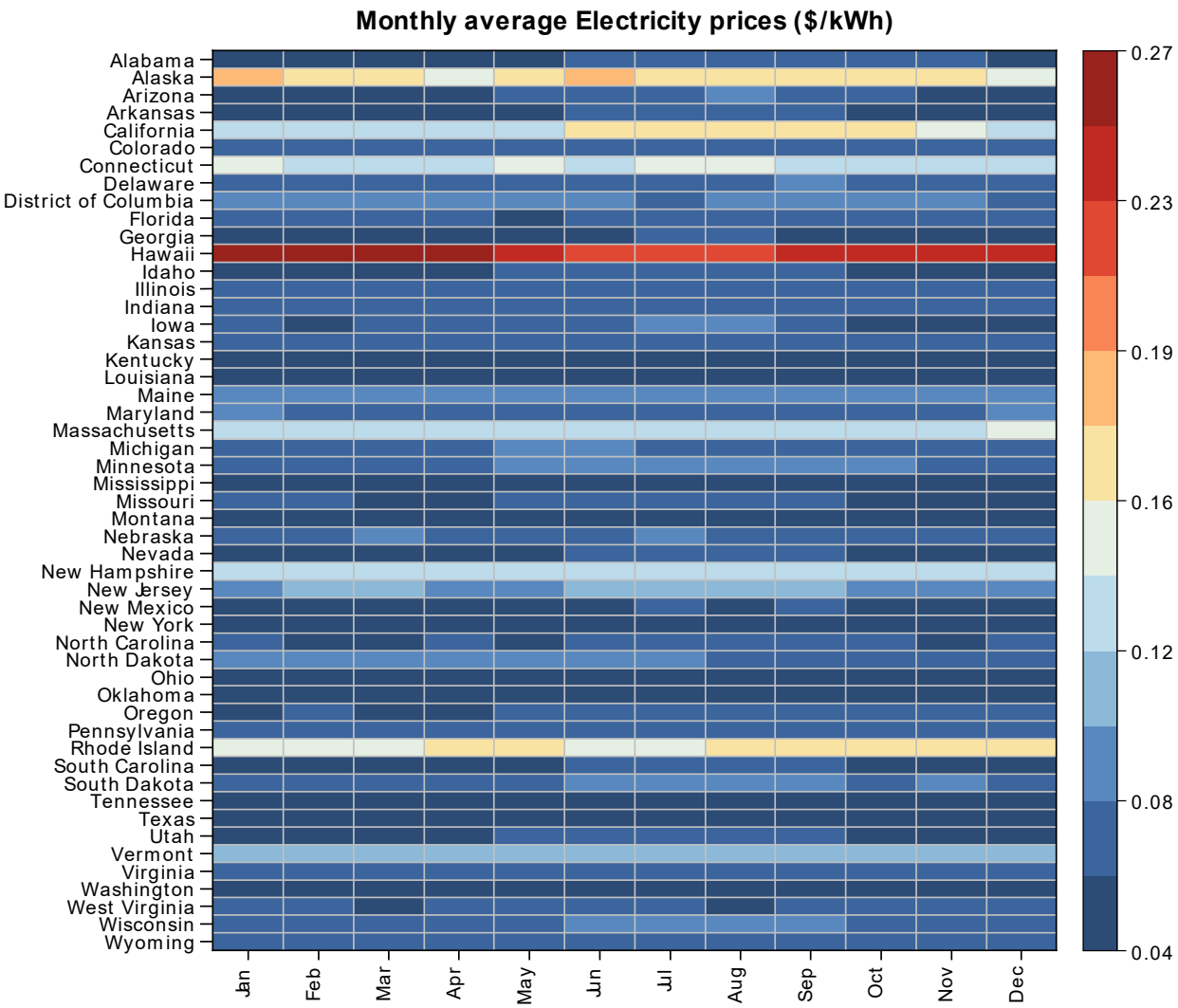

Figure S 1. US state-wise monthly average electricity price for the year 2020.

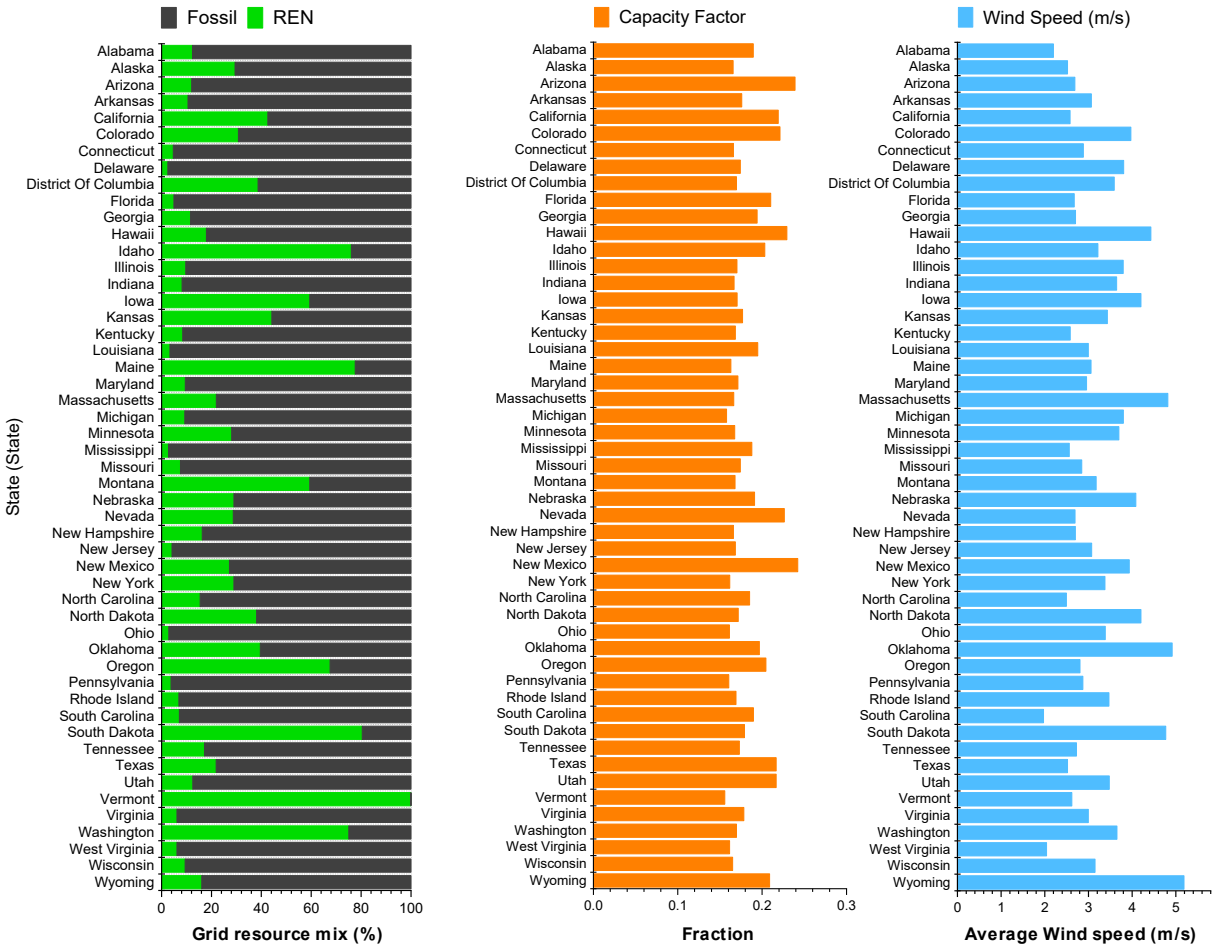

Figure S 2. U.S. state-wise (alphabetical order) renewable/fossil mix in grid electricity, solar capacity, and average wind speed [26–28].

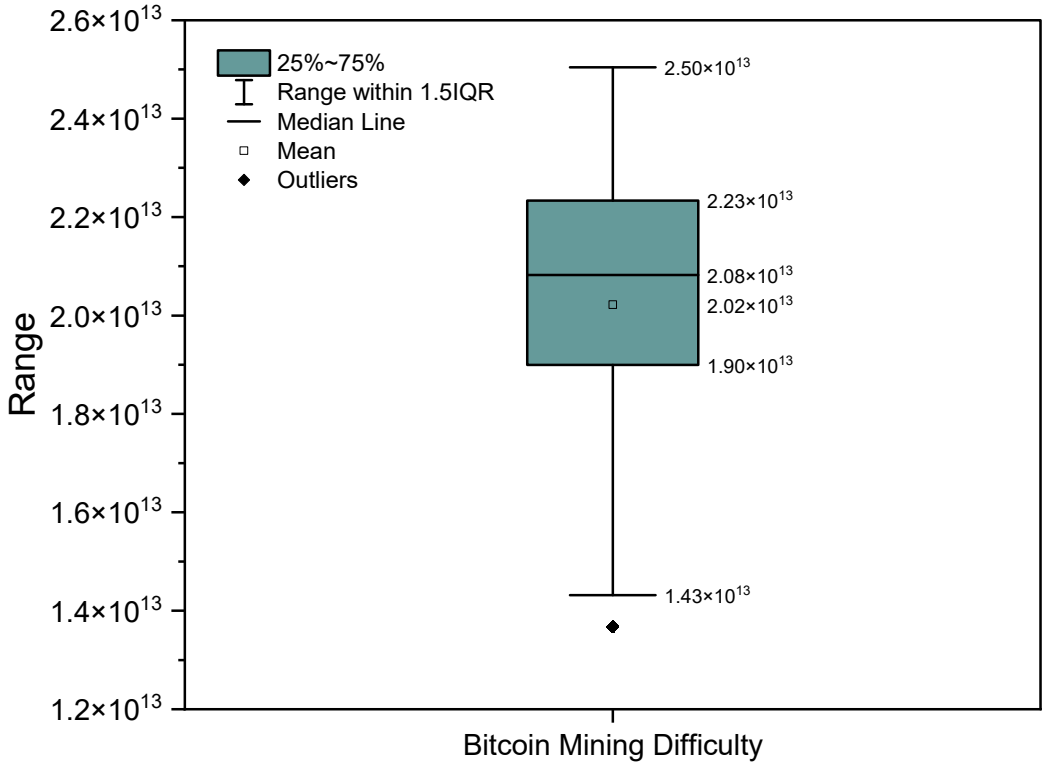

Figure S 3. Bitcoin mining difficulty for the year 2021. 25%–75% of data fall between 1.89×10^{13} and 2.23×10^{13}. The breakeven selling price of bitcoin was evaluated at a minimum difficulty level of 1.43×10^{13} and a maximum difficulty level of 2.50×10^{13} [29].

