Net-Zero America - arizona state report

2021-03-05

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)	0	15,691	17,430	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	9.42	24.7	74.5	91.3	93	93.1	93.1
Sales of space heating units - Electric Resistance (%)	8.85	3.72	4.18	5.96	6.38	6.41	6.34
Sales of space heating units - Fossil (%)	0	0.191	0.037	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	81.7	71.4	21.3	2.75	0.604	0.53	0.531
Sales of water heating units - Electric Heat Pump (%)	0.083	10.5	56.1	67.4	68.1	68.1	68.1
Sales of water heating units - Electric Resistance (%)	4.09	5.98	25.6	31.1	31.5	31.5	31.5
Sales of water heating units - Gas Furnace (%)	94.7	83.1	18	1.12	0.029	0	0
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388

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)		5.56	5.85	7.13	7.54	7.14	7.45

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	154	154	150	142	136	133	134
Final energy use - Industry (PJ)	138	138	137	143	157	161	165
Final energy use - Residential (PJ)	190	187	180	168	158	153	152
Final energy use - Transportation (PJ)	577	543	484	411	345	303	285

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)	0	9.03	12.9	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.8	86.5	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.2	13.5	2.31	0.116	0	0	0
Sales of space heating units - Electric Heat Pump (%)	20.5	39.8	77.9	87.9	88.7	88.6	88.5
Sales of space heating units - Electric Resistance (%)	25.1	29.4	12.9	8.67	8.4	8.53	8.6
Sales of space heating units - Fossil (%)	3.8	4.75	2.83	2.2	1.94	1.88	1.97
Sales of space heating units - Gas (%)	50.6	26.1	6.34	1.28	0.966	0.96	0.955
Sales of water heating units - Electric Heat Pump (%)	0	11.1	59.1	70.5	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	46.7	56.4	31.4	25.8	25.6	25.6	25.6
Sales of water heating units - Gas Furnace (%)	49.7	29.2	6.29	0.391	0.01	0	0
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.24	3.23	3.24	3.24

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)	0	1,096	2,868	4,551	6,933	7,503	7,177
Public EV charging plugs - DC Fast (1000 units)	0.323	0	1.88	0	7.6	0	12.2
Public EV charging plugs - L2 (1000 units)	1.11	0	45.2	0	183	0	293
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 (%)	1.52	1.79	1.25	0.398	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	4.01	15.5	46.9	82	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.7	77.7	48.4	16.3	3.27	0.589	0
Vehicle sales - Light-duty - hybrid (%)	4.51	4.61	3.24	1.2	0.293	0.064	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.338	0.201	0.062	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.1	0.096	0.063	0.022	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	0.005	0.135	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0.057
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0.315
Capital invested - Solar PV - Base (billion $2018)	0	0	0	0	0	0	1.17
Capital invested - Solar PV - Constrained (billion $2018)	0	1.03	0	0	1.13	0.159	6.01
Capital invested - Wind - Base (billion $2018)	0	0	0.096	0.499	0.141	0.13	0.33
Capital invested - Wind - Constrained (billion $2018)	0	0.159	0.739	5.99	10.7	12.7	9.9
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Rooftop PV (MW)	1,845	2,808	3,773	4,985	6,485	8,313	10,586
Installed (cumulative) - Solar - Base land use assumptions (MW)	5,833	5,833	5,833	5,833	5,833	5,833	7,101
Installed (cumulative) - Wind - Base land use assumptions (MW)	618	618	691	1,093	1,212	1,328	1,640

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	10.1	276	276	276	276	276
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	57.2
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	354
Solar - Base land use assumptions (GWh)	14,540	0	0	0	0	0	3,095
Solar - Constrained land use assumptions (GWh)	13,756	0	0	0	1,205	9,782	5,452

