Net-Zero America - missouri state report

2021-03-18

These data underlie graphs and tables presented in the Princeton Net-Zero America study:

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Notes

- These data are all data from the study available at https://netzeroamerica.princeton.edu.
- The Net-Zero America study describes five pathways to reach net-zero emissions and one "no new policies" reference scenario. In this document, state-level results are grouped by scenario. For some scenarios, the study generated national, but not state-level results.
- Within results for a given scenario, data tables are organized into corresponding sections of the full net-zero study (e.g., Pillar 1, Pillar 2, etc.)
- For Pillar 6 (Land sinks), values shown are maximum carbon storage potentials.

Data by category and subcategory

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		16,269	17,611				
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric Heat Pump (%)	4.52	24.4	70.6	87.7	89.7	89.7	89.7
Sales of space heating units - Electric Resistance (%)	8.06	5.73	7.1	9.32	9.79	9.8	9.8
Sales of space heating units - Fossil (%)	0	1.75	0.337	0.014	0	0	0
Sales of space heating units - Gas Furnace (%)	87.4	68.1	22	2.94	0.553	0.458	0.459
Sales of water heating units - Electric Heat Pump (%)	1.19	10.6	53.1	64.2	65	65	65
Sales of water heating units - Electric Resistance (%)	10.1	11	28.4	33.8	34.3	34.3	34.3
Sales of water heating units - Gas Furnace (%)	87.7	77.5	17.8	1.26	0.041	0	0
Sales of water heating units - Other (%)	0.996	0.947	0.735	0.688	0.685	0.688	0.687

Table 2: *E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.82	3.92	6.23	6.6	6.19	6.47

Table 3: *E+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	182	178	169	158	147	141	138
Final energy use - Industry (PJ)	241	249	271	274	290	326	330
Final energy use - Residential (PJ)	241	227	206	178	155	141	134
Final energy use - Transportation (PJ)	669	623	550	461	380	331	311

Table 4: *E+ scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		5.85	7.79				
Sales of cooking units - Electric Resistance (%)	76.5	81.5	96.8	99.8	100	100	100
Sales of cooking units - Gas (%)	23.5	18.5	3.16	0.159	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.5	22.5	72.3	86.1	87.5	87.8	87.4
Sales of space heating units - Electric Resistance (%)	19.7	22.4	10	6.61	6.36	6.55	6.72
Sales of space heating units - Fossil (%)	9.34	13.6	7.39	5.58	5.03	4.63	4.86
Sales of space heating units - Gas (%)	63.5	41.4	10.2	1.69	1.08	1.04	1.02
Sales of water heating units - Electric Heat Pump (%)	0	8.7	46.5	56.1	56.7	56.7	56.7
Sales of water heating units - Electric Resistance (%)	42.5	55.5	45.3	43.3	43.3	43.3	43.3
Sales of water heating units - Gas Furnace (%)	57.4	35.7	8.23	0.581	0.019	0	0
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.035	0.035	0.036	0.036

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)		1,055	2,704	4,381	6,637	7,223	6,887
Public EV charging plugs - DC Fast (1000 units)	0.178		1.98		8.67		14
Public EV charging plugs - L2 (1000 units)	1.67		47.5		208		337
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.59	1.85	1.27	0.408	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.79	14.8	45.9	81.6	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.1	78.5	49.4	16.8	3.32	0.591	0
Vehicle sales - Light-duty - hybrid (%)	4.3	4.45	3.17	1.18	0.287	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.342	0.206	0.064	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.103	0.099	0.065	0.023	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 6: *E+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0.003	0.021	0	0.003	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0.009	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	1.19	0.005	0
Capital invested - Solar PV - Base (billion $2018)		13.2	10.6	18.6	21	5.54	2.17
Capital invested - Solar PV - Constrained (billion $2018)		9.58	11.6	13.9	23.7	1.24	0.374
Capital invested - Wind - Base (billion $2018)		28.5	22.8	22	35.2	34.7	36.6
Capital invested - Wind - Constrained (billion $2018)		31.6	32.5	34.5	16.2	1.98	80.4
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	153	269	400	605	898	1,277	1,767
Installed renewables - Solar - Base land use assumptions (MW)	38	11,548	21,891	41,607	65,259	71,874	74,620
Installed renewables - Solar - Constrained land use assumptions (MW)	0	8,505	20,726	37,736	56,926	61,122	62,326
Installed renewables - Wind - Base land use assumptions (MW)	5,547	24,947	42,054	59,780	89,561	120,496	155,043
Installed renewables - Wind - Constrained land use assumptions (MW)	4,965	26,409	50,116	78,502	93,070	95,265	168,542

Table 7: *E+ scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	5.97	46.4	46.4	52.4	52.4	52.4
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	9.08	9.08
Biomass w/ccu power plant (GWh)	0	0	0	0	1,335	1,341	1,341
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	72.4	18,541	35,193	66,831	104,688	115,313	119,768
Solar - Constrained land use assumptions (GWh)	0	13,674	33,346	60,726	91,519	98,271	100,217
Wind - Base land use assumptions (GWh)	19,737	83,563	139,217	196,305	291,874	389,204	494,930
Wind - Constrained land use assumptions (GWh)	17,665	86,986	161,857	250,834	294,590	301,857	539,018