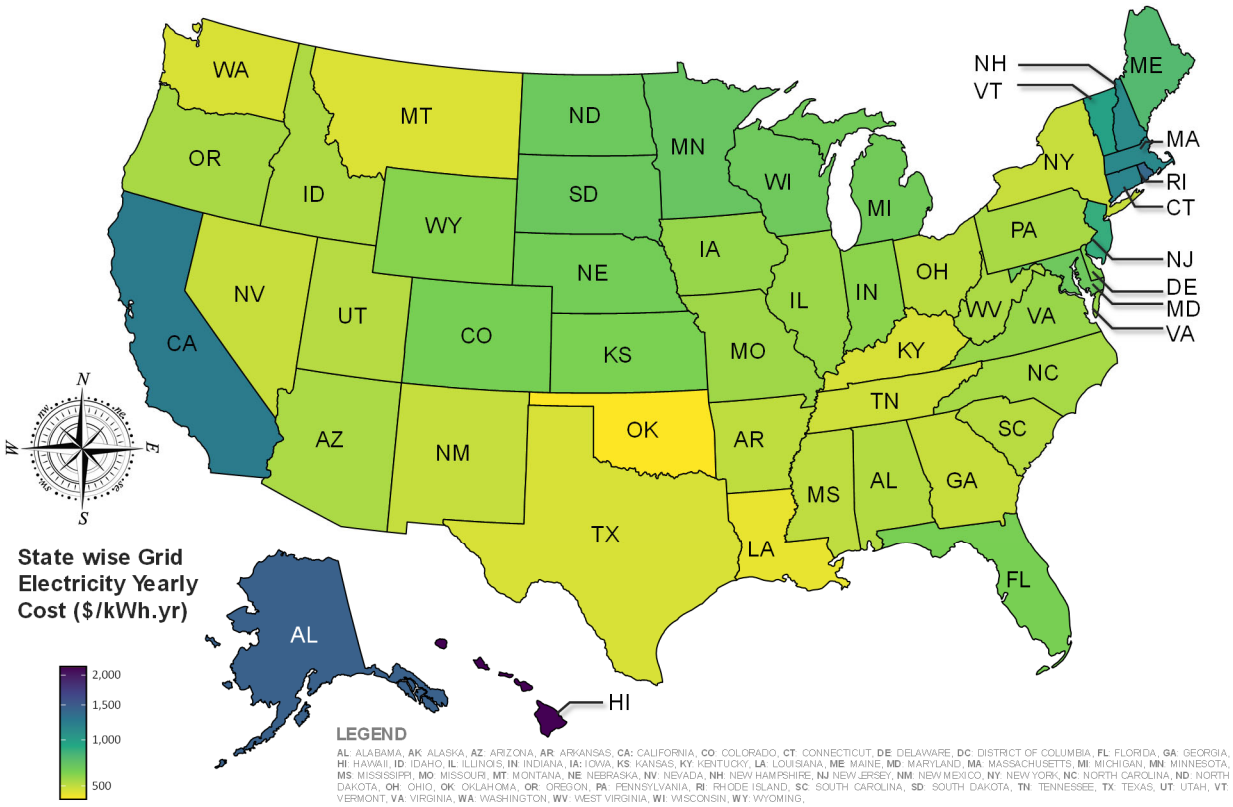

Figure S 4. Grid power prices on a yearly basis per kWh of consumption.

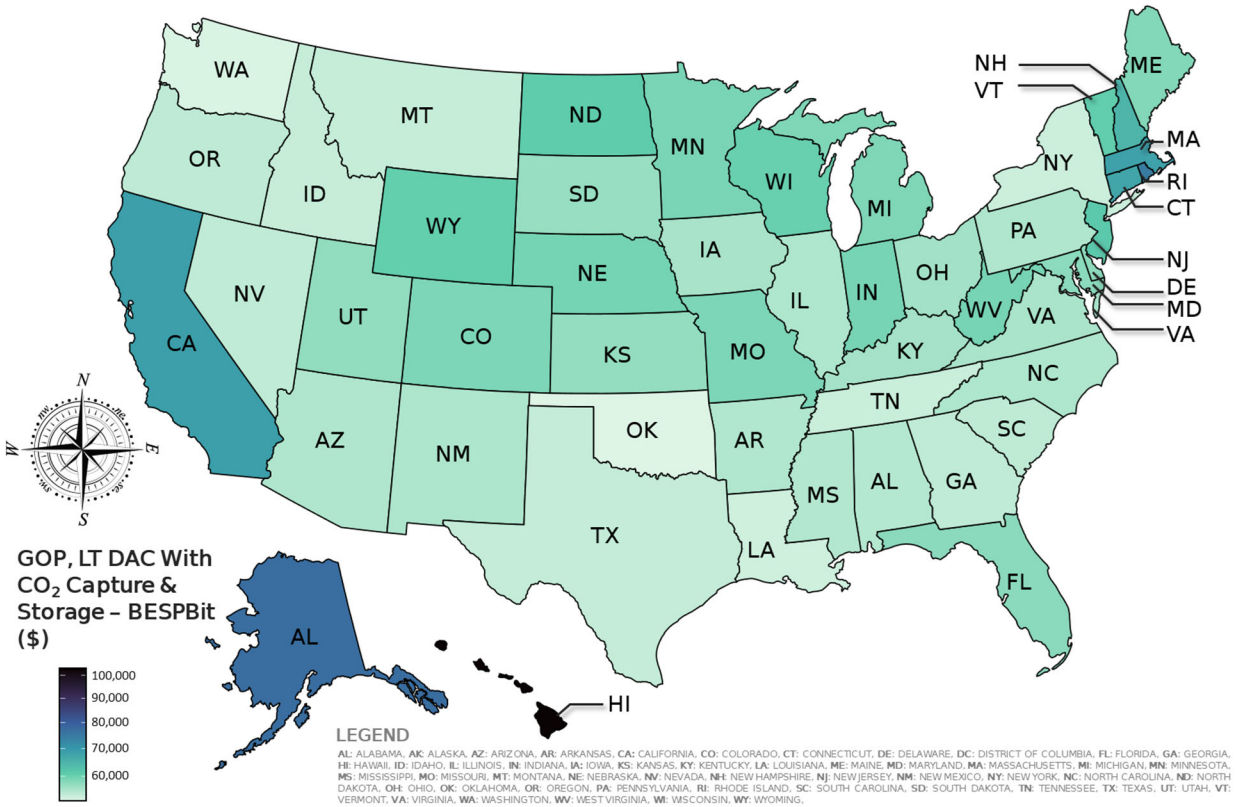

Figure S 5. Break-even selling price of Bitcoin (BESPBit) for LT DAC with CO_2 capture and storage using GOP.