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

Item	2020	2025	2030	2035	2040	2045	2050
Wind - Base land use assumptions (GWh)	1,920	0	227	1,183	334	320	862
Wind - Constrained land use assumptions (GWh)	2,143	613	1,061	13,815	21,261	21,504	22,291

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)	0	0.64	13.2	14.8	14.9	15.2	44.8
Conversion capital investment - Cumulative 5-yr (million $2018)	0	5.8	151	30.3	3.23	4.74	665
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	1
Number of facilities - Diesel (quantity)	0	0	0	2	2	2	2
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	2
Number of facilities - Power (quantity)	0	2	2	2	2	2	2
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	2
Number of facilities - Pyrolysis (quantity)	0	0	0	2	2	2	2
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Sng (quantity)	0	2	2	2	2	2	2
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	0.01	0.01	3.33	3.5	4.27
Annual - BECCS (MMT)		0	0	0	0	0	0.67
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0.01	0.01	0.01	0.08	0.07
Cumulative - All (MMT)		0	0.01	0.02	3.35	6.85	11.1
Cumulative - BECCS (MMT)		0	0	0	0	0	0.67
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)		0	0.01	0.02	0.03	0.11	0.18

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	415	415	504	514	885
Cumulative investment - All (million $2018)		0	445	445	531	537	740
Cumulative investment - Spur (million $2018)		0	5.14	5.13	90.9	97.6	300
Cumulative investment - Trunk (million $2018)		0	440	440	440	440	440
Spur (km)		0	9.36	9.36	98.6	108	479
Trunk (km)		0	406	406	406	406	406

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million $2020)		0	0	0	0	0	0
Wells and facilities construction costs (million $2020)		0	0	0	0	0	0

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)							-450
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-460
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-227
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-232
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)							506
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							521
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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264

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)							-1,802
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144

Table 13: *E+ 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)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-903
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0

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 - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7

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 - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		298	251	201	152	95.4	66.1
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	6,065
Natural gas production - Annual (tcf)		0.056	0.053	0.046	0.039	0.031	0.024
Oil consumption - Annual (million bbls)		95.3	80.2	58.8	39.2	23.7	12.1
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	1,832
Oil production - Annual (million bbls)		0.014	0.014	0.014	0.011	0.009	0.006

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		154	0.207	0.206	0.126	0.076	0
Monetary damages from air pollution - Natural Gas (million 2019$)		204	143	115	103	62.2	11.7
Monetary damages from air pollution - Transportation (million 2019$)		1,446	1,367	1,051	610	275	101
Premature deaths from air pollution - Coal (deaths)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Natural Gas (deaths)		23.1	16.1	13	11.6	7.02	1.32
Premature deaths from air pollution - Transportation (deaths)		163	154	118	68.6	30.9	11.4

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		96.6	118	120	76.5	32.7	55.5
By economic sector - Construction (jobs)		12,181	11,584	11,952	12,453	11,946	16,076
By economic sector - Manufacturing (jobs)		5,140	7,178	8,643	7,914	6,751	7,449
By economic sector - Mining (jobs)		1,940	1,239	774	443	226	106
By economic sector - Other (jobs)		1,529	1,565	1,827	2,128	2,392	4,297
By economic sector - Pipeline (jobs)		400	390	260	197	119	104
By economic sector - Professional (jobs)		5,261	4,878	5,036	5,275	5,284	7,561
By economic sector - Trade (jobs)		3,777	3,306	3,377	3,549	3,635	5,564
By economic sector - Utilities (jobs)		12,549	11,868	11,464	11,412	10,291	9,631
By education level - All sectors - Associates degree or some college (jobs)		13,646	13,474	13,997	14,170	13,307	16,555
By education level - All sectors - Bachelors degree (jobs)		8,645	8,407	8,512	8,358	7,824	9,779
By education level - All sectors - Doctoral degree (jobs)		291	272	271	268	261	361
By education level - All sectors - High school diploma or less (jobs)		18,187	17,954	18,643	18,643	17,380	21,718