Table 8: *E+ scenario - PILLAR 3: Clean fuels - Bioenergy*

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		38.3	97	98	192	298	656
Conversion capital investment - Cumulative 5-yr (million $2018)		3.44	23	19.7	1,705	1,881	6,256
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	1	4	11
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	1	2	2
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	1	2	2
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

Table 9: *E+ scenario - PILLAR 4: CCUS - CO2 capture*

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	3.24	3.35	5.37	14.7	23.1
Annual - BECCS (MMT)		0	0	0	2.05	4.46	12.5
Annual - Cement and lime (MMT)		0	3.24	3.35	3.32	10.3	10.6
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	3.24	6.59	12	26.7	49.8
Cumulative - BECCS (MMT)		0	0	0	2.05	6.51	19
Cumulative - Cement and lime (MMT)		0	3.24	6.59	9.91	20.2	30.8
Cumulative - NGCC (MMT)		0	0	0	0	0	0

Table 10: *E+ scenario - PILLAR 4: CCUS - CO2 pipelines*

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	420	589	687	959	1,557
Cumulative investment - All (million $2018)		0	1,962	2,109	2,192	2,337	2,845
Cumulative investment - Spur (million $2018)		0	11.9	160	242	387	895
Cumulative investment - Trunk (million $2018)		0	1,950	1,950	1,950	1,950	1,950
Spur (km)		0	10.4	180	278	550	1,148
Trunk (km)		0	409	409	409	409	409

Table 11: *E+ scenario - PILLAR 4: CCUS - CO2 storage*

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	0.88	1.81	3.44	3.73
Injection wells (wells)		0	1	2	4	7	9
Resource characterization, appraisal, permitting costs (million $2020)		27.9	78.2	101	101	101	101
Wells and facilities construction costs (million $2020)		0	18.6	72.5	129	216	268

Table 12: *E+ scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-13,495
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-313
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-13,808
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-7,068
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-157
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,225
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							5,748
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							570
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							6,318
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,016
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							285
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,301

Table 13: *E+ scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-164
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-51,213
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,274
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,741
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-151
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-3,212
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,247
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-10,656
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-21,079
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,690
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-82
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,537
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-379
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,973
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-77
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,071
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-787
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-5,328
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-1,597
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,244
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-123
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-32,374
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,326
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,357
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-113
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-2,141
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,517
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-7,992
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-11,338
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,467

Table 13: *E+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							26.8
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							308
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,947
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							55.7
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							214
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							705
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							599
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,223
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,077
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							289
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,512
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							112
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							352
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							104
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							740
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,151
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							20.1

Table 13: *E+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							298
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,730
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							41.9
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							528
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							751
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,490
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,022

Table 14: *E+ scenario - IMPACTS - Fossil fuel industries*

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		249	210	169	127	79.8	55.4
Natural gas consumption - Cumulative (tcf)							5,077
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		121	106	83.7	62.4	45.6	32.5
Oil consumption - Cumulative (million bbls)							2,577
Oil production - Annual (million bbls)		0.117	0.117	0.117	0.093	0.075	0.05

Table 15: *E+ scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		556	0.464	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		207	110	54.9	43.2	22.9	11.1
Monetary damages from air pollution - Transportation (million 2019$)		1,300	1,208	916	529	246	103
Premature deaths from air pollution - Coal (deaths)		62.8	0.052	0.05	0.042	0.028	0.001
Premature deaths from air pollution - Natural Gas (deaths)		23.4	12.4	6.2	4.87	2.59	1.25
Premature deaths from air pollution - Transportation (deaths)		146	136	103	59.5	27.6	11.6

Table 16: *E+ scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		441	515	610	545	438	734
By economic sector - Construction (jobs)		24,232	29,825	40,936	53,855	53,148	58,830
By economic sector - Manufacturing (jobs)		8,268	10,342	13,920	14,930	13,555	17,080
By economic sector - Mining (jobs)		2,224	1,584	1,073	699	468	322