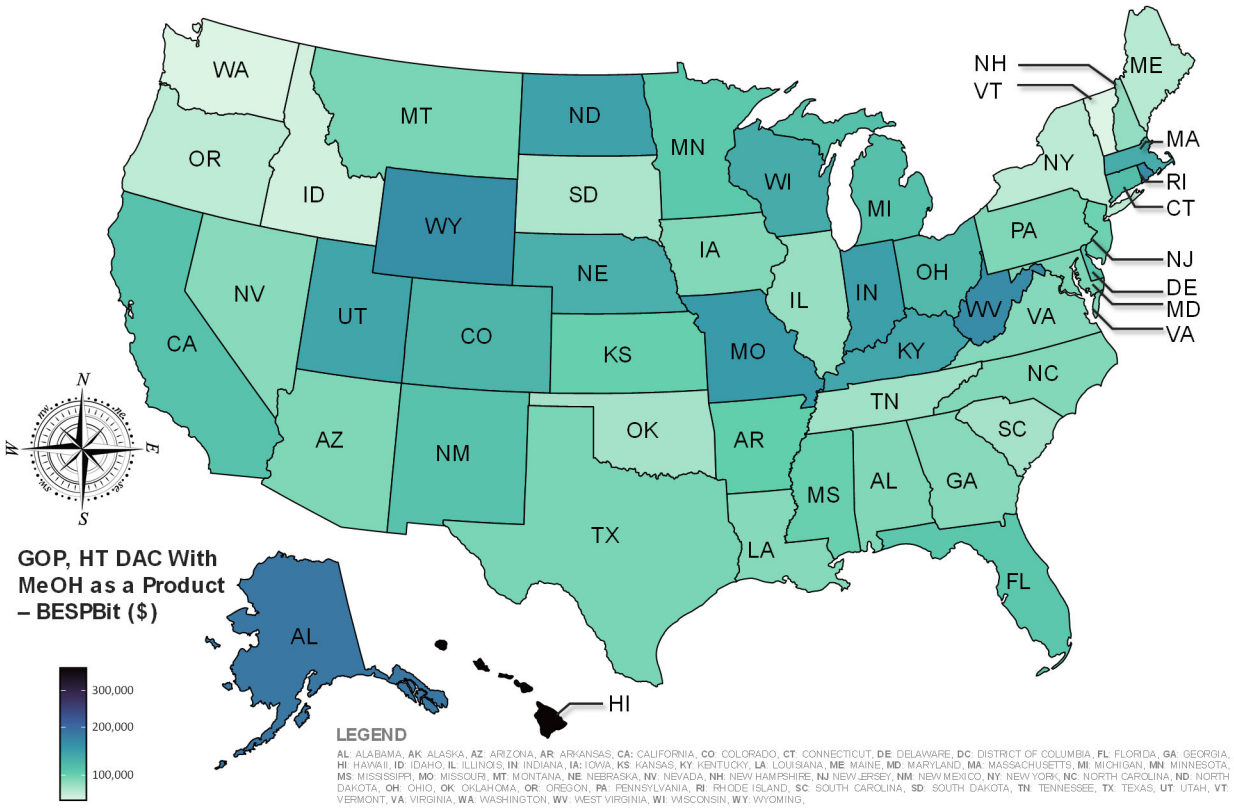

Figure S 6. Break-even selling price of bitcoin (BESPBit) for HT-DAC with MeOH as a product using GOP mining.

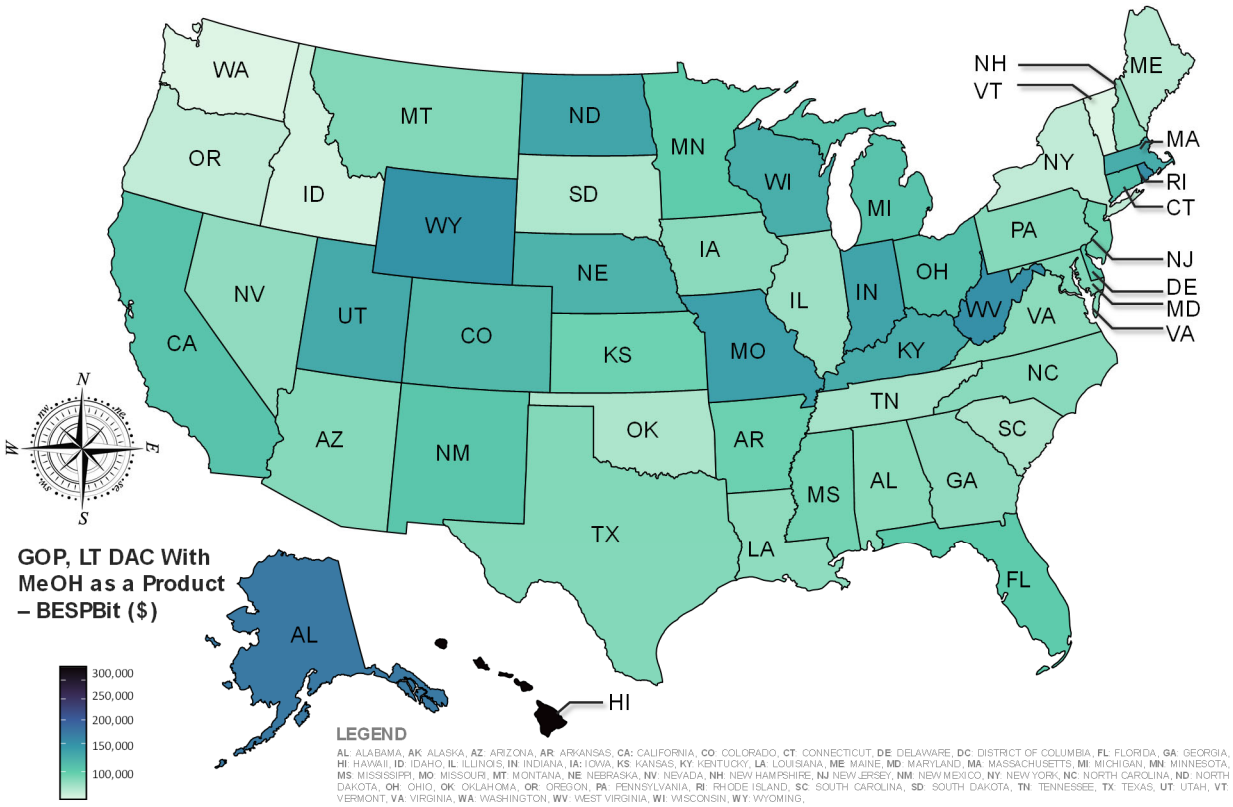

Figure S 7. Break-even selling price of Bitcoin (BESPBit) for LT DAC with MeOH as a product using GOP.

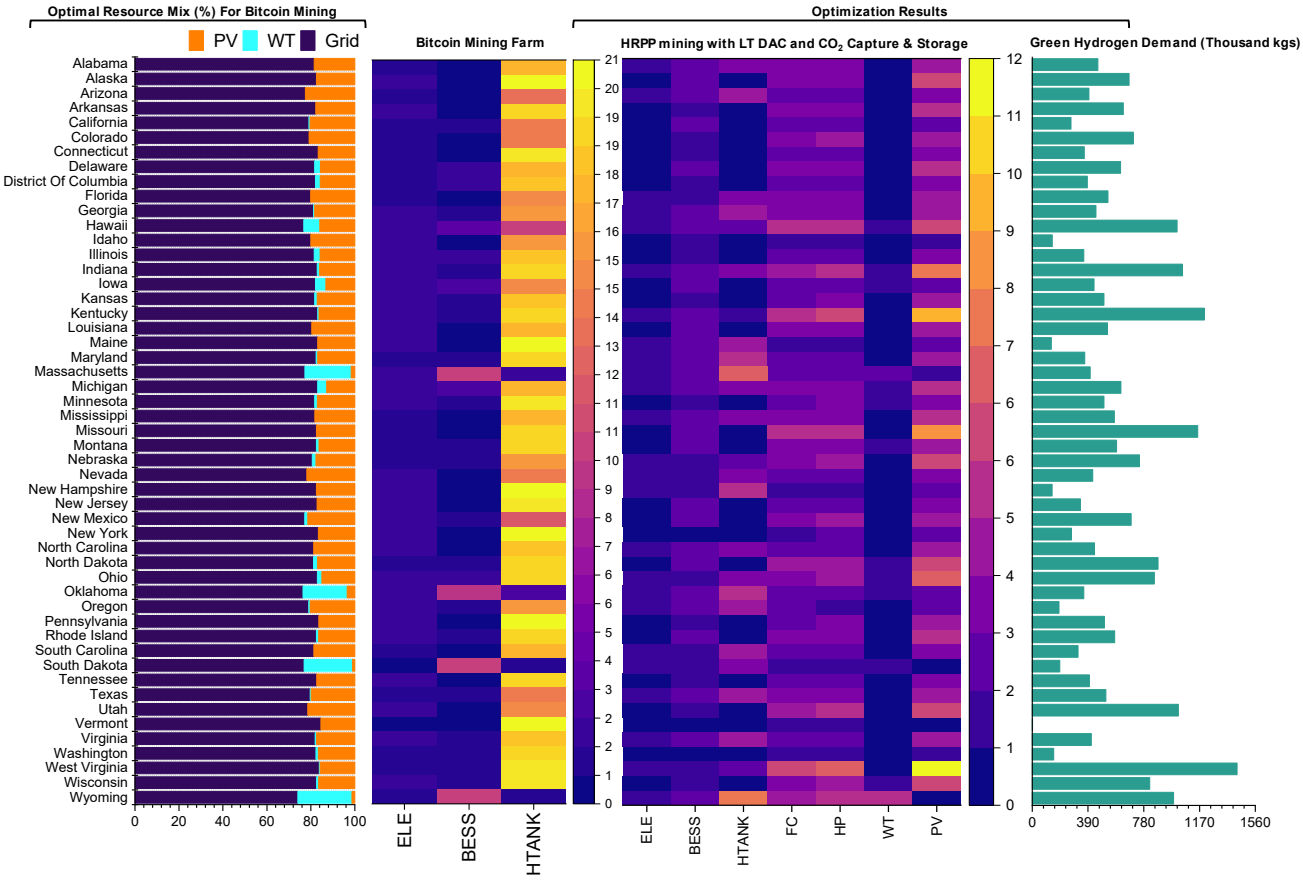

Figure S 8. US state-wise PVs, WTs, and grid resource mix and the optimal numbers of BESS, WTs, and PVs required to power the bitcoin mining farm, and the optimal numbers of ELE, BESS, HTANKs, FCs, HPs, WTs, PVs, and hydrogen required to power the LT-DAC plant for the HRPP scenario with CO_2 capture and storage. The BESS, PVs, ELE, FCs, and HPs all have a 1.0 MW rating, whereas WTs and HTANKs have a 1.5 MW and 10 kg rating.