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Masters or professional degree (jobs)		2,105	2,019	2,030	2,008	1,904	2,429
By resource sector - Biomass (jobs)		248	284	290	200	123	251
By resource sector - CO2 (jobs)		0	442	9.81	95.9	39	273
By resource sector - Coal (jobs)		1,309	391	4.06	3	2.32	1.94
By resource sector - Grid (jobs)		17,764	17,025	18,372	18,856	16,843	17,400
By resource sector - Natural Gas (jobs)		4,563	3,873	3,719	4,692	4,265	1,996
By resource sector - Nuclear (jobs)		2,125	2,091	1,213	0.031	0.093	0.136
By resource sector - Oil (jobs)		4,241	3,276	2,218	1,371	776	371
By resource sector - Solar (jobs)		10,849	11,171	13,760	15,000	16,322	28,124
By resource sector - Wind (jobs)		1,775	3,573	3,866	3,228	2,306	2,425
Median wages - Annual - All ($2019 per job)		59,133	59,519	59,798	60,498	61,285	61,297
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		7,107	6,976	7,199	7,258	6,794	8,403
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		3,023	2,891	2,941	3,019	2,848	3,533
On-Site or In-Plant Training - Total jobs - None (jobs)		6,883	6,795	7,014	6,995	6,580	8,359
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		375	368	383	393	369	450
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		25,485	25,096	25,914	25,781	24,086	30,096
On-the-Job Training - All sectors - 1 to 4 years (jobs)		9,179	8,999	9,274	9,367	8,773	10,825
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,985	2,854	2,915	3,014	2,853	3,557
On-the-Job Training - All sectors - None (jobs)		2,322	2,267	2,322	2,304	2,180	2,835
On-the-Job Training - All sectors - Over 10 years (jobs)		412	418	435	428	399	507
On-the-Job Training - All sectors - Up to 1 year (jobs)		27,975	27,589	28,507	28,334	26,471	33,118
Related work experience - All sectors - 1 to 4 years (jobs)		15,430	15,090	15,510	15,502	14,519	18,105
Related work experience - All sectors - 4 to 10 years (jobs)		10,025	9,812	10,074	10,094	9,447	11,697
Related work experience - All sectors - None (jobs)		6,218	6,109	6,314	6,362	5,967	7,459
Related work experience - All sectors - Over 10 years (jobs)		2,644	2,629	2,710	2,676	2,485	3,046
Related work experience - All sectors - Up to 1 year (jobs)		8,558	8,486	8,844	8,812	8,258	10,534
Wage income - All (million $2019)		2,535	2,508	2,599	2,629	2,493	3,117

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)	0	15,683	17,443	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Sales of space heating units - Electric Heat Pump (%)	9.42	15.4	21.2	37.7	63.9	82.8	90.3
Sales of space heating units - Electric Resistance (%)	8.85	3.71	3.77	3.94	4.58	5.53	6.06
Sales of space heating units - Fossil (%)	0	0.221	0.208	0.157	0.076	0.024	0.007
Sales of space heating units - Gas Furnace (%)	81.7	80.6	74.8	58.2	31.5	11.7	3.68

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Heat Pump (%)	0.083	1.86	7.04	22	45.1	60.6	66.1
Sales of water heating units - Electric Resistance (%)	4.09	2.3	4.52	11	21.1	28	30.5
Sales of water heating units - Gas Furnace (%)	94.7	95.5	88	66.6	33.4	11.1	2.96
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388

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)		5.08	5.31	5.56	5.79	6.91	7.24

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	154	154	154	153	150	146	143
Final energy use - Industry (PJ)	138	139	137	144	160	164	168
Final energy use - Residential (PJ)	190	188	187	184	176	167	161
Final energy use - Transportation (PJ)	578	547	504	469	441	408	369

