Net-Zero America - new mexico state report v2

Larson et al. 2020

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Reading guide

IN DRAFT

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Table 1: *E- scenario - PILLAR 1: Efficiency/Electrification - Residential*

variable_name	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr	0	1.801	1.888	0	0	0	0
Sale of space heating units by type - Electric Heat Pump	0.039	0.203	0.209	0.219	0.228	0.235	0.241
Sale of space heating units by type - Electric Resistance	0.067	0.104	0.102	0.101	0.1	0.095	0.088
Sale of space heating units by type - Fossil	0.103	0.136	0.139	0.135	0.12	0.11	0.119
Sale of space heating units by type - Gas	0.792	0.557	0.55	0.545	0.553	0.559	0.552
Sales of cooking units - Electric Resistance	0.411	0.411	0.411	0.411	0.411	0.411	0.411
Sales of cooking units - Gas	0.589	0.589	0.589	0.589	0.589	0.589	0.589
Sales of water heating units by type - Electric Heat Pump	0	0	0	0	0	0	0
Sales of water heating units by type - Electric Resistance	0.117	0.23	0.231	0.232	0.233	0.233	0.234
Sales of water heating units by type - Gas Furnace	0.873	0.758	0.757	0.756	0.755	0.754	0.754
Sales of water heating units by type - Other	0.01	0.012	0.012	0.012	0.012	0.012	0.012

Table 2: *E- scenario - PILLAR 1: Efficiency/Electrification - Transportation*

variable_name	2020	2025	2030	2035	2040	2045	2050
End-use technology sales by technology - HDV - diesel	0.981	0.982	0.979	0.97	0.956	0.935	0.916
End-use technology sales by technology - HDV - EV	0	0	0	0	0	0	0
End-use technology sales by technology - HDV - gasoline	0.002	0.002	0.003	0.003	0.003	0.003	0.003
End-use technology sales by technology - HDV - hybrid	0.001	0.001	0.001	0.001	0.002	0.002	0.002
End-use technology sales by technology - HDV - hydrogen FC	0.001	0.001	0.002	0.002	0.002	0.002	0.003
End-use technology sales by technology - HDV - other	0.015	0.013	0.016	0.024	0.037	0.057	0.076
End-use technology sales by technology - LDV - diesel	0.017	0.021	0.022	0.021	0.019	0.017	0.016
End-use technology sales by technology - LDV - EV	0.03	0.049	0.056	0.069	0.085	0.099	0.11
End-use technology sales by technology - LDV - gasoline	0.911	0.877	0.858	0.841	0.822	0.802	0.786
End-use technology sales by technology - LDV - hybrid	0.039	0.048	0.059	0.065	0.071	0.077	0.083
End-use technology sales by technology - LDV - hydrogen FC	0.001	0.004	0.004	0.003	0.003	0.003	0.003
End-use technology sales by technology - LDV - other	0.001	0.001	0.001	0.001	0.001	0.001	0.001
End-use technology sales by technology - MDV - diesel	0.652	0.635	0.616	0.596	0.58	0.565	0.552
End-use technology sales by technology - MDV - EV	0	0.001	0.003	0.007	0.009	0.01	0.01
End-use technology sales by technology - MDV - gasoline	0.34	0.355	0.37	0.385	0.397	0.408	0.417
End-use technology sales by technology - MDV - hybrid	0.004	0.004	0.005	0.006	0.007	0.008	0.009
End-use technology sales by technology - MDV - hydrogen FC	0.002	0.002	0.002	0.003	0.003	0.004	0.005
End-use technology sales by technology - MDV - other	0.003	0.003	0.003	0.003	0.004	0.005	0.007

Table 3: *E- scenario - PILLAR 6: Land carbon sinks - Agriculture*

variable_name	2020	2030	2050
Carbon sink enhancement potential - Accelerate regeneration	0	0	5665.4
Carbon sink enhancement potential - All (not counting overlap)	0	0	46573.3
Carbon sink enhancement potential - Avoid deforestation	0	0	1830.649
Carbon sink enhancement potential - Extend rotation length	0	0	16380.4
Carbon sink enhancement potential - Improve plantations	0	0	20.328
Carbon sink enhancement potential - Increase retention of HWP	0	0	172.16
Carbon sink enhancement potential - Increase trees outside forests	0	0	612.064
Carbon sink enhancement potential - Reforest cropland	0	0	9380.4
Carbon sink enhancement potential - Reforest pasture	0	0	1869.284
Carbon sink enhancement potential - Restore productivity	0	0	10642.6
Land impacted for carbon sink enhancement - Accelerate regeneration	0	0	2283.343
Land impacted for carbon sink enhancement - All (not counting overlap)	0	0	10623.1
Land impacted for carbon sink enhancement - Avoid deforestation	0	0	491.412
Land impacted for carbon sink enhancement - Extend rotation length	0	0	9023.6
Land impacted for carbon sink enhancement - Improve plantations	0	0	11.298
Land impacted for carbon sink enhancement - Increase retention of HWP	0	0	34.432
Land impacted for carbon sink enhancement - Increase trees outside forests	0	0	172.657
Land impacted for carbon sink enhancement - Natural uptake	-11.76	3.333	0.955
Land impacted for carbon sink enhancement - Reforest cropland	0	0	3123.095
Land impacted for carbon sink enhancement - Reforest pasture	0	0	141.346
Land impacted for carbon sink enhancement - Restore productivity	0	0	6005.7
Land impacted for carbon sink enhancement - Retained in Hardwood Products	-0.028	-0.058	-0.061
Land impacted for carbon sink enhancement - Total	-11.788	3.275	0.894
Land impacted for carbon sink enhancement - Total impacted (over 30 years)	0	0	10663.8