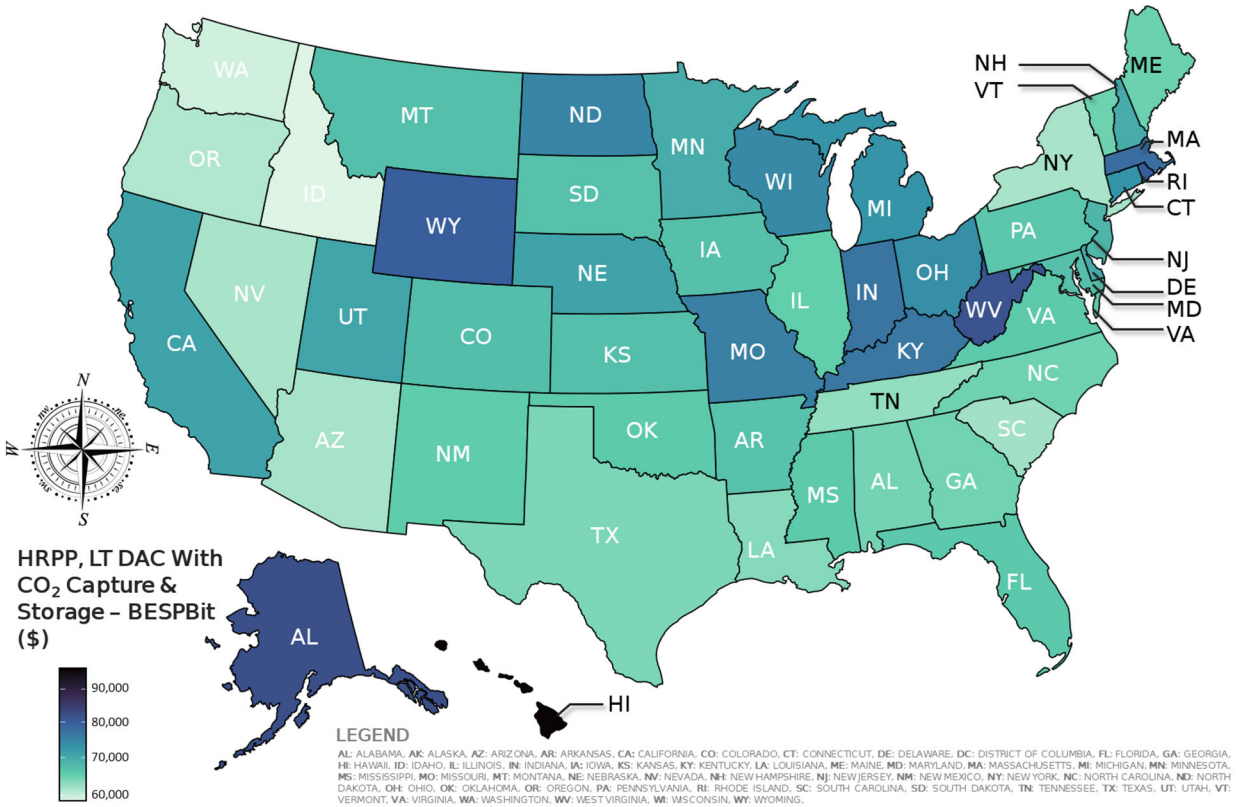

Figure S 9. Break-even selling price of Bitcoin (BESPBit) for LT DAC with CO_2 capture and storage with a HRPP case scenario.

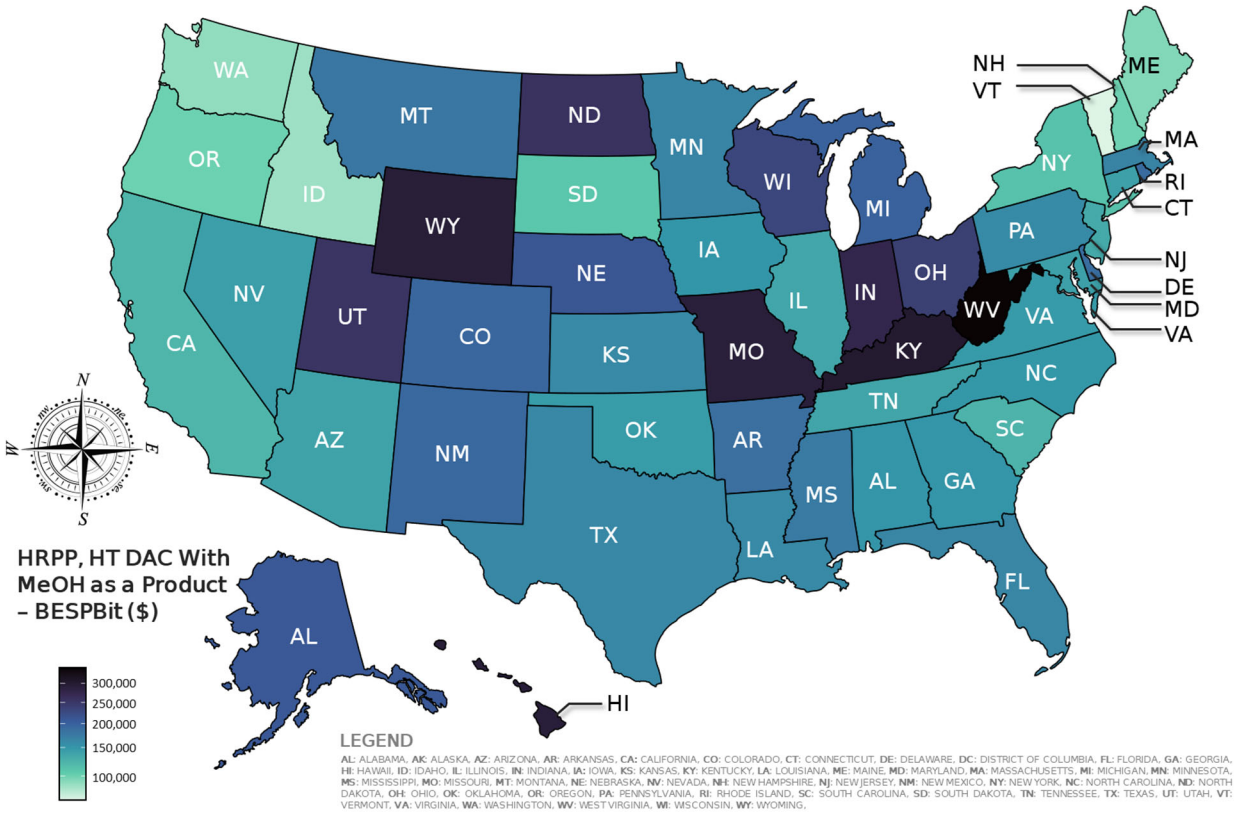

Figure S 10. Break even selling price of Bitcoin (BESPBit) for HT DAC with MeOH as a product with HRPP case scenario.