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)	0	8.98	12.7	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.8	83.2	84.8	89	94.7	98.3	99.5
Sales of cooking units - Gas (%)	17.2	16.8	15.2	11	5.27	1.7	0.457
Sales of space heating units - Electric Heat Pump (%)	20.5	32.5	36.8	49.4	69.2	82.3	86.9
Sales of space heating units - Electric Resistance (%)	25.1	32.5	30.6	25.2	16.8	11.2	9.24
Sales of space heating units - Fossil (%)	3.8	5.13	5.09	4.25	2.87	2.13	2.05
Sales of space heating units - Gas (%)	50.6	29.9	27.6	21.1	11.1	4.33	1.85
Sales of water heating units - Electric Heat Pump (%)	0	1.92	7.38	23.1	47.4	63.4	69.1
Sales of water heating units - Electric Resistance (%)	46.7	61.2	58.5	50.3	37.7	29.5	26.6
Sales of water heating units - Gas Furnace (%)	49.7	33.6	30.9	23.3	11.7	3.86	1.03
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.25	3.25	3.24	3.24

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	0	188	371	1,276	3,945	5,771
Public EV charging plugs - DC Fast (1000 units)	0.323	0	0.669	0	2.89	0	7.8
Public EV charging plugs - L2 (1000 units)	1.11	0	16.1	0	69.5	0	188
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 (%)	1.53	1.95	2.05	1.63	1.04	0.534	0.229

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	1.92	4.75	12	26.1	48.6	72.2	87.6
Vehicle sales - Light-duty - gasoline (%)	91.6	87.3	79.4	66.4	45.9	24.7	10.9
Vehicle sales - Light-duty - hybrid (%)	4.68	5.48	6.15	5.58	4.17	2.46	1.19
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.379	0.324	0.247	0.175	0.097	0.045
Vehicle sales - Light-duty - other (%)	0.102	0.105	0.095	0.083	0.06	0.033	0.015
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)							-450
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-460
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-227
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-232
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)							506
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							521
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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264

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)							-1,802
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-903
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001

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 - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		154	0.207	0.206	0.126	0.076	0
Monetary damages from air pollution - Natural Gas (million 2019$)		208	132	89.2	45.1	19.5	3.06
Monetary damages from air pollution - Transportation (million 2019$)		1,471	1,506	1,485	1,353	1,087	750
Premature deaths from air pollution - Coal (deaths)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Natural Gas (deaths)		23.5	14.9	10.1	5.09	2.2	0.346
Premature deaths from air pollution - Transportation (deaths)		165	169	167	152	122	84.4

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)	0	15,691	17,430	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	9.42	24.7	74.5	91.3	93	93.1	93.1
Sales of space heating units - Electric Resistance (%)	8.85	3.72	4.18	5.96	6.38	6.41	6.34
Sales of space heating units - Fossil (%)	0	0.191	0.037	0.002	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	81.7	71.4	21.3	2.75	0.604	0.53	0.531
Sales of water heating units - Electric Heat Pump (%)	0.083	10.5	56.1	67.4	68.1	68.1	68.1
Sales of water heating units - Electric Resistance (%)	4.09	5.98	25.6	31.1	31.5	31.5	31.5
Sales of water heating units - Gas Furnace (%)	94.7	83.1	18	1.12	0.029	0	0
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388

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)		5.56	5.85	7.13	7.54	7.14	7.45

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	154	154	150	142	136	133	134
Final energy use - Industry (PJ)	138	138	137	143	157	161	165
Final energy use - Residential (PJ)	190	187	180	168	158	153	152
Final energy use - Transportation (PJ)	577	543	484	411	345	303	285