Table 16: *E+ scenario - IMPACTS - Jobs (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		3,011	3,744	6,020	8,467	7,691	8,637
By economic sector - Pipeline (jobs)		404	504	279	221	179	217
By economic sector - Professional (jobs)		12,914	16,867	23,916	32,989	36,250	42,699
By economic sector - Trade (jobs)		7,818	9,644	13,648	18,886	20,379	24,221
By economic sector - Utilities (jobs)		14,201	19,173	26,240	37,258	42,241	49,482
By education level - All sectors - Associates degree or some college (jobs)		23,298	29,432	40,627	54,161	56,338	65,293
By education level - All sectors - Bachelors degree (jobs)		14,948	18,745	25,637	34,102	36,078	42,175
By education level - All sectors - Doctoral degree (jobs)		605	766	1,062	1,435	1,542	1,803
By education level - All sectors - High school diploma or less (jobs)		30,893	38,476	52,721	69,260	70,862	81,788
By education level - All sectors - Masters or professional degree (jobs)		3,770	4,780	6,594	8,891	9,529	11,164
By resource sector - Biomass (jobs)		1,042	1,210	1,474	1,486	1,618	3,207
By resource sector - CO2 (jobs)		14.7	1,318	91.3	194	438	1,118
By resource sector - Coal (jobs)		1,495	345	151	132	119	105
By resource sector - Grid (jobs)		21,309	31,638	47,437	69,141	80,149	94,229
By resource sector - Natural Gas (jobs)		3,513	2,388	2,008	2,340	1,045	796
By resource sector - Nuclear (jobs)		624	614	356	0	0	0
By resource sector - Oil (jobs)		5,419	4,356	3,168	2,195	1,500	1,003
By resource sector - Solar (jobs)		18,264	19,292	31,168	39,241	26,325	26,730
By resource sector - Wind (jobs)		21,834	31,036	40,787	53,120	63,156	75,034
Median wages - Annual - All ($2019 per job)		58,825	59,744	60,424	61,583	63,065	64,083
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		12,061	15,181	20,867	27,762	28,841	33,341
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		5,261	6,631	9,101	12,233	12,763	14,660
On-Site or In-Plant Training - Total jobs - None (jobs)		12,107	15,167	20,861	27,598	28,597	33,179
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		646	822	1,133	1,519	1,590	1,842
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		43,440	54,398	74,680	98,737	102,558	119,201
On-the-Job Training - All sectors - 1 to 4 years (jobs)		15,610	19,683	27,057	36,063	37,539	43,389
On-the-Job Training - All sectors - 4 to 10 years (jobs)		5,223	6,602	9,093	12,257	12,772	14,647
On-the-Job Training - All sectors - None (jobs)		4,076	5,060	6,956	9,192	9,466	10,954
On-the-Job Training - All sectors - Over 10 years (jobs)		739	911	1,239	1,598	1,605	1,840
On-the-Job Training - All sectors - Up to 1 year (jobs)		47,866	59,943	82,296	108,739	112,967	131,392
Related work experience - All sectors - 1 to 4 years (jobs)		26,270	32,976	45,303	60,227	62,836	72,957
Related work experience - All sectors - 4 to 10 years (jobs)		17,219	21,667	29,726	39,556	41,364	47,987
Related work experience - All sectors - None (jobs)		10,540	13,227	18,195	24,170	25,038	29,025
Related work experience - All sectors - Over 10 years (jobs)		4,465	5,615	7,688	10,150	10,599	12,334
Related work experience - All sectors - Up to 1 year (jobs)		15,020	18,713	25,730	33,746	34,512	39,920
Wage income - All (million $2019)		4,325	5,509	7,653	10,338	10,997	12,961

Table 17: *E- scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		16,266	17,675				
Sales of cooking units - Electric Resistance (%)	44.8	49.3	53.1	63	76.9	85.5	88.5
Sales of cooking units - Gas (%)	55.2	50.7	46.9	37	23.1	14.5	11.5
Sales of space heating units - Electric Heat Pump (%)	4.52	15.9	21.2	36.6	61.3	79.5	86.8
Sales of space heating units - Electric Resistance (%)	8.06	5.57	5.72	6.25	7.38	8.69	9.45
Sales of space heating units - Fossil (%)	0	2.02	1.9	1.42	0.689	0.224	0.059
Sales of space heating units - Gas Furnace (%)	87.4	76.5	71.1	55.7	30.6	11.6	3.64
Sales of water heating units - Electric Heat Pump (%)	1.19	2.53	7.36	21.3	43.1	57.7	63
Sales of water heating units - Electric Resistance (%)	10.1	7.76	9.75	15.5	24.6	31	33.4
Sales of water heating units - Gas Furnace (%)	87.7	88.7	81.9	62.3	31.6	10.6	2.88
Sales of water heating units - Other (%)	0.996	0.987	0.962	0.892	0.786	0.72	0.695

Table 18: *E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.2	3.23	3.9	4.01	5.79	6.1

Table 19: *E- scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	182	179	174	169	162	155	149
Final energy use - Industry (PJ)	241	250	272	277	295	331	335
Final energy use - Residential (PJ)	241	228	218	206	189	170	154
Final energy use - Transportation (PJ)	670	628	574	531	498	459	413

Table 20: *E- scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		5.81	7.68				
Sales of cooking units - Electric Resistance (%)	76.4	77	79.2	84.9	92.8	97.7	99.4
Sales of cooking units - Gas (%)	23.6	23	20.8	15.1	7.21	2.33	0.626
Sales of space heating units - Electric Heat Pump (%)	7.5	13	18.7	35.2	61.1	79	85.2
Sales of space heating units - Electric Resistance (%)	19.7	24.8	23.3	19.2	12.8	8.51	7.04
Sales of space heating units - Fossil (%)	9.34	14.9	14.4	12.2	8.46	5.78	5.24
Sales of space heating units - Gas (%)	63.5	47.3	43.7	33.5	17.6	6.67	2.55
Sales of water heating units - Electric Heat Pump (%)	0	1.51	5.81	18.2	37.5	50.4	55
Sales of water heating units - Electric Resistance (%)	42.5	57.5	56.3	52.9	47.8	44.7	43.6
Sales of water heating units - Gas Furnace (%)	57.4	40.9	37.8	28.9	14.7	4.93	1.34
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.036	0.036	0.036	0.036