Table 4: *E- scenario - PILLAR 6: Land carbon sinks - Forests*

variable_name	2050
Business-as-usual carbon sink - Accelerate regeneration	529.475
Business-as-usual carbon sink - Avoid deforestation	156.541
Business-as-usual carbon sink - Extend rotation length	4936.6
Business-as-usual carbon sink - Improve plantations	4.29

Table 4: *E- scenario - PILLAR 6: Land carbon sinks - Forests (continued)*

variable_name	2050
Business-as-usual carbon sink - Increase retention of HWP	0
Business-as-usual carbon sink - Increase trees outside forests	34.714
Business-as-usual carbon sink - Reforest cropland	354.396
Business-as-usual carbon sink - Reforest pasture	34.531
Business-as-usual carbon sink - Restore productivity	2114.2
Business-as-usual carbon sink - Total impacted (over 30 years)	354.396

Table 5: *E- scenario - PILLAR 1: Efficiency/Electrification - Overview*

variable_name	2020	2025	2030	2035	2040	2045	2050
Final energy demand by sector - commercial	0.062	0.063	0.064	0.064	0.064	0.066	0.069
Final energy demand by sector - industry	0.036	0.038	0.038	0.04	0.042	0.044	0.047
Final energy demand by sector - residential	0.074	0.071	0.07	0.07	0.071	0.073	0.074
Final energy demand by sector - transportation	0.268	0.252	0.233	0.221	0.221	0.228	0.236

Table 6: *E- scenario - PILLAR 1: Efficiency/Electrification - Commercial*

variable_name	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr	0	4935926602	5160311377	0	0	0	0
Sales of cooking units - Electric Resistance	0.419	0.447	0.447	0.446	0.444	0.445	0.446
Sales of cooking units - Gas	0.581	0.553	0.553	0.554	0.556	0.555	0.554
Sales of space heating units - Electric Heat Pump	0.016	0.199	0.535	0.751	0.785	0.788	0.788
Sales of space heating units - Electric Resistance	0.018	0.045	0.093	0.158	0.2	0.206	0.207
Sales of space heating units - Fossil	0	0.002	0.001	0	0	0	0
Sales of space heating units - Gas Furnace	0.967	0.754	0.371	0.091	0.016	0.006	0.005
Sales of water heating units - Electric Heat Pump	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance	0.008	0.015	0.015	0.015	0.015	0.015	0.015
Sales of water heating units - Gas Furnace	0.99	0.981	0.981	0.981	0.981	0.981	0.981
Sales of water heating units - Other	0.002	0.004	0.004	0.004	0.004	0.004	0.004

Table 7: *E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

variable_name	2025	2030	2035	2040	2045	2050
Electricity distribution peak load (capital invested) - Cumulative 5-yr	0.941	0.974	1.679	1.792	1.791	1.89

Table 8: *RE- scenario - PILLAR 1: Efficiency/Electrification - Residential*

variable_name	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr	0	1.873	2.239	0	0	0	0
Sale of space heating units by type - Electric Heat Pump	0.051	0.202	0.633	0.853	0.888	0.893	0.89
Sale of space heating units by type - Electric Resistance	0.065	0.104	0.056	0.032	0.029	0.03	0.03
Sale of space heating units by type - Fossil	0.102	0.147	0.102	0.073	0.062	0.058	0.061
Sale of space heating units by type - Gas	0.782	0.547	0.209	0.042	0.02	0.02	0.019
Sales of cooking units - Electric Resistance	0.419	0.542	0.922	0.996	1	1	1
Sales of cooking units - Gas	0.581	0.458	0.078	0.004	0	0	0
Sales of water heating units by type - Electric Heat Pump	0	0.076	0.427	0.575	0.592	0.592	0.592
Sales of water heating units by type - Electric Resistance	0.117	0.242	0.313	0.383	0.394	0.395	0.395
Sales of water heating units by type - Gas Furnace	0.873	0.67	0.248	0.03	0.002	0	0
Sales of water heating units by type - Other	0.01	0.012	0.012	0.012	0.012	0.012	0.012

Table 9: *RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation*

variable_name	2020	2025	2030	2035	2040	2045	2050
End-use technology sales by technology - HDV - diesel	0.972	0.921	0.67	0.233	0.042	0.006	0
End-use technology sales by technology - HDV - EV	0.006	0.038	0.19	0.456	0.574	0.596	0.6
End-use technology sales by technology - HDV - gasoline	0.002	0.002	0.002	0.001	0	0	0
End-use technology sales by technology - HDV - hybrid	0.001	0.001	0.001	0	0	0	0
End-use technology sales by technology - HDV - hydrogen FC	0.004	0.025	0.127	0.304	0.382	0.397	0.4
End-use technology sales by technology - HDV - other	0.015	0.012	0.011	0.006	0.002	0	0
End-use technology sales by technology - LDV - diesel	0.017	0.02	0.013	0.004	0.001	0	0
End-use technology sales by technology - LDV - EV	0.034	0.136	0.44	0.808	0.962	0.993	1
End-use technology sales by technology - LDV - gasoline	0.908	0.798	0.514	0.175	0.034	0.006	0
End-use technology sales by technology - LDV - hybrid	0.039	0.042	0.03	0.011	0.003	0.001	0
End-use technology sales by technology - LDV - hydrogen FC	0.001	0.003	0.002	0.001	0	0	0
End-use technology sales by technology - LDV - other	0.001	0.001	0.001	0	0	0	0
End-use technology sales by technology - MDV - diesel	0.647	0.597	0.423	0.144	0.026	0.004	0
End-use technology sales by technology - MDV - EV	0.008	0.051	0.253	0.608	0.765	0.795	0.8
End-use technology sales by technology - MDV - gasoline	0.337	0.333	0.255	0.093	0.018	0.003	0
End-use technology sales by technology - MDV - hybrid	0.004	0.004	0.003	0.001	0	0	0
End-use technology sales by technology - MDV - hydrogen FC	0.002	0.013	0.063	0.152	0.191	0.199	0.2
End-use technology sales by technology - MDV - other	0.003	0.003	0.002	0.001	0	0	0
Light-duty vehicle capital costs - Cumulative 5-yr	0	349771946	897291274	1452747776	2201139807	2395091775	2283885814
Number of public EV charging plugs - DC Fast Charging	99	0	639.977	0	2799.5	0	4525.1
Number of public EV charging plugs - L2 Charging	151	0	15433.3	0	67510.1	0	109125.1