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)	0	9.03	12.9	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.8	86.5	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.2	13.5	2.31	0.116	0	0	0
Sales of space heating units - Electric Heat Pump (%)	20.5	39.8	77.9	87.9	88.7	88.6	88.5
Sales of space heating units - Electric Resistance (%)	25.1	29.4	12.9	8.67	8.4	8.53	8.6
Sales of space heating units - Fossil (%)	3.8	4.75	2.83	2.2	1.94	1.88	1.97
Sales of space heating units - Gas (%)	50.6	26.1	6.34	1.28	0.966	0.96	0.955
Sales of water heating units - Electric Heat Pump (%)	0	11.1	59.1	70.5	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	46.7	56.4	31.4	25.8	25.6	25.6	25.6
Sales of water heating units - Gas Furnace (%)	49.7	29.2	6.29	0.391	0.01	0	0
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.24	3.23	3.24	3.24

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)	0	1,096	2,868	4,551	6,933	7,503	7,177
Public EV charging plugs - DC Fast (1000 units)	0.323	0	1.88	0	7.6	0	12.2
Public EV charging plugs - L2 (1000 units)	1.11	0	45.2	0	183	0	293
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.52	1.79	1.25	0.398	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	4.01	15.5	46.9	82	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.7	77.7	48.4	16.3	3.27	0.589	0
Vehicle sales - Light-duty - hybrid (%)	4.51	4.61	3.24	1.2	0.293	0.064	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.338	0.201	0.062	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.1	0.096	0.063	0.022	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)	0	0	0	0	3.77	5.43	4.09
Capital invested - Wind - Base (billion $2018)	0	0	0.196	0.451	0.325	0.263	1.53
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Solar - Base land use assumptions (MW)	5,833	5,833	5,833	5,833	9,455	14,992	19,411
Installed (cumulative) - Wind - Base land use assumptions (MW)	618	618	765	1,129	1,405	1,640	3,085

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	14,540	0	0	0	8,845	13,464	10,690
Solar - Constrained land use assumptions (GWh)	14,540	0	0	2,685	13,875	23,681	15,359
Wind - Base land use assumptions (GWh)	1,920	0	454	1,061	750	646	3,895
Wind - Constrained land use assumptions (GWh)	2,143	850	2,002	25,592	43,651	6,325	2,044

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)							-450
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-460
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-227

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-232
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)							506
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							521
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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264

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)							-1,802
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-903
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821

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 - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		154	0.207	0.206	0.126	0.076	0

Table 34: *E+RE+ scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Natural Gas (million 2019$)		181	154	72	48.8	22.7	2.68
Monetary damages from air pollution - Transportation (million 2019$)		1,446	1,367	1,051	610	275	101
Premature deaths from air pollution - Coal (deaths)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Natural Gas (deaths)		20.4	17.4	8.13	5.51	2.56	0.302
Premature deaths from air pollution - Transportation (deaths)		163	154	118	68.6	30.9	11.4

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)	0	15,691	17,430	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	9.42	24.7	74.5	91.3	93	93.1	93.1
Sales of space heating units - Electric Resistance (%)	8.85	3.72	4.18	5.96	6.38	6.41	6.34
Sales of space heating units - Fossil (%)	0	0.191	0.037	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	81.7	71.4	21.3	2.75	0.604	0.53	0.531
Sales of water heating units - Electric Heat Pump (%)	0.083	10.5	56.1	67.4	68.1	68.1	68.1
Sales of water heating units - Electric Resistance (%)	4.09	5.98	25.6	31.1	31.5	31.5	31.5
Sales of water heating units - Gas Furnace (%)	94.7	83.1	18	1.12	0.029	0	0
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388

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)		5.56	5.85	7.13	7.54	7.14	7.45

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	154	154	150	142	136	133	134
Final energy use - Industry (PJ)	138	138	137	143	157	161	165
Final energy use - Residential (PJ)	190	187	180	168	158	153	152
Final energy use - Transportation (PJ)	577	543	484	411	345	303	285