Table 21: *E- scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)		0	171	359	1,211	3,810	5,551
Public EV charging plugs - DC Fast (1000 units)	0.178		0.611		3.21		8.98
Public EV charging plugs - L2 (1000 units)	1.67		14.7		77.3		216
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.6	2.01	2.06	1.64	1.05	0.542	0.232
Vehicle sales - Light-duty - EV (%)	1.84	4.58	11.7	25.5	48	71.8	87.5
Vehicle sales - Light-duty - gasoline (%)	91.9	87.7	79.9	67.1	46.6	25.1	11.1
Vehicle sales - Light-duty - hybrid (%)	4.45	5.27	5.93	5.41	4.08	2.42	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.381	0.328	0.251	0.179	0.1	0.046
Vehicle sales - Light-duty - other (%)	0.105	0.108	0.098	0.086	0.062	0.034	0.016
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

Table 22: *E- scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-13,495
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-313
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-13,808
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-7,068
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-157
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,225
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							5,748
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							570

Table 22: *E- scenario - PILLAR 6: Land sinks - Agriculture (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							6,318
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,016
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							285
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,301

Table 23: *E- scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-164
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-51,213
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,274
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,741
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-151
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-3,212
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,247
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-10,656
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-21,079
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,690
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-82
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,537
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-379
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,973
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-77
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,071
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-787
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-5,328
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-1,597
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,244
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-123

Table 23: *E- scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-32,374
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,326
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,357
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-113
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-2,141
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,517
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-7,992
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-11,338
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,467
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							26.8
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							308
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,947
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							55.7
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							214
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							705
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							599
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,223
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,077
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							289
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,512
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0

Table 23: *E- scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							112
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							352
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							104
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							740
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,151
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							20.1
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							298
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,730
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							41.9
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							528
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							751
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,490
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,022

Table 24: *E- scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		556	0.464	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		201	92.7	41.3	19.8	7.64	5.99
Monetary damages from air pollution - Transportation (million 2019$)		1,321	1,328	1,290	1,161	924	634
Premature deaths from air pollution - Coal (deaths)		62.8	0.052	0.05	0.042	0.028	0.001
Premature deaths from air pollution - Natural Gas (deaths)		22.7	10.5	4.66	2.24	0.862	0.676
Premature deaths from air pollution - Transportation (deaths)		149	149	145	131	104	71.3

Table 25: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		16,269	17,611				
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric Heat Pump (%)	4.52	24.4	70.6	87.7	89.7	89.7	89.7
Sales of space heating units - Electric Resistance (%)	8.06	5.73	7.1	9.32	9.79	9.8	9.8
Sales of space heating units - Fossil (%)	0	1.75	0.337	0.014	0	0	0
Sales of space heating units - Gas Furnace (%)	87.4	68.1	22	2.94	0.553	0.458	0.459
Sales of water heating units - Electric Heat Pump (%)	1.19	10.6	53.1	64.2	65	65	65
Sales of water heating units - Electric Resistance (%)	10.1	11	28.4	33.8	34.3	34.3	34.3
Sales of water heating units - Gas Furnace (%)	87.7	77.5	17.8	1.26	0.041	0	0
Sales of water heating units - Other (%)	0.996	0.947	0.735	0.688	0.685	0.688	0.687

Table 26: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.82	3.92	6.23	6.6	6.19	6.47

Table 27: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	182	178	169	158	147	141	138
Final energy use - Industry (PJ)	241	249	271	274	290	326	330
Final energy use - Residential (PJ)	241	227	206	178	155	141	134
Final energy use - Transportation (PJ)	669	623	550	461	380	331	311

Table 28: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		5.85	7.79				
Sales of cooking units - Electric Resistance (%)	76.5	81.5	96.8	99.8	100	100	100
Sales of cooking units - Gas (%)	23.5	18.5	3.16	0.159	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.5	22.5	72.3	86.1	87.5	87.8	87.4
Sales of space heating units - Electric Resistance (%)	19.7	22.4	10	6.61	6.36	6.55	6.72
Sales of space heating units - Fossil (%)	9.34	13.6	7.39	5.58	5.03	4.63	4.86
Sales of space heating units - Gas (%)	63.5	41.4	10.2	1.69	1.08	1.04	1.02
Sales of water heating units - Electric Heat Pump (%)	0	8.7	46.5	56.1	56.7	56.7	56.7
Sales of water heating units - Electric Resistance (%)	42.5	55.5	45.3	43.3	43.3	43.3	43.3
Sales of water heating units - Gas Furnace (%)	57.4	35.7	8.23	0.581	0.019	0	0
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.035	0.035	0.036	0.036