Table 10: *RE- scenario - PILLAR 2: Clean Electricity - Generating capacity*

variable_name	2020	2025	2030	2035	2040	2045	2050
Power generation capital investment - biomass power plant	0	0	0	0	0	0	0
Power generation capital investment - biomass w/ccu allam power plant	0	0	0	0	0	0.01	0.021
Power generation capital investment - biomass w/ccu power plant	0	0	0	0	0	0.014	0.004
Power generation capital investment - Solar PV - Base	0	7.827	9.255	11.135	5.383	3.262	1.967
Power generation capital investment - Solar PV - Constrained	0	0.876	0	0	1.044	1.021	1.113
Power generation capital investment - Wind - Base	0	14.415	19.018	20.658	13.5	8.906	13.457
Power generation capital investment - Wind - Constrained	0	14.628	12.788	18.456	13.55	5.099	14.328

Table 11: *RE- scenario - PILLAR 2: Clean Electricity - Generation*

variable_name	2020	2025	2030	2035	2040	2045	2050
Power generation by technology - biomass power plant	0	0	0	0	0	0	0
Power generation by technology - biomass w/ccu allam power plant	0	0	0	0	0	9.982	30.837
Power generation by technology - biomass w/ccu power plant	0	0	0	0	0	16.037	20.098

Table 12: *RE- scenario - PILLAR 2: Clean Electricity - Transmission*

variable_name	2020	2025	2030	2035	2040	2045	2050
HV transmission for wind and solar - base all	0	10202.5	20086.8	32376.9	42518.4	51593.4	60046.6
HV transmission for wind and solar - base other intra-state	0	2519.1	6070	10134.9	12644.2	14305.1	15991.3
HV transmission for wind and solar - base spur intra-state	0	2918.5	5837.2	9267.6	11607.6	13432	15445
HV transmission for wind and solar - constrained all	0	5951.2	9743.8	15881.9	22205.3	26066.3	29022.4
HV transmission for wind and solar - constrained other intra-state	0	244.299	317.073	817.305	1299.1	1405.3	2160.8
HV transmission for wind and solar - constrained spur intra-state	0	1831.2	2708.2	4465.7	6277.1	6920.4	7394.5

Table 13: *RE- scenario - PILLAR 3: Bioenergy and Hydrogen - Bioconversion*

variable_name	2020	2025	2030	2035	2040	2045	2050
Biomass purchases	0	0	0	0	0.013	0.081	0.184
Capital investment	0	0	0	0	0.192	0	2.485
Number of facilities - allam power w ccu	0	0	0	0	0	1	1
Number of facilities - beccs hydrogen	0	0	0	0	1	3	6
Number of facilities - diesel	0	0	0	0	0	0	0
Number of facilities - diesel ccu	0	0	0	0	0	1	1
Number of facilities - power	0	0	0	0	0	0	0
Number of facilities - power ccu	0	0	0	0	0	1	1
Number of facilities - pyrolysis	0	0	0	0	0	0	0
Number of facilities - pyrolysis ccu	0	0	0	0	0	1	1
Number of facilities - sng	0	0	0	0	0	0	0
Number of facilities - sng ccu	0	0	0	0	0	1	1

Table 14: *RE- scenario - PILLAR 4: CO2 capture, use, storage - CO2 capture*

variable_name	2025	2030	2035	2040	2045	2050
Annual - All	0	0	0	0.26	1.57	3.58
Annual - BECCS	0	0	0	0.26	1.57	3.58
Annual - Cement	0	0	0	0	0	0
Annual - NGCC	0	0	0	0	0	0
Cumulative - All	0	0	0	0.26	1.83	5.41
Cumulative - BECCS	0	0	0	0.26	1.83	5.41
Cumulative - Cement	0	0	0	0	0	0
Cumulative - NGCC	0	0	0	0	0	0

Table 15: *RE- scenario - PILLAR 4: CO2 capture, use, storage - CO2 storage*

variable_name	2025	2030	2035	2040	2045	2050
Annual	0	0	3.52	5.42	10.33	13.05
Injection wells	0	0	4	6	12	14
Resource characterization, appraisal and permitting costs cumulative	5.15	92.7	146.88	146.88	146.88	146.88
Wells and facilities construction costs cumulative	0	28.42	110.75	197.37	330.03	409.73

Table 16: *RE- scenario - PILLAR 4: CO2 capture, use, storage - CO2 transportation*

variable_name	2025	2030	2035	2040	2045	2050
CO2 pipelines - All	0	0	0	20269.752	379234.475	710036
CO2 pipelines - Spur	0	0	0	20269.752	379234.475	710036
CO2 pipelines - Trunk	0	0	0	0	0	0

Table 17: *RE- scenario - IMPACTS - Jobs*

variable_name	2020	2025	2030	2035	2040	2045	2050
Jobs by economic sector - agriculture	1.458	1.681	3.413	1.305	20.052	94.912	178.21
Jobs by economic sector - construction	9112.6	21264.5	27580.1	34987.6	33874.3	32502	33504.7
Jobs by economic sector - manufacturing	8862.5	10184.4	12451.9	14360.9	12846.3	11239.7	11099.4