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)	0	9.03	12.9	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.8	86.5	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.2	13.5	2.31	0.116	0	0	0
Sales of space heating units - Electric Heat Pump (%)	20.5	39.8	77.9	87.9	88.7	88.6	88.5
Sales of space heating units - Electric Resistance (%)	25.1	29.4	12.9	8.67	8.4	8.53	8.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Fossil (%)	3.8	4.75	2.83	2.2	1.94	1.88	1.97
Sales of space heating units - Gas (%)	50.6	26.1	6.34	1.28	0.966	0.96	0.955
Sales of water heating units - Electric Heat Pump (%)	0	11.1	59.1	70.5	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	46.7	56.4	31.4	25.8	25.6	25.6	25.6
Sales of water heating units - Gas Furnace (%)	49.7	29.2	6.29	0.391	0.01	0	0
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.24	3.23	3.24	3.24

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)	0	1,096	2,868	4,551	6,933	7,503	7,177
Public EV charging plugs - DC Fast (1000 units)	0.323	0	1.88	0	7.6	0	12.2
Public EV charging plugs - L2 (1000 units)	1.11	0	45.2	0	183	0	293
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 (%)	1.52	1.79	1.25	0.398	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	4.01	15.5	46.9	82	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.7	77.7	48.4	16.3	3.27	0.589	0
Vehicle sales - Light-duty - hybrid (%)	4.51	4.61	3.24	1.2	0.293	0.064	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.338	0.201	0.062	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.1	0.096	0.063	0.022	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)		0	0	0	0	0	0
Capital invested - Solar PV - Constrained (billion $2018)		0	0	0.805	0.25	0	0
Capital invested - Wind - Base (billion $2018)		0	0	0.09	0.214	0.166	0.116
Capital invested - Wind - Constrained (billion $2018)		0.159	0.253	0.498	3.38	1.47	7.97

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	14,540	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	14,540	0	0	1,738	578	0	0
Wind - Base land use assumptions (GWh)	1,920	0	0	227	538	428	322
Wind - Constrained land use assumptions (GWh)	1,920	330	506	971	6,160	2,781	15,721

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)							-450
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-460
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-227
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-232
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)							506
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							521
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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264

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)							-1,802
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144

Table 43: *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)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-903
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0

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 - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7

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 - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		154	0.207	0.206	0.126	0.076	0
Monetary damages from air pollution - Natural Gas (million 2019$)		236	168	145	151	82.7	9.62
Monetary damages from air pollution - Transportation (million 2019$)		1,446	1,367	1,051	610	275	101
Premature deaths from air pollution - Coal (deaths)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Natural Gas (deaths)		26.7	19	16.3	17.1	9.34	1.09
Premature deaths from air pollution - Transportation (deaths)		163	154	118	68.6	30.9	11.4

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)	0	15,683	17,443	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Sales of space heating units - Electric Heat Pump (%)	9.42	15.4	21.2	37.7	63.9	82.8	90.3
Sales of space heating units - Electric Resistance (%)	8.85	3.71	3.77	3.94	4.58	5.53	6.06
Sales of space heating units - Fossil (%)	0	0.221	0.208	0.157	0.076	0.024	0.007
Sales of space heating units - Gas Furnace (%)	81.7	80.6	74.8	58.2	31.5	11.7	3.68
Sales of water heating units - Electric Heat Pump (%)	0.083	1.86	7.04	22	45.1	60.6	66.1
Sales of water heating units - Electric Resistance (%)	4.09	2.3	4.52	11	21.1	28	30.5
Sales of water heating units - Gas Furnace (%)	94.7	95.5	88	66.6	33.4	11.1	2.96
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388

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)		5.08	5.31	5.56	5.79	6.91	7.24

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	154	154	154	153	150	146	143

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	138	139	137	144	160	164	168
Final energy use - Residential (PJ)	190	188	187	184	176	167	161
Final energy use - Transportation (PJ)	578	547	504	469	441	408	369