Table 29: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)		1,055	2,704	4,381	6,637	7,223	6,887
Public EV charging plugs - DC Fast (1000 units)	0.178		1.98		8.67		14
Public EV charging plugs - L2 (1000 units)	1.67		47.5		208		337
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.59	1.85	1.27	0.408	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.79	14.8	45.9	81.6	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.1	78.5	49.4	16.8	3.32	0.591	0
Vehicle sales - Light-duty - hybrid (%)	4.3	4.45	3.17	1.18	0.287	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.342	0.206	0.064	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.103	0.099	0.065	0.023	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 30: *E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		11.8	14.4	21.1	17.8	44.8	27.5
Capital invested - Wind - Base (billion $2018)		29	22.7	41.1	51.8	57.2	30.3
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	128	10,423	24,534	46,913	66,934	120,413	155,109
Installed renewables - Solar - Constrained land use assumptions (MW)	76	20,609	52,954	86,841	134,515	230,818	272,610
Installed renewables - Wind - Base land use assumptions (MW)	5,547	25,250	42,336	75,470	119,284	170,306	198,927
Installed renewables - Wind - Constrained land use assumptions (MW)	9,929	53,886	102,192	185,789	193,779	199,349	462,063

Table 31: *E+RE+ scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	216	16,765	39,441	75,390	107,459	193,354	249,128
Solar - Constrained land use assumptions (GWh)	145	33,147	85,095	139,507	215,976	370,604	437,809
Wind - Base land use assumptions (GWh)	19,737	84,539	140,172	247,311	386,254	545,010	631,310
Wind - Constrained land use assumptions (GWh)	35,330	177,376	330,559	588,274	614,269	631,531	1,466,853

Table 32: *E+RE+ scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-13,495
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-313
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-13,808
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-7,068
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-157
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,225
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							5,748
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							570
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							6,318
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,016
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							285
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,301

Table 33: *E+RE+ scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-164
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-51,213
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,274
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,741
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-151
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-3,212

Table 33: *E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,247
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-10,656
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-21,079
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,690
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-82
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,537
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-379
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,973
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-77
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,071
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-787
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-5,328
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-1,597
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,244
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-123
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-32,374
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,326
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,357
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-113
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-2,141
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,517
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-7,992
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-11,338
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,467
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							26.8
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							308
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,947
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							55.7

Table 33: *E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							214
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							705
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							599
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,223
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,077
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							289
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,512
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							112
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							352
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							104
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							740
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,151
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							20.1
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							298
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,730
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							41.9
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							163

Table 33: *E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							528
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							751
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,490
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,022

Table 34: *E+RE+ scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		556	0.464	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		192	100	36.9	24.9	9.27	5.4
Monetary damages from air pollution - Transportation (million 2019$)		1,300	1,208	916	529	246	103
Premature deaths from air pollution - Coal (deaths)		62.8	0.052	0.05	0.042	0.028	0.001
Premature deaths from air pollution - Natural Gas (deaths)		21.6	11.3	4.17	2.81	1.05	0.61
Premature deaths from air pollution - Transportation (deaths)		146	136	103	59.5	27.6	11.6

Table 35: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		16,269	17,611				
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric Heat Pump (%)	4.52	24.4	70.6	87.7	89.7	89.7	89.7
Sales of space heating units - Electric Resistance (%)	8.06	5.73	7.1	9.32	9.79	9.8	9.8
Sales of space heating units - Fossil (%)	0	1.75	0.337	0.014	0	0	0
Sales of space heating units - Gas Furnace (%)	87.4	68.1	22	2.94	0.553	0.458	0.459
Sales of water heating units - Electric Heat Pump (%)	1.19	10.6	53.1	64.2	65	65	65
Sales of water heating units - Electric Resistance (%)	10.1	11	28.4	33.8	34.3	34.3	34.3
Sales of water heating units - Gas Furnace (%)	87.7	77.5	17.8	1.26	0.041	0	0
Sales of water heating units - Other (%)	0.996	0.947	0.735	0.688	0.685	0.688	0.687

Table 36: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.82	3.92	6.23	6.6	6.19	6.47

Table 37: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	182	178	169	158	147	141	138

Table 37: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	241	249	271	274	290	326	330
Final energy use - Residential (PJ)	241	227	206	178	155	141	134
Final energy use - Transportation (PJ)	669	623	550	461	380	331	311

Table 38: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		5.85	7.79				
Sales of cooking units - Electric Resistance (%)	76.5	81.5	96.8	99.8	100	100	100
Sales of cooking units - Gas (%)	23.5	18.5	3.16	0.159	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.5	22.5	72.3	86.1	87.5	87.8	87.4
Sales of space heating units - Electric Resistance (%)	19.7	22.4	10	6.61	6.36	6.55	6.72
Sales of space heating units - Fossil (%)	9.34	13.6	7.39	5.58	5.03	4.63	4.86
Sales of space heating units - Gas (%)	63.5	41.4	10.2	1.69	1.08	1.04	1.02
Sales of water heating units - Electric Heat Pump (%)	0	8.7	46.5	56.1	56.7	56.7	56.7
Sales of water heating units - Electric Resistance (%)	42.5	55.5	45.3	43.3	43.3	43.3	43.3
Sales of water heating units - Gas Furnace (%)	57.4	35.7	8.23	0.581	0.019	0	0
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.035	0.035	0.036	0.036