Table 17: *RE- scenario - IMPACTS - Jobs (continued)*

variable_name	2020	2025	2030	2035	2040	2045	2050
Jobs by economic sector - mining	14800.7	12758.7	10124.3	7931.7	5180.6	3362.5	1824.2
Jobs by economic sector - other	543.952	2098.6	3111.8	4343.8	4297	4328.7	4833.5
Jobs by economic sector - pipeline	1139.7	1194.1	1121.9	1031.2	807.726	648.95	521.016
Jobs by economic sector - professional	5800.8	11805.9	15764.2	20749	21351.9	21510.9	23141.7
Jobs by economic sector - trade	7412.5	10056.7	11660.8	14035.8	13627.2	13358.7	14029.3
Jobs by economic sector - utilities	5240.8	13264.9	17083.2	23185.4	24978.5	25343.4	27309.6
Jobs by resource sector - Biomass	6.045	7.215	9.411	3.716	60.363	346.155	761.028
Jobs by resource sector - CO2	0	2.009	52.415	65.516	75.35	393.757	1114.6
Jobs by resource sector - Coal	1733.8	741.598	120.876	10.206	7.549	5.869	4.929
Jobs by resource sector - Grid	5006.9	20811.3	28724.4	41454.2	45354.9	46917.7	50936
Jobs by resource sector - Natural Gas	11644.1	11031.5	9084.1	6952.7	5555.3	3587.8	2149.2
Jobs by resource sector - Nuclear	0	0	0	0	0	0	0
Jobs by resource sector - Oil	25695.3	24959.3	22652.8	20474.1	14925.6	11195.2	6939.4
Jobs by resource sector - Solar	3984.3	11104.8	15166.2	20050.5	16842.3	15307.1	16590.5
Jobs by resource sector - Wind	4844.6	13971.8	23091.4	31616	34162.2	34636.5	37945.9
Median wages - All	59775.3	58972.4	59066.2	59476.9	60349.2	61243.2	62041.9
Required Level of Education - Associates degree or some college	15243.1	25055.5	30536.6	37787.5	37020.7	35777	37350.7
Required Level of Education - Bachelors degree	12774.7	18409.6	21446.4	25657.2	24722.5	23671.9	24391.4
Required Level of Education - Doctoral degree	433.323	679.412	821.73	1009	991.378	967.094	1011.3
Required Level of Education - High school diploma or less	21461.3	33988.4	40785.4	49724.9	47948.1	45868.8	47331.8
Required Level of Education - Masters or professional degree	3002.6	4496.5	5311.4	6448.2	6300.9	6105.2	6356.5
Wage income - All	3163133790	4873238780	5842298551	7175272001	7060634484	6883909127	7225153812

Table 18: *RE- scenario - PILLAR 6: Land carbon sinks - Agriculture*

variable_name	2050
Carbon sink enhancement potential - Accelerate regeneration	5665.4
Carbon sink enhancement potential - All (not counting overlap)	46573.3
Carbon sink enhancement potential - Avoid deforestation	1830.649
Carbon sink enhancement potential - corn-ethanol to energy grasses	0
Carbon sink enhancement potential - cropland measures	-767.542
Carbon sink enhancement potential - Extend rotation length	16380.4
Carbon sink enhancement potential - Improve plantations	20.328
Carbon sink enhancement potential - Increase retention of HWP	172.16
Carbon sink enhancement potential - Increase trees outside forests	612.064
Carbon sink enhancement potential - permanent conservation cover	-47.506
Carbon sink enhancement potential - Reforest cropland	9380.4
Carbon sink enhancement potential - Reforest pasture	1869.284
Carbon sink enhancement potential - Restore productivity	10642.6
Carbon sink enhancement potential - total	-815.048
Land impacted for carbon sink enhancement - Accelerate regeneration	2283.343
Land impacted for carbon sink enhancement - All (not counting overlap)	10623.1
Land impacted for carbon sink enhancement - Avoid deforestation	491.412
Land impacted for carbon sink enhancement - corn-ethanol to energy grasses	0
Land impacted for carbon sink enhancement - cropland measures	1048.45
Land impacted for carbon sink enhancement - Extend rotation length	9023.6
Land impacted for carbon sink enhancement - Improve plantations	11.298
Land impacted for carbon sink enhancement - Increase retention of HWP	34.432
Land impacted for carbon sink enhancement - Increase trees outside forests	172.657
Land impacted for carbon sink enhancement - permanent conservation cover	72.888
Land impacted for carbon sink enhancement - Reforest cropland	3123.095
Land impacted for carbon sink enhancement - Reforest pasture	141.346
Land impacted for carbon sink enhancement - Restore productivity	6005.7
Land impacted for carbon sink enhancement - total	1121.338
Land impacted for carbon sink enhancement - Total impacted (over 30 years)	10663.8

Table 19: *RE- scenario - PILLAR 6: Land carbon sinks - Forests*

variable_name	2050
Business-as-usual carbon sink - Accelerate regeneration	529.475
Business-as-usual carbon sink - Avoid deforestation	156.541
Business-as-usual carbon sink - Extend rotation length	4936.6
Business-as-usual carbon sink - Improve plantations	4.29
Business-as-usual carbon sink - Increase retention of HWP	0
Business-as-usual carbon sink - Increase trees outside forests	34.714
Business-as-usual carbon sink - Reforest cropland	354.396
Business-as-usual carbon sink - Reforest pasture	34.531
Business-as-usual carbon sink - Restore productivity	2114.2
Business-as-usual carbon sink - Total impacted (over 30 years)	354.396

Table 20: *RE- scenario - IMPACTS - Fossil fuel industries*

variable_name	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption	207041.1	210116	177115.9	142054.3	106936.3	67280.7	46664.2
Oil consumption	48348.8	45484.5	39266.5	30031.4	21090	14087.8	8126.9

Table 21: *RE- scenario - PILLAR 1: Efficiency/Electrification - Overview*

variable_name	2020	2025	2030	2035	2040	2045	2050
Final energy demand by sector - commercial	0.062	0.061	0.059	0.055	0.052	0.049	0.049
Final energy demand by sector - industry	0.036	0.036	0.036	0.037	0.039	0.039	0.04
Final energy demand by sector - residential	0.074	0.07	0.064	0.056	0.049	0.044	0.042
Final energy demand by sector - transportation	0.268	0.25	0.222	0.187	0.156	0.137	0.129