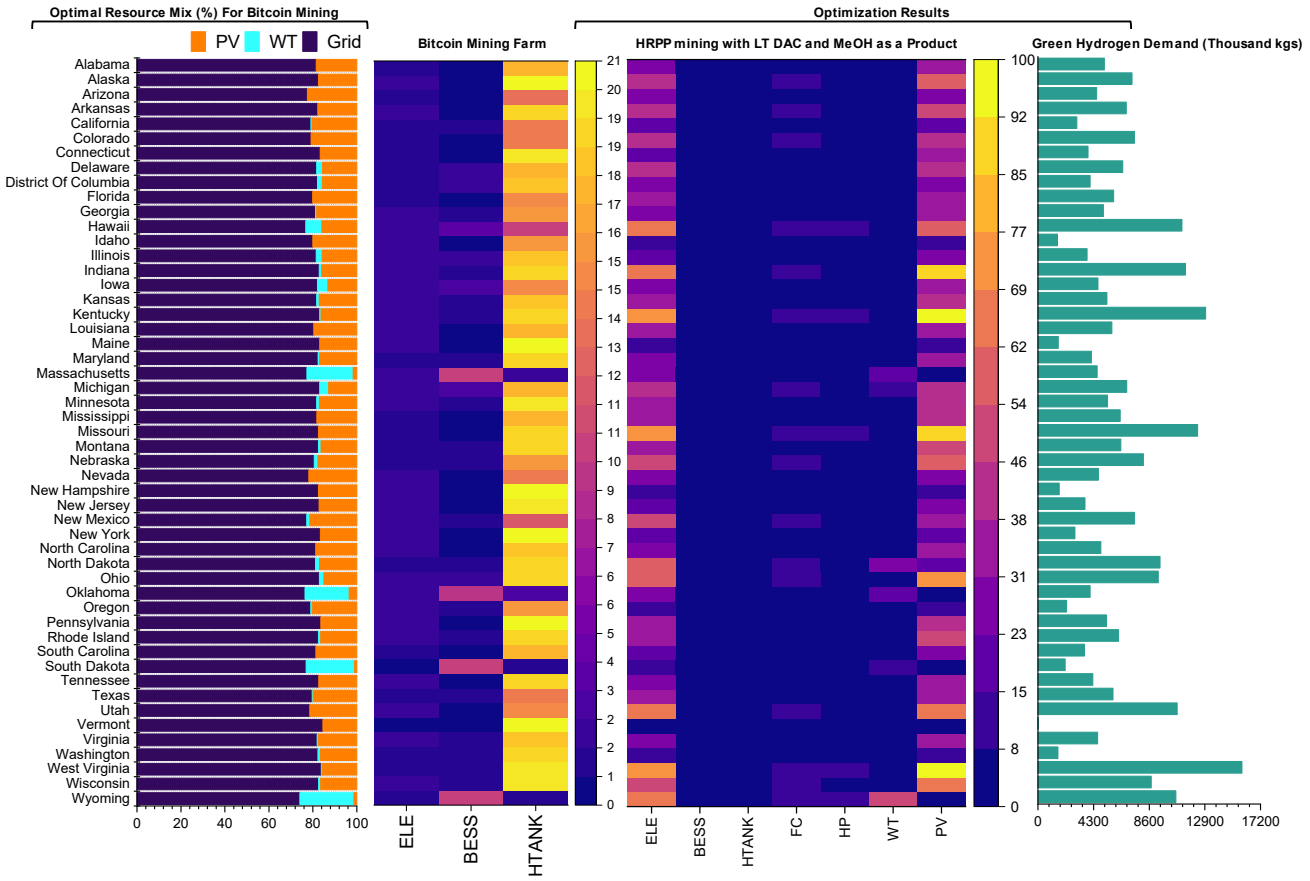

Figure S 11. US state-wise PV, WT, and grid resource mix, the optimal numbers of BESS, WTs, and PVs required to power the bitcoin mining farm, and the optimal numbers of ELE, BESS, HTANKs, FCs, HPs, WTs, PVs, and hydrogen required to power the LT-DAC plant for the HRPP case with MeOH as a product. The BESS, PVs, ELE, FCs, and HPs all have a 1.0 MW rating, whereas the WTs and HTANKs have a 1.5 MW and 10 kg rating.

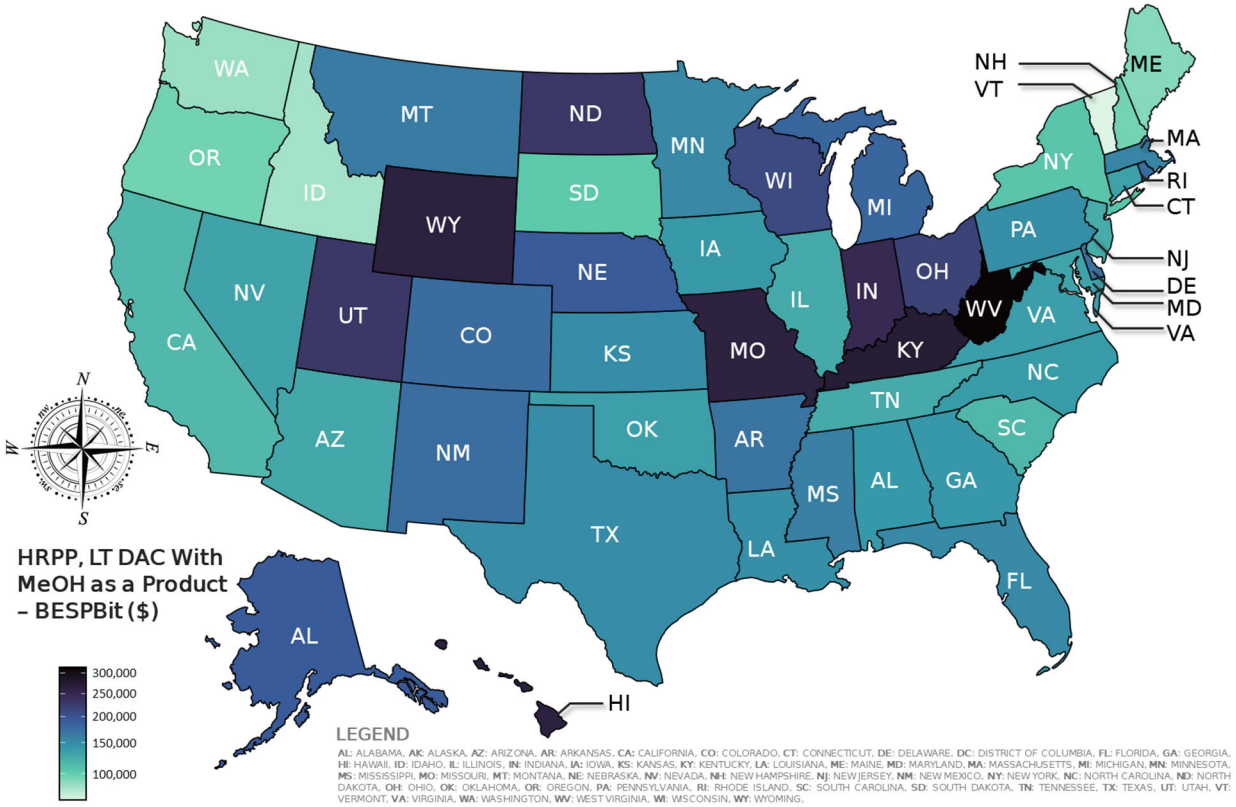

Figure S 12. Break-even selling price of Bitcoin (BESPBit) for LT DAC with MeOH as a product with HRPP case scenario.

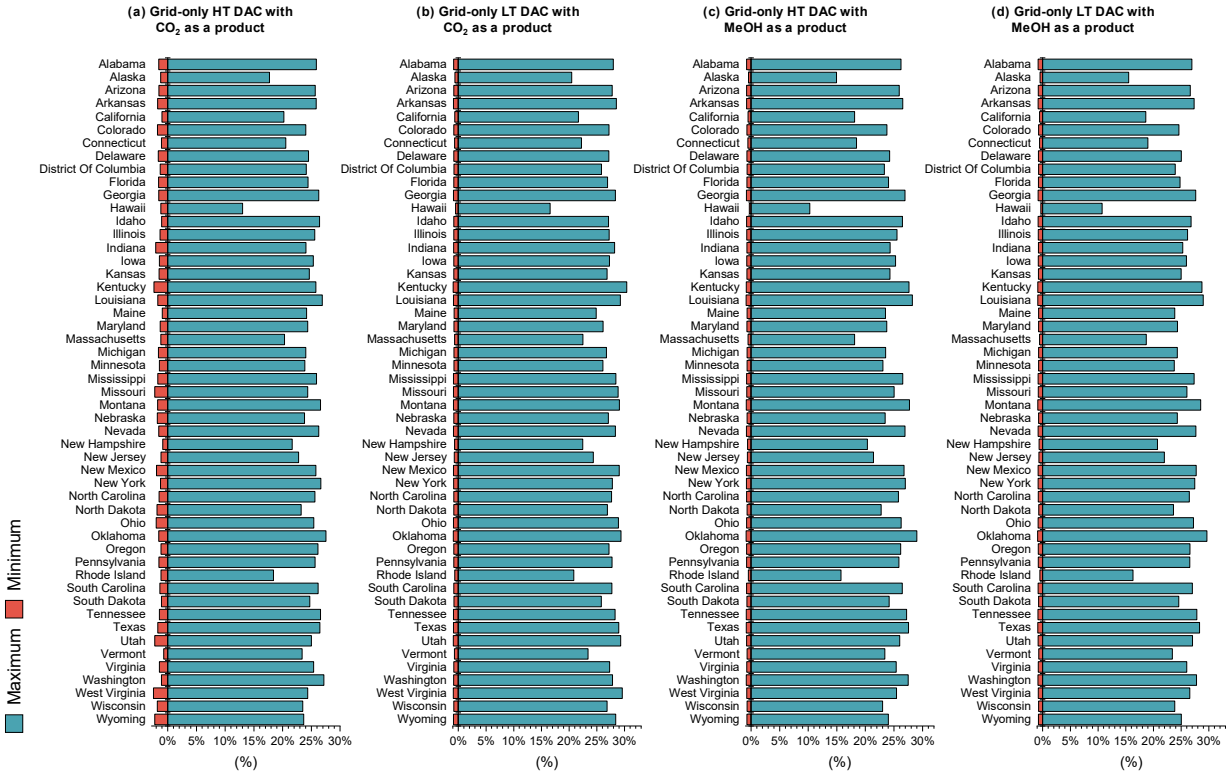

Figure S 13. Sensitivity analysis results for variations in the interest rate for a minimum value of 4% and a maximum value of 20% for the GOP scenario. A higher interest rate was kept to evaluate and take into account the market risk associated with a relatively volatile business.