Table 39: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)		1,055	2,704	4,381	6,637	7,223	6,887
Public EV charging plugs - DC Fast (1000 units)	0.178		1.98		8.67		14
Public EV charging plugs - L2 (1000 units)	1.67		47.5		208		337
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.59	1.85	1.27	0.408	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.79	14.8	45.9	81.6	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.1	78.5	49.4	16.8	3.32	0.591	0
Vehicle sales - Light-duty - hybrid (%)	4.3	4.45	3.17	1.18	0.287	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.342	0.206	0.064	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.103	0.099	0.065	0.023	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 40: *E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		13.4	11.2	11.2	14.8	7.82	0
Capital invested - Solar PV - Constrained (billion $2018)		12.7	12	9.51	12.8	6.74	0
Capital invested - Wind - Base (billion $2018)		25.1	7.19	0	11.4	14.3	21.8
Capital invested - Wind - Constrained (billion $2018)		27.8	8.28	0.338	16.4	24.2	26.7
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	38	11,791	22,769	34,703	51,385	60,722	60,722
Installed renewables - Solar - Constrained land use assumptions (MW)	128	11,265	22,961	33,063	47,438	55,482	55,482
Installed renewables - Wind - Base land use assumptions (MW)	4,629	21,719	27,121	27,121	36,752	49,540	70,118
Installed renewables - Wind - Constrained land use assumptions (MW)	4,138	23,048	29,268	29,541	43,453	65,037	90,259

Table 41: *E+RE- scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	72.4	18,933	36,537	55,667	82,436	97,369	97,369
Solar - Constrained land use assumptions (GWh)	216	18,113	36,914	53,140	76,195	89,104	89,104
Wind - Base land use assumptions (GWh)	16,617	73,100	90,582	90,582	122,043	163,615	228,918
Wind - Constrained land use assumptions (GWh)	14,915	76,207	96,035	97,035	141,929	209,549	285,205

Table 42: *E+RE- scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-13,495
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-313
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-13,808
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-7,068
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-157
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,225

Table 42: *E+RE- scenario - PILLAR 6: Land sinks - Agriculture (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							5,748
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							570
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							6,318
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,016
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							285
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,301

Table 43: *E+RE- scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-164
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-51,213
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,274
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,741
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-151
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-3,212
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,247
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-10,656
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-21,079
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,690
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-82
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,537
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-379
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,973
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-77
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,071
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-787

Table 43: *E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-5,328
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-1,597
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,244
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-123
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-32,374
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,326
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,357
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-113
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-2,141
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,517
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-7,992
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-11,338
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,467
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							26.8
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							308
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,947
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							55.7
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							214
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							705
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							599
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,223
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,077
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							289

Table 43: *E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,512
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							112
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							352
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							104
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							740
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,151
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							20.1
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							298
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,730
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							41.9
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							528
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							751
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,490
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,022

Table 44: *E+RE- scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		556	0.464	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		213	107	114	85.7	32.6	11.6
Monetary damages from air pollution - Transportation (million 2019$)		1,300	1,208	916	529	246	103
Premature deaths from air pollution - Coal (deaths)		62.8	0.052	0.05	0.042	0.028	0.001

Table 44: *E+RE- scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Natural Gas (deaths)		24.1	12.1	12.8	9.67	3.68	1.31
Premature deaths from air pollution - Transportation (deaths)		146	136	103	59.5	27.6	11.6

Table 45: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		16,266	17,675				
Sales of cooking units - Electric Resistance (%)	44.8	49.3	53.1	63	76.9	85.5	88.5
Sales of cooking units - Gas (%)	55.2	50.7	46.9	37	23.1	14.5	11.5
Sales of space heating units - Electric Heat Pump (%)	4.52	15.9	21.2	36.6	61.3	79.5	86.8
Sales of space heating units - Electric Resistance (%)	8.06	5.57	5.72	6.25	7.38	8.69	9.45
Sales of space heating units - Fossil (%)	0	2.02	1.9	1.42	0.689	0.224	0.059
Sales of space heating units - Gas Furnace (%)	87.4	76.5	71.1	55.7	30.6	11.6	3.64
Sales of water heating units - Electric Heat Pump (%)	1.19	2.53	7.36	21.3	43.1	57.7	63
Sales of water heating units - Electric Resistance (%)	10.1	7.76	9.75	15.5	24.6	31	33.4
Sales of water heating units - Gas Furnace (%)	87.7	88.7	81.9	62.3	31.6	10.6	2.88
Sales of water heating units - Other (%)	0.996	0.987	0.962	0.892	0.786	0.72	0.695

Table 46: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.2	3.23	3.9	4.01	5.79	6.1

Table 47: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	182	179	174	169	162	155	149
Final energy use - Industry (PJ)	241	250	272	277	295	331	335
Final energy use - Residential (PJ)	241	228	218	206	189	170	154
Final energy use - Transportation (PJ)	670	628	574	531	498	459	413

Table 48: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		5.81	7.68				
Sales of cooking units - Electric Resistance (%)	76.4	77	79.2	84.9	92.8	97.7	99.4
Sales of cooking units - Gas (%)	23.6	23	20.8	15.1	7.21	2.33	0.626
Sales of space heating units - Electric Heat Pump (%)	7.5	13	18.7	35.2	61.1	79	85.2
Sales of space heating units - Electric Resistance (%)	19.7	24.8	23.3	19.2	12.8	8.51	7.04
Sales of space heating units - Fossil (%)	9.34	14.9	14.4	12.2	8.46	5.78	5.24
Sales of space heating units - Gas (%)	63.5	47.3	43.7	33.5	17.6	6.67	2.55
Sales of water heating units - Electric Heat Pump (%)	0	1.51	5.81	18.2	37.5	50.4	55
Sales of water heating units - Electric Resistance (%)	42.5	57.5	56.3	52.9	47.8	44.7	43.6