Table 22: *RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial*

variable_name	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr	0	5003259219	5574353177	0	0	0	0
Sales of cooking units - Electric Resistance	0.419	0.546	0.83	0.886	0.889	0.889	0.889
Sales of cooking units - Gas	0.581	0.454	0.17	0.114	0.111	0.111	0.111
Sales of space heating units - Electric Heat Pump	0.016	0.198	0.626	0.887	0.925	0.926	0.927
Sales of space heating units - Electric Resistance	0.018	0.034	0.041	0.064	0.068	0.069	0.069
Sales of space heating units - Fossil	0	0.002	0	0	0	0	0
Sales of space heating units - Gas Furnace	0.967	0.766	0.333	0.049	0.007	0.005	0.005
Sales of water heating units - Electric Heat Pump	0	0.08	0.447	0.609	0.628	0.629	0.629
Sales of water heating units - Electric Resistance	0.008	0.05	0.229	0.348	0.366	0.367	0.367
Sales of water heating units - Gas Furnace	0.99	0.867	0.321	0.039	0.002	0	0
Sales of water heating units - Other	0.002	0.004	0.004	0.004	0.004	0.004	0.004

Table 23: *RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

variable_name	2025	2030	2035	2040	2045	2050
Electricity distribution peak load (capital invested) - Cumulative 5-yr	1.117	1.171	2.249	2.426	2.161	2.285

Table 24: *REF scenario - PILLAR 1: Efficiency/Electrification - Residential*

variable_name	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr	0	1.863	2.239	0	0	0	0
Sale of space heating units by type - Electric Heat Pump	0.051	0.128	0.177	0.324	0.573	0.772	0.854
Sale of space heating units by type - Electric Resistance	0.065	0.112	0.106	0.091	0.065	0.043	0.034
Sale of space heating units by type - Fossil	0.102	0.155	0.154	0.131	0.092	0.068	0.065
Sale of space heating units by type - Gas	0.782	0.604	0.563	0.455	0.27	0.117	0.048
Sales of cooking units - Electric Resistance	0.417	0.432	0.485	0.626	0.822	0.942	0.985
Sales of cooking units - Gas	0.583	0.568	0.515	0.374	0.178	0.058	0.015
Sales of water heating units by type - Electric Heat Pump	0	0.014	0.054	0.171	0.362	0.507	0.568
Sales of water heating units by type - Electric Resistance	0.117	0.232	0.242	0.267	0.314	0.36	0.384
Sales of water heating units by type - Gas Furnace	0.873	0.741	0.692	0.55	0.311	0.12	0.035
Sales of water heating units by type - Other	0.01	0.012	0.012	0.012	0.012	0.012	0.012

Table 25: *REF scenario - PILLAR 1: Efficiency/Electrification - Transportation*

variable_name	2020	2025	2030	2035	2040	2045	2050
End-use technology sales by technology - HDV - diesel	0.974	0.96	0.913	0.798	0.582	0.321	0.137
End-use technology sales by technology - HDV - EV	0.005	0.015	0.041	0.108	0.236	0.394	0.51
End-use technology sales by technology - HDV - gasoline	0.002	0.002	0.002	0.002	0.002	0.001	0.001
End-use technology sales by technology - HDV - hybrid	0.001	0.001	0.001	0.001	0.001	0.001	0
End-use technology sales by technology - HDV - hydrogen FC	0.003	0.01	0.027	0.072	0.157	0.263	0.34
End-use technology sales by technology - HDV - other	0.015	0.013	0.015	0.019	0.022	0.02	0.011
End-use technology sales by technology - LDV - diesel	0.017	0.021	0.021	0.017	0.011	0.006	0.002
End-use technology sales by technology - LDV - EV	0.017	0.043	0.11	0.245	0.469	0.711	0.872
End-use technology sales by technology - LDV - gasoline	0.923	0.882	0.809	0.684	0.479	0.259	0.114
End-use technology sales by technology - LDV - hybrid	0.04	0.049	0.055	0.051	0.039	0.024	0.012
End-use technology sales by technology - LDV - hydrogen FC	0.001	0.004	0.003	0.003	0.002	0.001	0
End-use technology sales by technology - LDV - other	0.001	0.001	0.001	0.001	0.001	0	0
End-use technology sales by technology - MDV - diesel	0.648	0.622	0.577	0.494	0.356	0.196	0.084
End-use technology sales by technology - MDV - EV	0.007	0.019	0.055	0.143	0.314	0.526	0.68
End-use technology sales by technology - MDV - gasoline	0.338	0.347	0.347	0.319	0.244	0.142	0.063
End-use technology sales by technology - MDV - hybrid	0.004	0.004	0.005	0.005	0.004	0.003	0.001
End-use technology sales by technology - MDV - hydrogen FC	0.002	0.005	0.014	0.036	0.079	0.132	0.17
End-use technology sales by technology - MDV - other	0.003	0.003	0.003	0.003	0.003	0.002	0.001
Light-duty vehicle capital costs - Cumulative 5-yr	0	0	56717054	118877102	401734471	1263275369	1840766868
Number of public EV charging plugs - DC Fast Charging	99	0	199.127	0	1039.2	0	2898.3
Number of public EV charging plugs - L2 Charging	151	0	4802	0	25060.1	0	69894.6

Table 26: *REF scenario - PILLAR 6: Land carbon sinks - Agriculture*

variable_name	2050
Carbon sink enhancement potential - Accelerate regeneration	5665.4
Carbon sink enhancement potential - All (not counting overlap)	46573.3
Carbon sink enhancement potential - Avoid deforestation	1830.649
Carbon sink enhancement potential - corn-ethanol to energy grasses	0