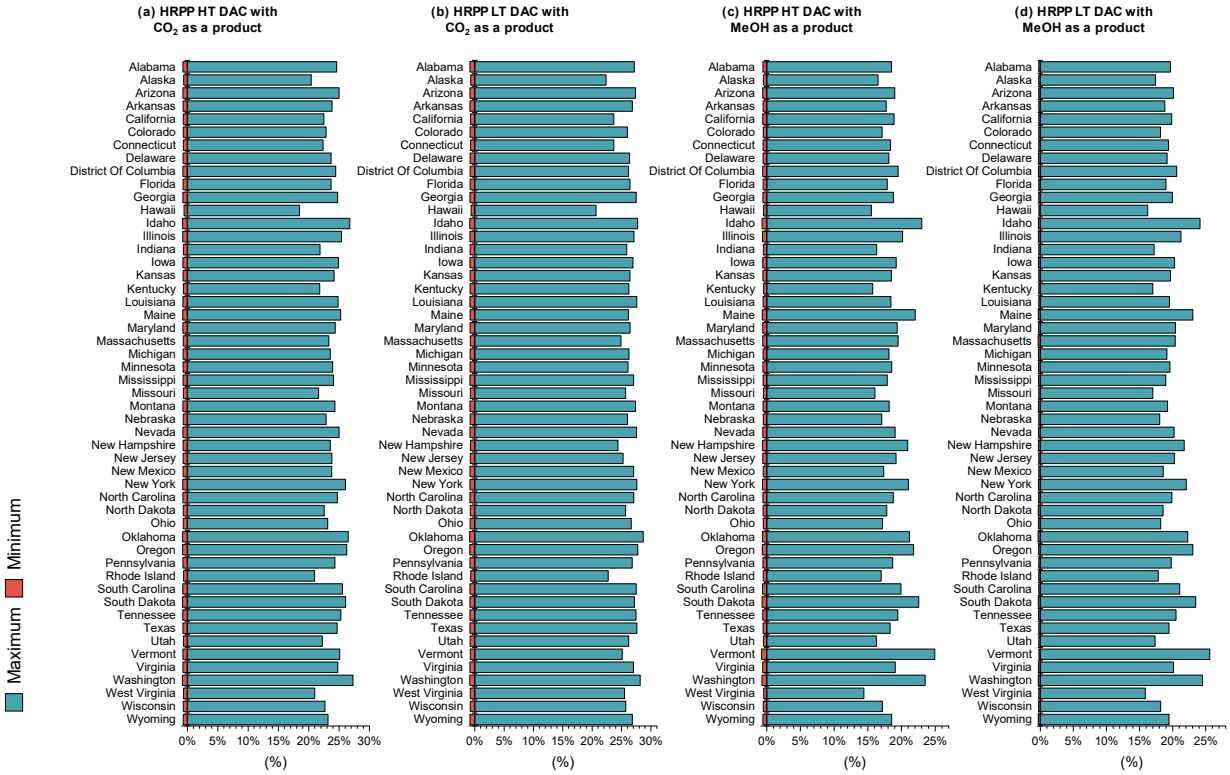

Figure S 14. Sensitivity analysis results for variations in the interest rate for a minimum value of 4% and a maximum value of 20% for the HRPP scenario. A higher interest rate was kept to evaluate and take into account the market risk associated with a relatively volatile business.

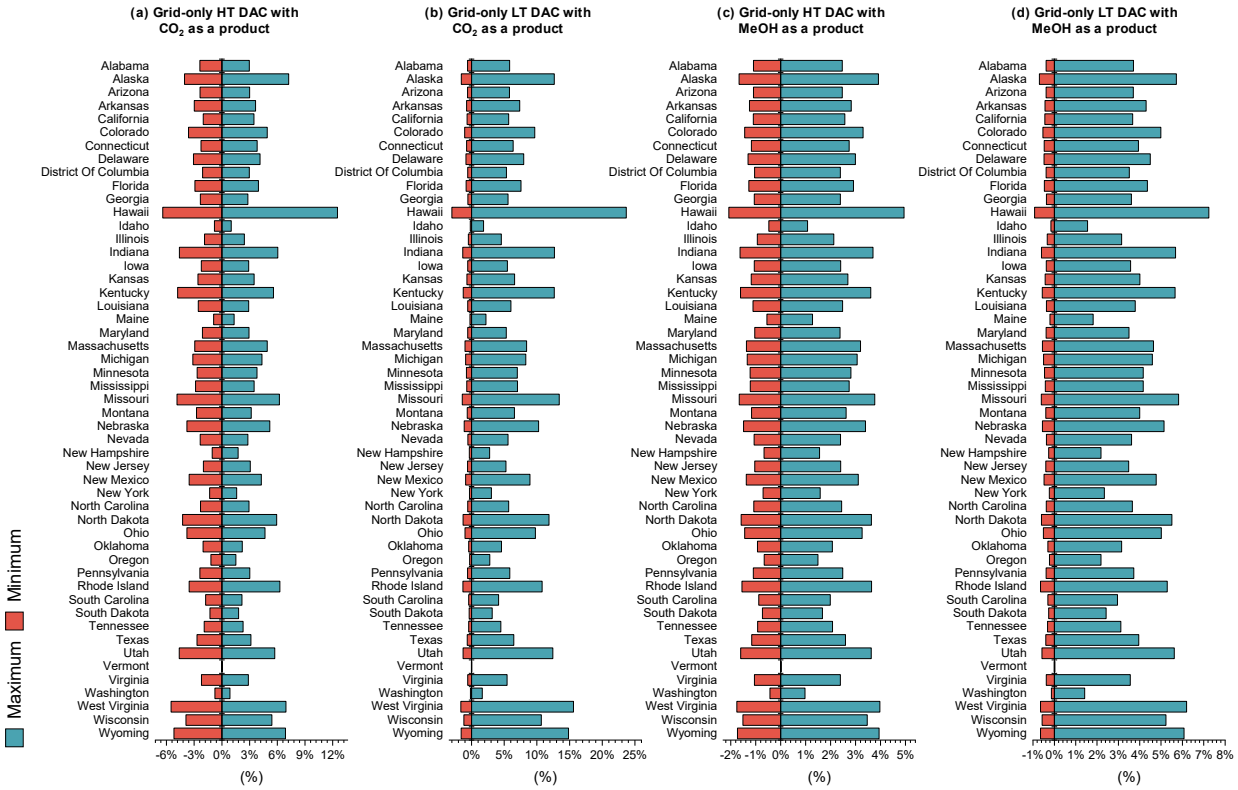

Figure S 15. Sensitivity analysis results for variations in the electrical (P_e) and thermal (P_t) requirements of DAC for the GOP scenario.

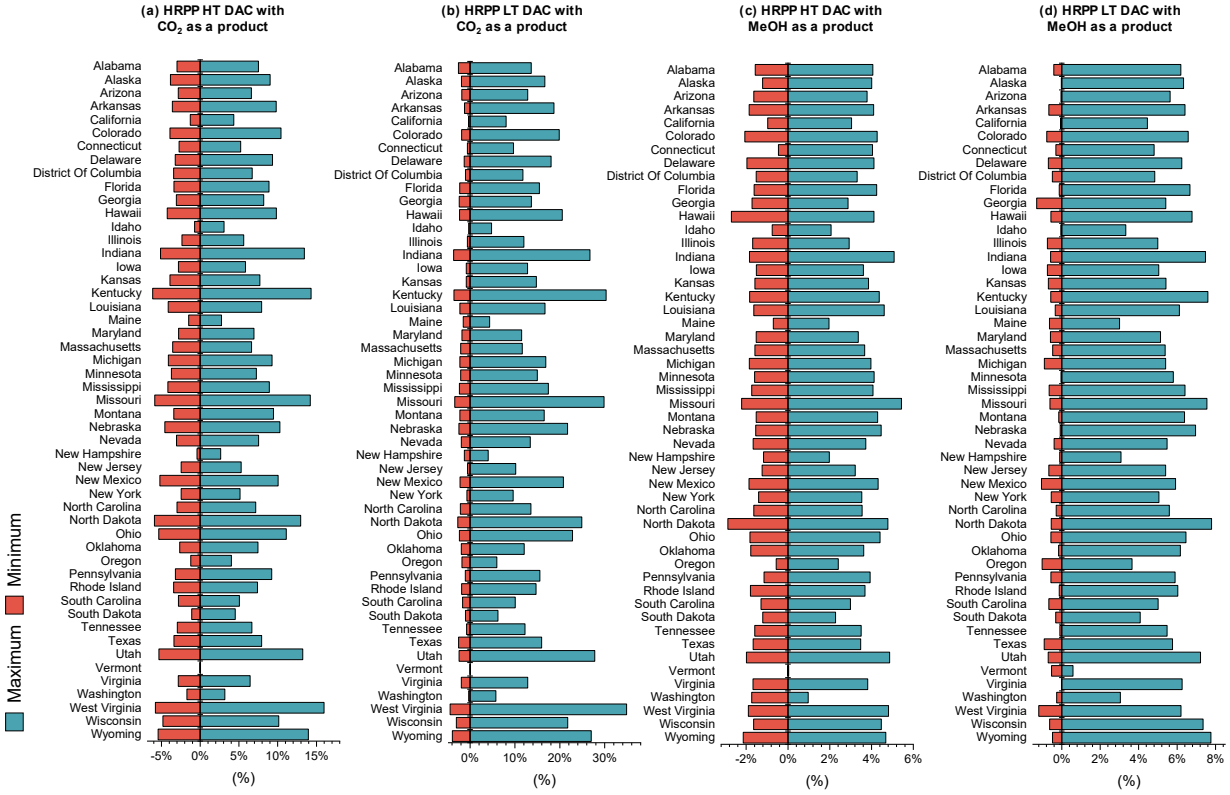

Figure S 16. Sensitivity analysis results for variations in the electrical (P_e) and thermal (P_t) requirements of DAC for the HRPP scenario.