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)	0	8.98	12.7	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.8	83.2	84.8	89	94.7	98.3	99.5
Sales of cooking units - Gas (%)	17.2	16.8	15.2	11	5.27	1.7	0.457
Sales of space heating units - Electric Heat Pump (%)	20.5	32.5	36.8	49.4	69.2	82.3	86.9
Sales of space heating units - Electric Resistance (%)	25.1	32.5	30.6	25.2	16.8	11.2	9.24
Sales of space heating units - Fossil (%)	3.8	5.13	5.09	4.25	2.87	2.13	2.05
Sales of space heating units - Gas (%)	50.6	29.9	27.6	21.1	11.1	4.33	1.85
Sales of water heating units - Electric Heat Pump (%)	0	1.92	7.38	23.1	47.4	63.4	69.1
Sales of water heating units - Electric Resistance (%)	46.7	61.2	58.5	50.3	37.7	29.5	26.6
Sales of water heating units - Gas Furnace (%)	49.7	33.6	30.9	23.3	11.7	3.86	1.03
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.25	3.25	3.24	3.24

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	0	188	371	1,276	3,945	5,771
Public EV charging plugs - DC Fast (1000 units)	0.323	0	0.669	0	2.89	0	7.8
Public EV charging plugs - L2 (1000 units)	1.11	0	16.1	0	69.5	0	188
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 (%)	1.53	1.95	2.05	1.63	1.04	0.534	0.229
Vehicle sales - Light-duty - EV (%)	1.92	4.75	12	26.1	48.6	72.2	87.6
Vehicle sales - Light-duty - gasoline (%)	91.6	87.3	79.4	66.4	45.9	24.7	10.9
Vehicle sales - Light-duty - hybrid (%)	4.68	5.48	6.15	5.58	4.17	2.46	1.19
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.379	0.324	0.247	0.175	0.097	0.045
Vehicle sales - Light-duty - other (%)	0.102	0.105	0.095	0.083	0.06	0.033	0.015
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	0.002	0.061	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0.007	0.02
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0.001	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	4.19	124	124	124	124	124
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	6.99	26.8
Biomass w/ccu power plant (GWh)	0	0	0	0	0	1.2	1.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)	0	0.513	8.84	10.5	10.6	30.4	39.8
Conversion capital investment - Cumulative 5-yr (million $2018)	0	2.42	68	21.8	2.59	253	166
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	0	1	1
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	0	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	1	1
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 53: *E-B+ scenario - PILLAR 4: CCUS - CO2 capture*

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0.15	3.44	3.83	4.06
Annual - BECCS (MMT)		0	0	0	0	0.31	0.44
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0.15	0.12	0.1	0.08
Cumulative - All (MMT)		0	0	0.15	3.59	7.42	11.5
Cumulative - BECCS (MMT)		0	0	0	0	0.31	0.75
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)		0	0	0.15	0.27	0.37	0.45

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	406	415	504	708	708
Cumulative investment - All (million $2018)		0	440	445	531	643	646
Cumulative investment - Spur (million $2018)		0	0	5.33	91.1	203	207
Cumulative investment - Trunk (million $2018)		0	440	440	440	440	440
Spur (km)		0	0	9.36	98.6	303	303
Trunk (km)		0	406	406	406	406	406

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million $2020)		0	0	0	0	0	0
Wells and facilities construction costs (million $2020)		0	0	0	0	0	0

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)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-450
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-460
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-227
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)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-232
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)							1,249
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,264

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

Item	2020	2025	2030	2035	2040	2045	2050
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)							257
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264

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)							-1,802
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-903
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0

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 - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		154	0.207	0.206	0.126	0.076	0
Monetary damages from air pollution - Natural Gas (million 2019$)		196	128	93.2	70.6	43.5	7.16
Monetary damages from air pollution - Transportation (million 2019$)		1,471	1,506	1,485	1,353	1,087	750
Premature deaths from air pollution - Coal (deaths)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Natural Gas (deaths)		22.2	14.5	10.5	7.97	4.91	0.808
Premature deaths from air pollution - Transportation (deaths)		165	169	167	152	122	84.4