Table 26: *REF scenario - PILLAR 6: Land carbon sinks - Agriculture (continued)*

variable_name	2050
Carbon sink enhancement potential - cropland measures	-767.542
Carbon sink enhancement potential - Extend rotation length	16380.4
Carbon sink enhancement potential - Improve plantations	20.328
Carbon sink enhancement potential - Increase retention of HWP	172.16
Carbon sink enhancement potential - Increase trees outside forests	612.064
Carbon sink enhancement potential - permanent conservation cover	-47.506
Carbon sink enhancement potential - Reforest cropland	9380.4
Carbon sink enhancement potential - Reforest pasture	1869.284
Carbon sink enhancement potential - Restore productivity	10642.6
Carbon sink enhancement potential - total	-815.048
Land impacted for carbon sink enhancement - Accelerate regeneration	2283.343
Land impacted for carbon sink enhancement - All (not counting overlap)	10623.1
Land impacted for carbon sink enhancement - Avoid deforestation	491.412
Land impacted for carbon sink enhancement - corn-ethanol to energy grasses	0
Land impacted for carbon sink enhancement - cropland measures	1048.45
Land impacted for carbon sink enhancement - Extend rotation length	9023.6
Land impacted for carbon sink enhancement - Improve plantations	11.298
Land impacted for carbon sink enhancement - Increase retention of HWP	34.432
Land impacted for carbon sink enhancement - Increase trees outside forests	172.657
Land impacted for carbon sink enhancement - permanent conservation cover	72.888
Land impacted for carbon sink enhancement - Reforest cropland	3123.095
Land impacted for carbon sink enhancement - Reforest pasture	141.346
Land impacted for carbon sink enhancement - Restore productivity	6005.7
Land impacted for carbon sink enhancement - total	1121.338
Land impacted for carbon sink enhancement - Total impacted (over 30 years)	10663.8

Table 27: *REF scenario - PILLAR 6: Land carbon sinks - Forests*

variable_name	2050
Business-as-usual carbon sink - Accelerate regeneration	529.475
Business-as-usual carbon sink - Avoid deforestation	156.541
Business-as-usual carbon sink - Extend rotation length	4936.6
Business-as-usual carbon sink - Improve plantations	4.29
Business-as-usual carbon sink - Increase retention of HWP	0
Business-as-usual carbon sink - Increase trees outside forests	34.714
Business-as-usual carbon sink - Reforest cropland	354.396
Business-as-usual carbon sink - Reforest pasture	34.531
Business-as-usual carbon sink - Restore productivity	2114.2
Business-as-usual carbon sink - Total impacted (over 30 years)	354.396

Table 28: *REF scenario - PILLAR 1: Efficiency/Electrification - Overview*

variable_name	2020	2025	2030	2035	2040	2045	2050
Final energy demand by sector - commercial	0.062	0.062	0.061	0.06	0.058	0.056	0.054
Final energy demand by sector - industry	0.036	0.036	0.036	0.037	0.04	0.04	0.041
Final energy demand by sector - residential	0.074	0.07	0.068	0.065	0.061	0.055	0.049
Final energy demand by sector - transportation	0.268	0.252	0.231	0.214	0.201	0.186	0.169

Table 29: *REF scenario - PILLAR 1: Efficiency/Electrification - Commercial*

variable_name	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr	0	4999628698	5547308891	0	0	0	0
Sales of cooking units - Electric Resistance	0.419	0.462	0.502	0.608	0.754	0.846	0.878
Sales of cooking units - Gas	0.581	0.538	0.498	0.392	0.246	0.154	0.122
Sales of space heating units - Electric Heat Pump	0.016	0.128	0.177	0.322	0.573	0.786	0.884
Sales of space heating units - Electric Resistance	0.018	0.034	0.035	0.038	0.046	0.058	0.065
Sales of space heating units - Fossil	0	0.002	0.002	0.002	0.001	0	0
Sales of space heating units - Gas Furnace	0.967	0.836	0.787	0.639	0.38	0.156	0.051
Sales of water heating units - Electric Heat Pump	0	0.015	0.057	0.18	0.382	0.537	0.603
Sales of water heating units - Electric Resistance	0.008	0.022	0.042	0.103	0.21	0.304	0.347
Sales of water heating units - Gas Furnace	0.99	0.959	0.897	0.713	0.404	0.156	0.046
Sales of water heating units - Other	0.002	0.004	0.004	0.004	0.004	0.004	0.004

Table 30: *REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

variable_name	2025	2030	2035	2040	2045	2050
Electricity distribution peak load (capital invested) - Cumulative 5-yr	0.866	0.891	1.242	1.305	1.975	2.11

Table 31: *E+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

variable_name	2025	2030	2035	2040	2045	2050
Power generation capital investment - Solar PV - Base	8.465	15.077	7.551	2.517	8.419	7.45
Power generation capital investment - Wind - Base	19.271	19.785	27.194	19.843	11.494	22.262

Table 32: *E+ scenario - PILLAR 2: Clean Electricity - Transmission*

variable_name	2020	2025	2030	2035	2040	2045	2050
HV transmission for wind and solar - base all	0	8934	18755.2	29349	41141.2	57952.2	74241.7
HV transmission for wind and solar - base other intra-state	0	2980.1	8003.8	11548.2	13735.4	16926.6	19620.1
HV transmission for wind and solar - base spur intra-state	0	3235.4	6563.2	10653.9	13464.2	16115.7	20143.1