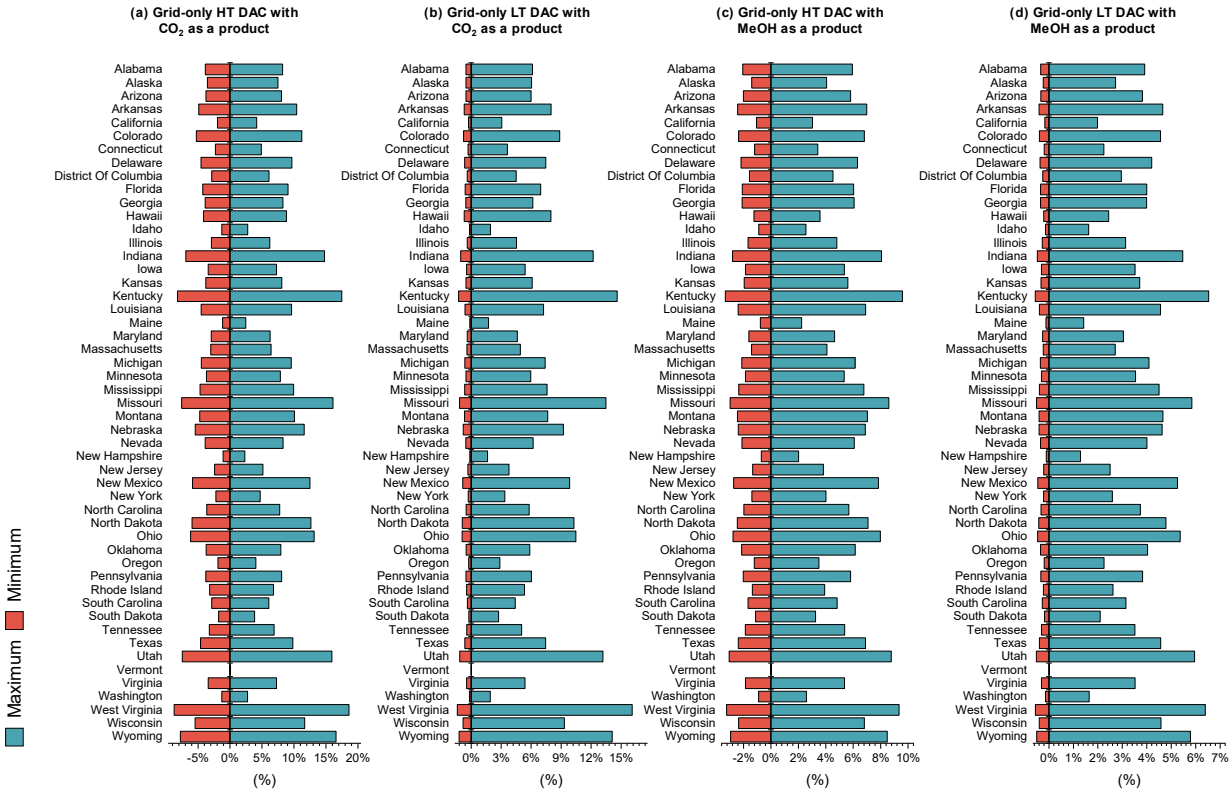

Figure S 17. Sensitivity analysis results for variations in DAC CAPEX for the GOP scenario.

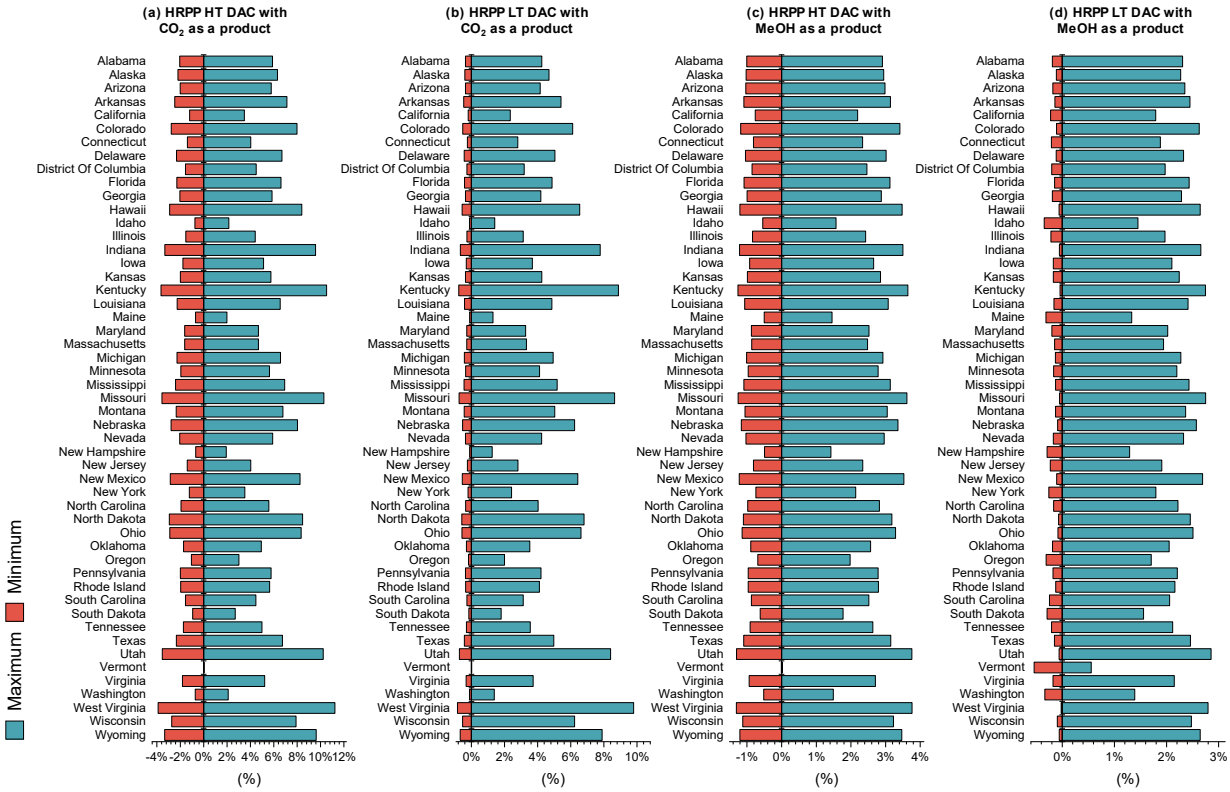

Figure S 18. Sensitivity analysis results for variations in DAC CAPEX for the HRPP scenario.

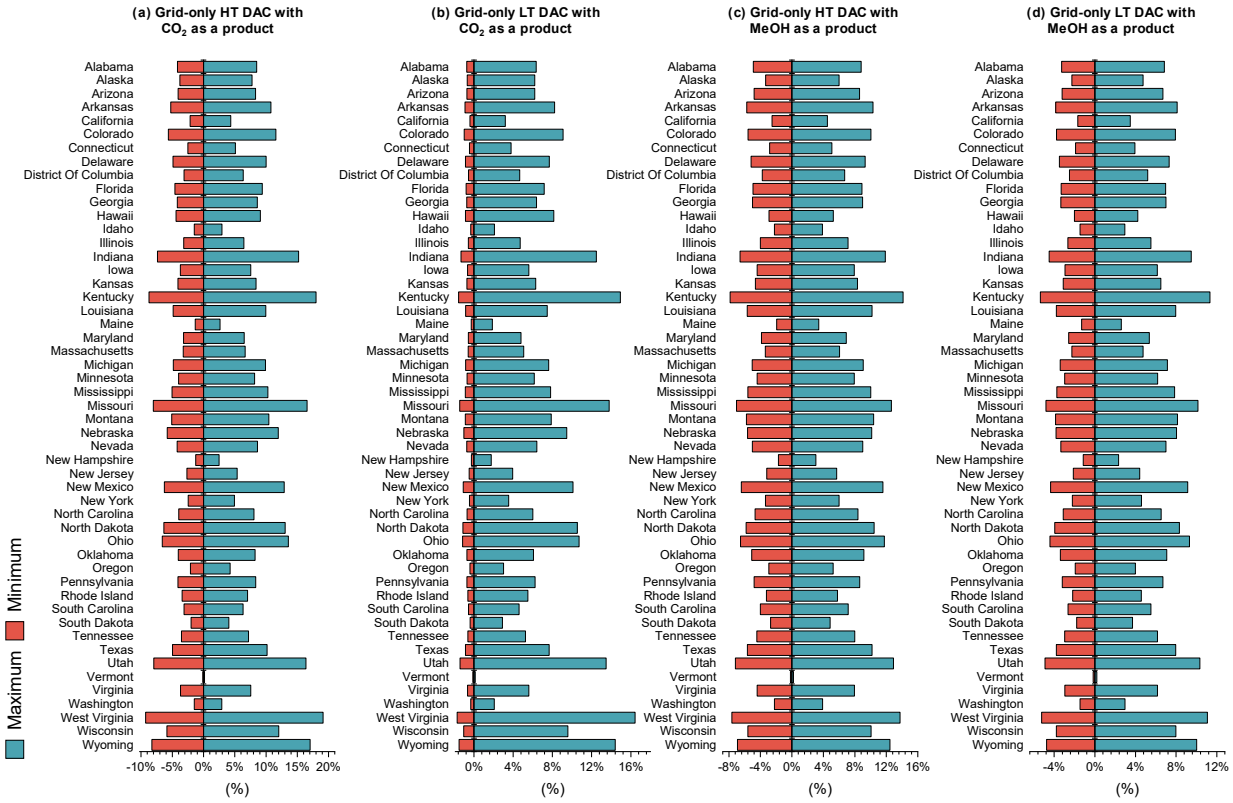

Figure S 19. Sensitivity analysis results for variations in the CAPEX of equipment (i.e., ELE, BESS, HTANKs, FCs, HPs, WTs, and PVs) for the GOP scenario.