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)	0	15,479	16,145	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41.9	44.7	44.7	44.6	44.4	44.5	44.6
Sales of cooking units - Gas (%)	58.1	55.3	55.3	55.4	55.6	55.5	55.4
Sales of space heating units - Electric Heat Pump (%)	9.42	27.3	68.2	78	78.7	78.8	78.8
Sales of space heating units - Electric Resistance (%)	8.85	5.52	11.3	16.2	20	20.6	20.6
Sales of space heating units - Fossil (%)	0	0.189	0.074	0.026	0.004	0	0
Sales of space heating units - Gas Furnace (%)	81.7	67	20.4	5.76	1.23	0.588	0.532
Sales of water heating units - Electric Heat Pump (%)	0.083	0.031	0.031	0.031	0.031	0.031	0.031
Sales of water heating units - Electric Resistance (%)	4.09	1.51	1.51	1.53	1.5	1.51	1.5
Sales of water heating units - Gas Furnace (%)	94.7	98.1	98.1	98.1	98.1	98.1	98.1
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388

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)		5.57	5.85	6.55	6.89	7.44	7.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	154	157	160	162	165	172	181
Final energy use - Industry (PJ)	138	144	147	154	162	173	185
Final energy use - Residential (PJ)	190	190	195	202	212	222	230
Final energy use - Transportation (PJ)	577	551	515	496	500	516	538

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)	0	8.41	8.88	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.6	82.6	82.6	82.6	82.6	82.6	82.6
Sales of cooking units - Gas (%)	17.4	17.4	17.4	17.4	17.4	17.4	17.4
Sales of space heating units - Electric Heat Pump (%)	19.5	39.9	40.6	41.7	43.2	45.2	47.9
Sales of space heating units - Electric Resistance (%)	25.4	29.6	29.2	28.6	27.5	25.7	23
Sales of space heating units - Fossil (%)	3.83	3.9	4.03	3.98	3.57	3.36	3.58
Sales of space heating units - Gas (%)	51.3	26.5	26.2	25.7	25.7	25.7	25.6
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	46.7	62.2	62.4	62.4	62.4	62.5	62.5
Sales of water heating units - Gas Furnace (%)	49.7	34.5	34.4	34.3	34.3	34.3	34.2
Sales of water heating units - Other (%)	3.58	3.23	3.23	3.25	3.26	3.26	3.26

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 (%)	1.53	1.94	2.18	2.03	1.83	1.7	1.62
Vehicle sales - Light-duty - EV (%)	3.65	5.72	6.51	8.01	9.74	11.3	12.4
Vehicle sales - Light-duty - gasoline (%)	90.1	86.5	84.3	82.4	80.3	78.4	76.8
Vehicle sales - Light-duty - hybrid (%)	4.53	5.37	6.57	7.13	7.7	8.26	8.69
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.376	0.344	0.305	0.302	0.302	0.313
Vehicle sales - Light-duty - other (%)	0.101	0.105	0.101	0.101	0.101	0.1	0.102
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
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)							-1,802
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-903
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371

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 - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988

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)	7.56		2.19				0.629
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.039		-0.082				-0.086
Business-as-usual carbon sink - Total (Mt CO2e/y)	7.52		2.11				0.543

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		262	148	78.2	59.2	54.8	51.4
Monetary damages from air pollution - Natural Gas (million 2019$)		294	286	260	195	204	99
Monetary damages from air pollution - Transportation (million 2019$)		1,469	1,526	1,582	1,645	1,708	1,772
Premature deaths from air pollution - Coal (deaths)		29.6	16.7	8.83	6.68	6.18	5.81
Premature deaths from air pollution - Natural Gas (deaths)		33.2	32.3	29.3	22	23	11.2
Premature deaths from air pollution - Transportation (deaths)		165	172	178	185	192	199