Table 33: *E+ scenario - PILLAR 6: Land carbon sinks - Agriculture*

variable_name	2050
Carbon sink enhancement potential - Accelerate regeneration	5665.4
Carbon sink enhancement potential - All (not counting overlap)	46573.3
Carbon sink enhancement potential - Avoid deforestation	1830.649
Carbon sink enhancement potential - corn-ethanol to energy grasses	0
Carbon sink enhancement potential - cropland measures	-767.542
Carbon sink enhancement potential - Extend rotation length	16380.4
Carbon sink enhancement potential - Improve plantations	20.328
Carbon sink enhancement potential - Increase retention of HWP	172.16
Carbon sink enhancement potential - Increase trees outside forests	612.064
Carbon sink enhancement potential - permanent conservation cover	-47.506
Carbon sink enhancement potential - Reforest cropland	9380.4
Carbon sink enhancement potential - Reforest pasture	1869.284
Carbon sink enhancement potential - Restore productivity	10642.6
Carbon sink enhancement potential - total	-815.048
Land impacted for carbon sink enhancement - Accelerate regeneration	2283.343
Land impacted for carbon sink enhancement - All (not counting overlap)	10623.1
Land impacted for carbon sink enhancement - Avoid deforestation	491.412
Land impacted for carbon sink enhancement - corn-ethanol to energy grasses	0
Land impacted for carbon sink enhancement - cropland measures	1048.45
Land impacted for carbon sink enhancement - Extend rotation length	9023.6
Land impacted for carbon sink enhancement - Improve plantations	11.298
Land impacted for carbon sink enhancement - Increase retention of HWP	34.432
Land impacted for carbon sink enhancement - Increase trees outside forests	172.657
Land impacted for carbon sink enhancement - permanent conservation cover	72.888
Land impacted for carbon sink enhancement - Reforest cropland	3123.095
Land impacted for carbon sink enhancement - Reforest pasture	141.346
Land impacted for carbon sink enhancement - Restore productivity	6005.7
Land impacted for carbon sink enhancement - total	1121.338
Land impacted for carbon sink enhancement - Total impacted (over 30 years)	10663.8

Table 34: *E+ scenario - PILLAR 6: Land carbon sinks - Forests*

variable_name	2050
Business-as-usual carbon sink - Accelerate regeneration	529.475
Business-as-usual carbon sink - Avoid deforestation	156.541
Business-as-usual carbon sink - Extend rotation length	4936.6
Business-as-usual carbon sink - Improve plantations	4.29
Business-as-usual carbon sink - Increase retention of HWP	0
Business-as-usual carbon sink - Increase trees outside forests	34.714
Business-as-usual carbon sink - Reforest cropland	354.396
Business-as-usual carbon sink - Reforest pasture	34.531
Business-as-usual carbon sink - Restore productivity	2114.2
Business-as-usual carbon sink - Total impacted (over 30 years)	354.396

Table 35: *RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

variable_name	2020	2025	2030	2035	2040	2045	2050
Power generation capital investment - biomass power plant	0	0	0	0	0	0	0
Power generation capital investment - biomass w/ccu allam power plant	0	0	0	0	0	0	0.058
Power generation capital investment - biomass w/ccu power plant	0	0	0	0	0	0	1.589

Table 36: *RE+ scenario - PILLAR 2: Clean Electricity - Generation*

variable_name	2020	2025	2030	2035	2040	2045	2050
Power generation by technology - biomass power plant	0	0	0	0	0	0	0
Power generation by technology - biomass w/ccu allam power plant	0	0	0	0	0	0	57.516
Power generation by technology - biomass w/ccu power plant	0	0	0	0	0	0	1784

Table 37: *RE+ scenario - PILLAR 3: Bioenergy and Hydrogen - Bioconversion*

variable_name	2020	2025	2030	2035	2040	2045	2050
Biomass purchases	0	0	0	0	0	0.056	0.163
Capital investment	0	0	0	0	0	0	2.085
Number of facilities - allam power w ccu	0	0	0	0	0	0	1
Number of facilities - beccs hydrogen	0	0	0	0	0	1	1
Number of facilities - diesel	0	0	0	0	0	0	0
Number of facilities - diesel ccu	0	0	0	0	0	0	0
Number of facilities - power	0	0	0	0	0	0	0
Number of facilities - power ccu	0	0	0	0	0	0	1
Number of facilities - pyrolysis	0	0	0	0	0	0	0
Number of facilities - pyrolysis ccu	0	0	0	0	0	0	0
Number of facilities - sng	0	0	0	0	0	0	0
Number of facilities - sng ccu	0	0	0	0	0	0	0

Table 38: *RE+ scenario - PILLAR 4: CO2 capture, use, storage - CO2 capture*

variable_name	2025	2030	2035	2040	2045	2050
Annual - All	0	0	0	0	0.88	2.68
Annual - BECCS	0	0	0	0	0.88	2.68
Annual - Cement	0	0	0	0	0	0
Annual - NGCC	0	0	0	0	0	0
Cumulative - All	0	0	0	0	0.88	3.56
Cumulative - BECCS	0	0	0	0	0.88	3.56
Cumulative - Cement	0	0	0	0	0	0
Cumulative - NGCC	0	0	0	0	0	0

Table 39: *RE+ scenario - PILLAR 4: CO2 capture, use, storage - CO2 storage*

variable_name	2025	2030	2035	2040	2045	2050
Annual	0	1.85	6.42	11.88	15.76	16.72
Injection wells	0	2	6	10	16	20
Resource characterization, appraisal and permitting costs cumulative	5.15	127.13	203.94	203.94	203.94	203.94
Wells and facilities construction costs cumulative	0	40.29	157.03	279.84	467.91	580.92

Table 40: *RE+ scenario - PILLAR 4: CO2 capture, use, storage - CO2 transportation*

variable_name	2025	2030	2035	2040	2045	2050
CO2 pipelines - All	0	0	0	0	6228.606	152621.051
CO2 pipelines - Spur	0	0	0	0	6228.606	152621.051
CO2 pipelines - Trunk	0	0	0	0	0	0