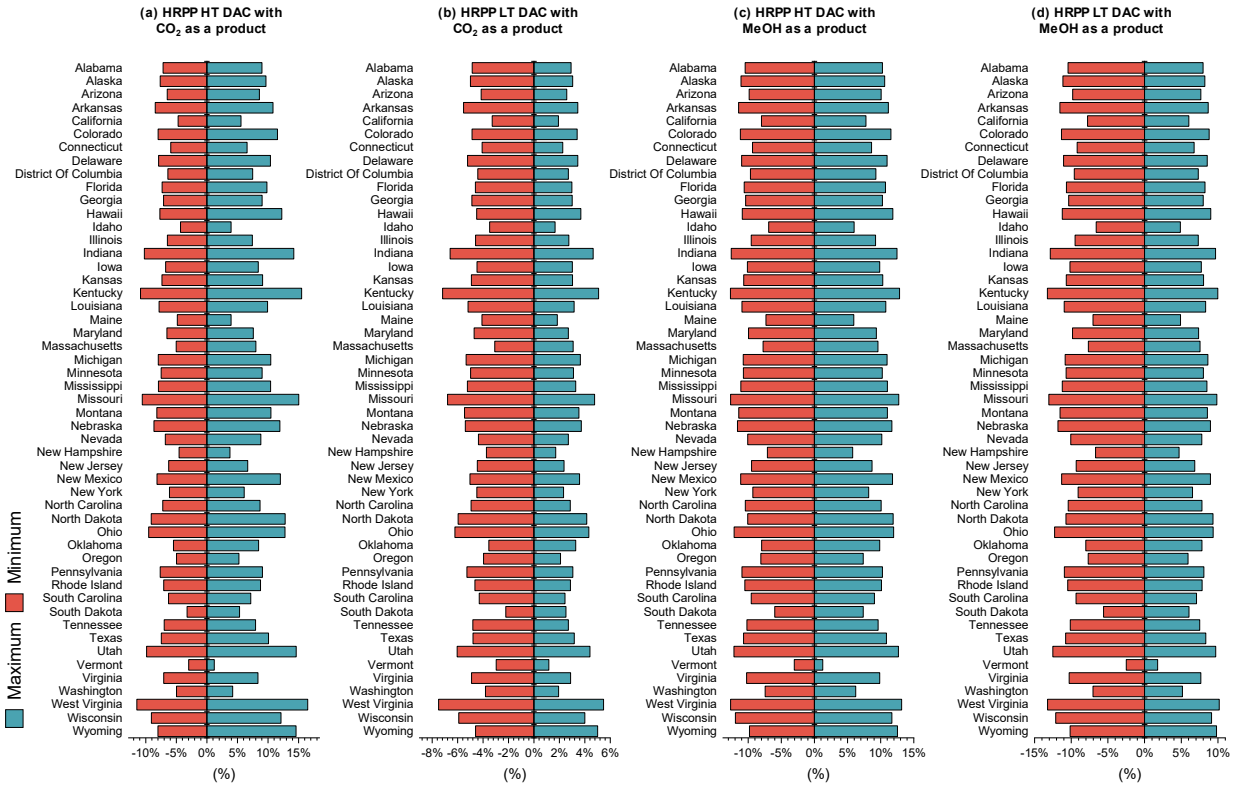

Figure S 20. Sensitivity analysis results for variations in the CAPEX of equipment (i.e., ELE, BESS, HTANKs, FCs, HPs, WTs, and PVs) for the HRPP scenario.

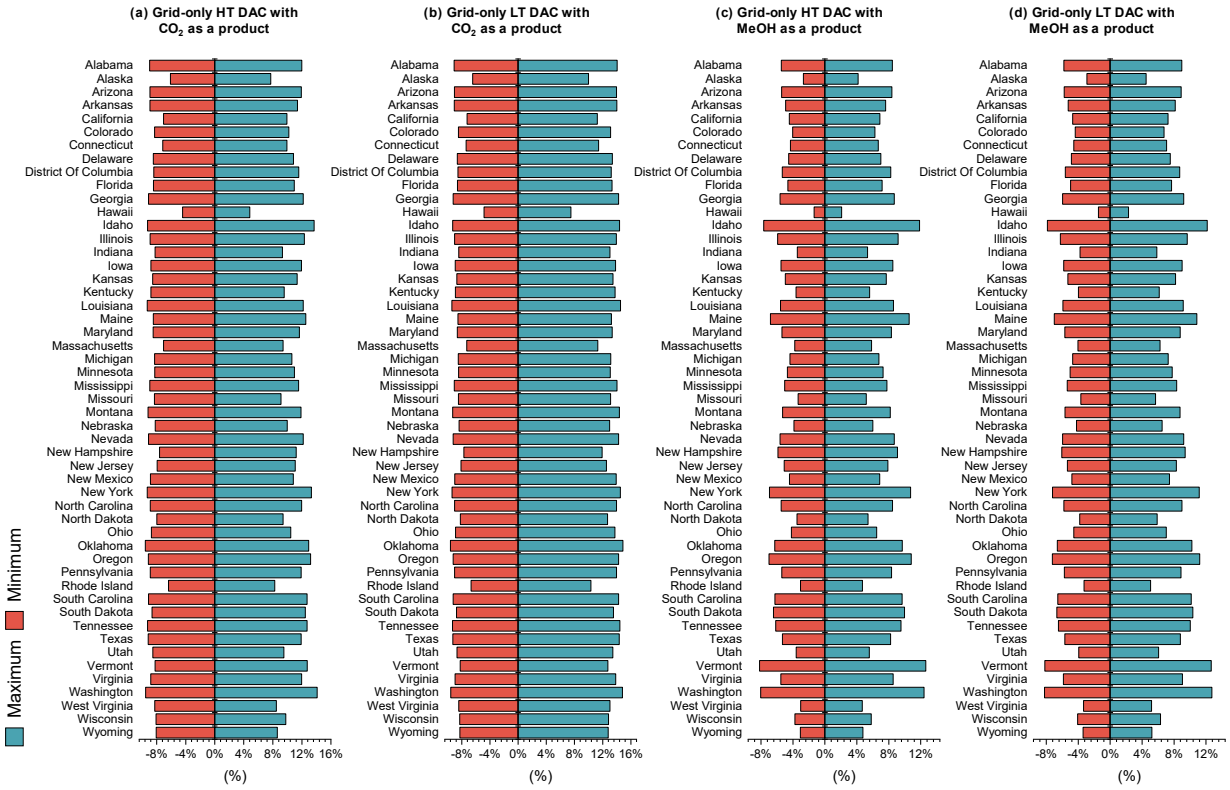

Figure S 21. Sensitivity analysis results for variations in the CAPEX of bitcoin mining equipment for the GOP scenario.

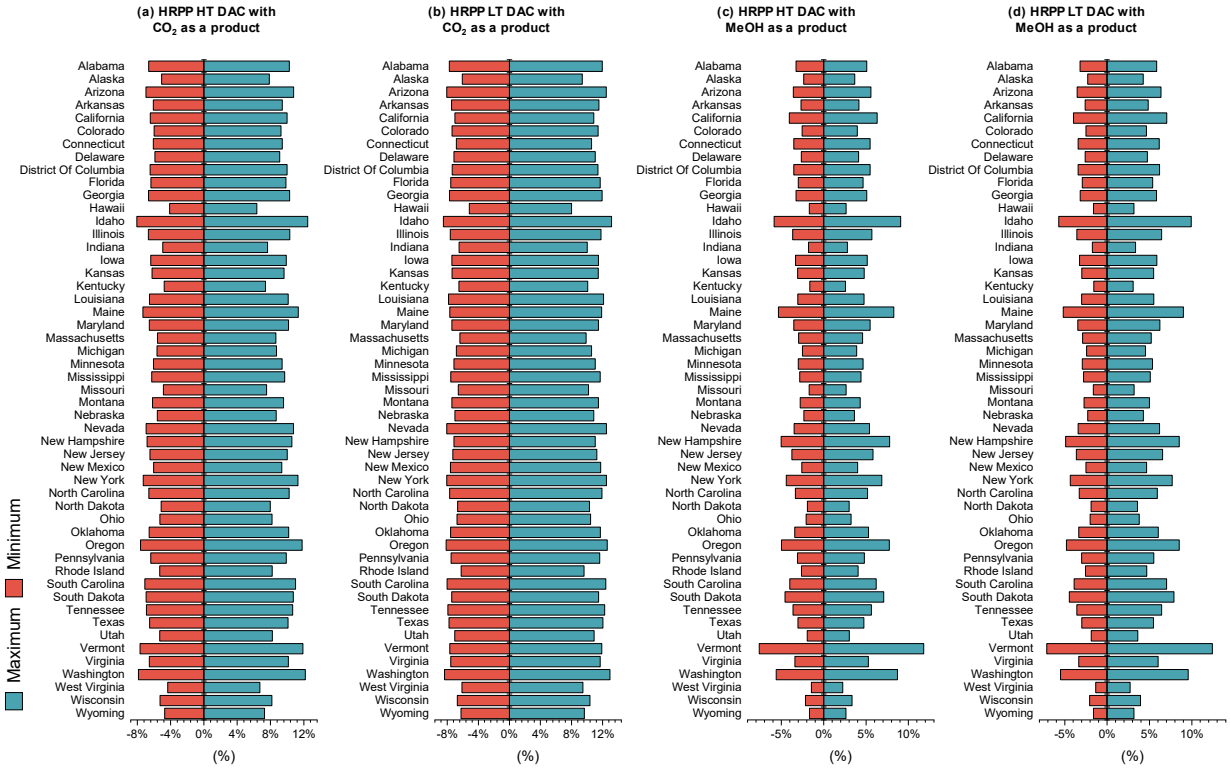

Figure S 22. Sensitivity analysis results for variations in the CAPEX of bitcoin mining equipment for the HRPP scenario.

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