Table 48: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	57.4	40.9	37.8	28.9	14.7	4.93	1.34
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.036	0.036	0.036	0.036

Table 49: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)		0	171	359	1,211	3,810	5,551
Public EV charging plugs - DC Fast (1000 units)	0.178		0.611		3.21		8.98
Public EV charging plugs - L2 (1000 units)	1.67		14.7		77.3		216
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.6	2.01	2.06	1.64	1.05	0.542	0.232
Vehicle sales - Light-duty - EV (%)	1.84	4.58	11.7	25.5	48	71.8	87.5
Vehicle sales - Light-duty - gasoline (%)	91.9	87.7	79.9	67.1	46.6	25.1	11.1
Vehicle sales - Light-duty - hybrid (%)	4.45	5.27	5.93	5.41	4.08	2.42	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.381	0.328	0.251	0.179	0.1	0.046
Vehicle sales - Light-duty - other (%)	0.105	0.108	0.098	0.086	0.062	0.034	0.016
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

Table 50: *E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0.01	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	3.67	21.9	3.22

Table 51: *E-B+ scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	9.64	9.64
Biomass w/ccu power plant (GWh)	0	0	0	0	4,118	28,723	32,333

Table 52: *E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy*

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		0	0	549	1,075	3,318	3,802
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	6,005	6,222	27,270	5,804
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	1	1

Table 52: *E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Beccs hydrogen (quantity)	0	0	0	7	10	18	21
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	3	23	26
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	1	1	2
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

Table 53: *E-B+ scenario - PILLAR 4: CCUS - CO2 capture*

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	3.24	11.1	18.8	59.3	66.5
Annual - BECCS (MMT)		0	0	7.72	15.5	49	55.9
Annual - Cement and lime (MMT)		0	3.24	3.35	3.32	10.3	10.6
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	3.24	14.3	33.1	92.3	159
Cumulative - BECCS (MMT)		0	0	7.72	23.2	72.2	128
Cumulative - Cement and lime (MMT)		0	3.24	6.59	9.91	20.2	30.8
Cumulative - NGCC (MMT)		0	0	0	0	0	0

Table 54: *E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines*

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	420	582	802	2,436	2,996
Cumulative investment - All (million $2018)		0	1,962	2,301	2,695	4,822	5,266
Cumulative investment - Spur (million $2018)		0	11.9	351	550	2,677	3,120
Cumulative investment - Trunk (million $2018)		0	1,950	1,950	2,145	2,145	2,145
Spur (km)		0	10.4	173	393	2,027	2,587
Trunk (km)		0	409	409	409	409	409

Table 55: *E-B+ scenario - PILLAR 4: CCUS - CO2 storage*

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0.92	4.28	7.13	10.8	10.9
Injection wells (wells)		0	2	7	13	22	27
Resource characterization, appraisal, permitting costs (million $2020)		27.9	123	190	190	190	190
Wells and facilities construction costs (million $2020)		0	55.8	217	387	648	804

Table 56: *E-B+ scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-1,072
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-12,355
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0

Table 56: *E-B+ scenario - PILLAR 6: Land sinks - Agriculture (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-284
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-13,711
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-1,072
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-6,467
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-142
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,681
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							497
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							13,018
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							292
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							979
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							517
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							15,303
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							497
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							2,765
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							292
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							979
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							259
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							4,793

Table 57: *E-B+ scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-164
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-51,213
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,274
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,741
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-151
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-3,212
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,247
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-10,656
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-21,079
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,690
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-82
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,537
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-379
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,973
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-77
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,071
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-787
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-5,328
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-1,597
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,244
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-123
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-32,374
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,326
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,357
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-113
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-2,141
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,517
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-7,992
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-11,338
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,467

Table 57: *E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							26.8
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							308
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,947
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							55.7
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							214
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							705
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							599
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,223
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,077
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							289
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,512
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							112
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							352
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							104
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							740
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,151
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							20.1

Table 57: *E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							298
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,730
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							41.9
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							528
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							751
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,490
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,022

Table 58: *E-B+ scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		556	0.464	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		201	87.5	51.2	33.1	14.6	7.52
Monetary damages from air pollution - Transportation (million 2019$)		1,321	1,328	1,290	1,161	924	634
Premature deaths from air pollution - Coal (deaths)		62.8	0.052	0.05	0.042	0.028	0.001
Premature deaths from air pollution - Natural Gas (deaths)		22.7	9.88	5.78	3.74	1.65	0.849
Premature deaths from air pollution - Transportation (deaths)		149	149	145	131	104	71.3