Table 41: *RE+ scenario - PILLAR 6: Land carbon sinks - Agriculture*

variable_name	2050
Carbon sink enhancement potential - Accelerate regeneration	5665.4
Carbon sink enhancement potential - All (not counting overlap)	46573.3
Carbon sink enhancement potential - Avoid deforestation	1830.649
Carbon sink enhancement potential - corn-ethanol to energy grasses	-68.322
Carbon sink enhancement potential - cropland measures	-730.979
Carbon sink enhancement potential - Cropland to woody energy crops	0
Carbon sink enhancement potential - Extend rotation length	16380.4
Carbon sink enhancement potential - Improve plantations	20.328
Carbon sink enhancement potential - Increase retention of HWP	172.16
Carbon sink enhancement potential - Increase trees outside forests	612.064
Carbon sink enhancement potential - pasture to energy crops	0
Carbon sink enhancement potential - permanent conservation cover	-43.518
Carbon sink enhancement potential - Reforest cropland	9380.4
Carbon sink enhancement potential - Reforest pasture	1869.284
Carbon sink enhancement potential - Restore productivity	10642.6
Carbon sink enhancement potential - total	-842.819
Land impacted for carbon sink enhancement - Accelerate regeneration	2283.343
Land impacted for carbon sink enhancement - All (not counting overlap)	10623.1
Land impacted for carbon sink enhancement - Avoid deforestation	491.412
Land impacted for carbon sink enhancement - corn-ethanol to energy grasses	75.23
Land impacted for carbon sink enhancement - cropland measures	1953.403

Table 41: *RE+ scenario - PILLAR 6: Land carbon sinks - Agriculture (continued)*

variable_name	2050
Land impacted for carbon sink enhancement - Cropland to woody energy crops	6.366
Land impacted for carbon sink enhancement - Extend rotation length	9023.6
Land impacted for carbon sink enhancement - Improve plantations	11.298
Land impacted for carbon sink enhancement - Increase retention of HWP	34.432
Land impacted for carbon sink enhancement - Increase trees outside forests	172.657
Land impacted for carbon sink enhancement - pasture to energy crops	0
Land impacted for carbon sink enhancement - permanent conservation cover	66.768
Land impacted for carbon sink enhancement - Reforest cropland	3123.095
Land impacted for carbon sink enhancement - Reforest pasture	141.346
Land impacted for carbon sink enhancement - Restore productivity	6005.7
Land impacted for carbon sink enhancement - total	2101.757
Land impacted for carbon sink enhancement - Total impacted (over 30 years)	10663.8

Table 42: *RE+ scenario - PILLAR 6: Land carbon sinks - Forests*

variable_name	2050
Business-as-usual carbon sink - Accelerate regeneration	529.475
Business-as-usual carbon sink - Avoid deforestation	156.541
Business-as-usual carbon sink - Extend rotation length	4936.6
Business-as-usual carbon sink - Improve plantations	4.29
Business-as-usual carbon sink - Increase retention of HWP	0
Business-as-usual carbon sink - Increase trees outside forests	34.714
Business-as-usual carbon sink - Reforest cropland	354.396
Business-as-usual carbon sink - Reforest pasture	34.531
Business-as-usual carbon sink - Restore productivity	2114.2
Business-as-usual carbon sink - Total impacted (over 30 years)	354.396

Table 43: *B+ scenario - PILLAR 6: Land carbon sinks - Agriculture*

variable_name	2050
Carbon sink enhancement potential - Accelerate regeneration	5665.4
Carbon sink enhancement potential - All (not counting overlap)	46573.3
Carbon sink enhancement potential - Avoid deforestation	1830.649
Carbon sink enhancement potential - corn-ethanol to energy grasses	0
Carbon sink enhancement potential - cropland measures	-767.542
Carbon sink enhancement potential - Extend rotation length	16380.4
Carbon sink enhancement potential - Improve plantations	20.328
Carbon sink enhancement potential - Increase retention of HWP	172.16
Carbon sink enhancement potential - Increase trees outside forests	612.064
Carbon sink enhancement potential - permanent conservation cover	-47.506
Carbon sink enhancement potential - Reforest cropland	9380.4
Carbon sink enhancement potential - Reforest pasture	1869.284
Carbon sink enhancement potential - Restore productivity	10642.6
Carbon sink enhancement potential - total	-815.048
Land impacted for carbon sink enhancement - Accelerate regeneration	2283.343
Land impacted for carbon sink enhancement - All (not counting overlap)	10623.1
Land impacted for carbon sink enhancement - Avoid deforestation	491.412
Land impacted for carbon sink enhancement - corn-ethanol to energy grasses	0
Land impacted for carbon sink enhancement - cropland measures	1048.45
Land impacted for carbon sink enhancement - Extend rotation length	9023.6
Land impacted for carbon sink enhancement - Improve plantations	11.298
Land impacted for carbon sink enhancement - Increase retention of HWP	34.432
Land impacted for carbon sink enhancement - Increase trees outside forests	172.657
Land impacted for carbon sink enhancement - permanent conservation cover	72.888
Land impacted for carbon sink enhancement - Reforest cropland	3123.095
Land impacted for carbon sink enhancement - Reforest pasture	141.346
Land impacted for carbon sink enhancement - Restore productivity	6005.7
Land impacted for carbon sink enhancement - total	1121.338
Land impacted for carbon sink enhancement - Total impacted (over 30 years)	10663.8

Table 44: *B+ scenario - PILLAR 6: Land carbon sinks - Forests*

variable_name	2050
Business-as-usual carbon sink - Accelerate regeneration	529.475
Business-as-usual carbon sink - Avoid deforestation	156.541
Business-as-usual carbon sink - Extend rotation length	4936.6
Business-as-usual carbon sink - Improve plantations	4.29
Business-as-usual carbon sink - Increase retention of HWP	0
Business-as-usual carbon sink - Increase trees outside forests	34.714
Business-as-usual carbon sink - Reforest cropland	354.396
Business-as-usual carbon sink - Reforest pasture	34.531
Business-as-usual carbon sink - Restore productivity	2114.2
Business-as-usual carbon sink - Total impacted (over 30 years)	354.396