Table 59: *REF scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		16,080	16,491				
Sales of cooking units - Electric Resistance (%)	44.8	47.8	47.9	47.8	47.9	47.9	48
Sales of cooking units - Gas (%)	55.2	52.2	52.1	52.2	52.1	52.1	52
Sales of space heating units - Electric Heat Pump (%)	4.52	20.5	48.3	71.1	74.8	75.2	75.2
Sales of space heating units - Electric Resistance (%)	8.06	6.43	10.8	18.4	23.5	24.2	24.3
Sales of space heating units - Fossil (%)	0	1.98	1.55	0.695	0.102	0.009	0
Sales of space heating units - Gas Furnace (%)	87.4	71.1	39.3	9.83	1.63	0.522	0.461
Sales of water heating units - Electric Heat Pump (%)	1.19	0.826	0.821	0.823	0.819	0.815	0.814
Sales of water heating units - Electric Resistance (%)	10.1	7.06	7.07	7.05	7.05	7.05	7.04

Table 59: *REF scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	87.7	91.1	91.1	91.1	91.1	91.1	91.1
Sales of water heating units - Other (%)	0.996	0.996	0.994	0.993	0.993	0.997	0.996

Table 60: *REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.46	3.52	3.75	3.83	4.56	4.72

Table 61: *REF scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	182	183	183	181	179	181	187
Final energy use - Industry (PJ)	241	258	268	276	288	303	318
Final energy use - Residential (PJ)	241	227	219	214	212	213	214
Final energy use - Transportation (PJ)	670	629	580	552	553	571	593

Table 62: *REF scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		5.54	5.98				
Sales of cooking units - Electric Resistance (%)	76.2	76.2	76.2	76.2	76.2	76.2	76.2
Sales of cooking units - Gas (%)	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Sales of space heating units - Electric Heat Pump (%)	4.86	29.6	30.8	32.6	34.1	35.7	37.6
Sales of space heating units - Electric Resistance (%)	20.4	20.8	20.3	19.8	19.4	18	15.9
Sales of space heating units - Fossil (%)	9.54	10.9	11.1	11.1	10.6	10.2	10.6
Sales of space heating units - Gas (%)	65.2	38.7	37.8	36.4	35.8	36	36
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	42.5	58	57.9	57.7	57.7	57.6	57.5
Sales of water heating units - Gas Furnace (%)	57.4	42	42.1	42.3	42.3	42.4	42.4
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.036	0.036	0.036	0.036

Table 63: *REF scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - diesel (%)	98.1	98.2	97.9	97	95.6	93.5	91.6
Vehicle sales - Heavy-duty - EV (%)	0	0	0	0	0	0	0
Vehicle sales - Heavy-duty - gasoline (%)	0.229	0.242	0.257	0.274	0.294	0.317	0.343
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.096	0.112	0.13	0.15	0.174	0.202
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.119	0.138	0.16	0.186	0.216	0.25	0.29
Vehicle sales - Heavy-duty - other (%)	1.51	1.31	1.57	2.37	3.69	5.71	7.57
Vehicle sales - Light-duty - diesel (%)	1.59	2	2.19	2.04	1.84	1.71	1.63
Vehicle sales - Light-duty - EV (%)	3.44	5.43	6.2	7.62	9.29	10.8	11.9
Vehicle sales - Light-duty - gasoline (%)	90.4	86.9	84.8	83	81	79	77.4
Vehicle sales - Light-duty - hybrid (%)	4.32	5.17	6.33	6.9	7.48	8.08	8.55
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.378	0.348	0.31	0.307	0.308	0.319
Vehicle sales - Light-duty - other (%)	0.104	0.108	0.104	0.105	0.104	0.103	0.106
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7

Table 63: *REF scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Medium-duty - hybrid (%)	0.365	0.427	0.496	0.577	0.674	0.793	0.929
Vehicle sales - Medium-duty - hydrogen FC (%)	0.175	0.208	0.242	0.285	0.339	0.409	0.487
Vehicle sales - Medium-duty - other (%)	0.255	0.271	0.298	0.345	0.42	0.528	0.671

Table 64: *REF scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-164
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-51,213
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,274
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,741
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-151
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-3,212
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,247
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-10,656
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-21,079
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,690
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-82
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,537
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-379
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,973
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-77
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,071
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-787
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-5,328
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-1,597
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,244
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-123
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-32,374
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,326
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,357
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-113
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-2,141

Table 64: *REF scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,517
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-7,992
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-11,338
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,467
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							26.8
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							308
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,947
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							55.7
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							214
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							705
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							599
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,223
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,077
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							289
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,512
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							112
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							352
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							104
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							740

Table 64: *REF scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,151
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							20.1
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							298
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,730
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							41.9
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							528
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							751
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,490
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,022

Table 65: *REF scenario - PILLAR 6: Land sinks - Forests - REF only*

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	-4.2		-13.4				-12
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.874		-1.57				-1.63
Business-as-usual carbon sink - Total (Mt CO2e/y)	-5.07		-15				-13.6

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		2,253	1,348	899	709	630	623
Monetary damages from air pollution - Natural Gas (million 2019$)		219	197	209	152	131	117
Monetary damages from air pollution - Transportation (million 2019$)		1,320	1,347	1,376	1,412	1,448	1,483
Premature deaths from air pollution - Coal (deaths)		255	152	102	80	71.1	70.3
Premature deaths from air pollution - Natural Gas (deaths)		24.7	22.2	23.6	17.2	14.8	13.2
Premature deaths from air pollution - Transportation (deaths)		149	152	155	159	163	167