Net-Zero America - utah state report

2021-03-15

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)		7,533	8,381				
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 (%)	0.749	8.98	33.5	81.9	90.4	91	91
Sales of space heating units - Electric Resistance (%)	0.855	3.41	4.83	7.94	8.5	8.54	8.55
Sales of space heating units - Fossil (%)	0	0.208	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	98.4	87.4	61.6	10.2	1.06	0.491	0.49
Sales of water heating units - Electric Heat Pump (%)	0.008	1.61	16.7	45	50	50.3	50.3
Sales of water heating units - Electric Resistance (%)	0.41	2.69	16.3	44.1	49	49.3	49.3
Sales of water heating units - Gas Furnace (%)	99.5	95.3	66.6	10.6	0.622	0	0
Sales of water heating units - Other (%)	0.1	0.381	0.381	0.382	0.381	0.381	0.381

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)		1.72	1.81	3.2	3.44	3.67	3.91

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	103	103	101	94.8	87.6	82.5	80.3
Final energy use - Industry (PJ)	86.5	89.3	90.2	96.9	111	116	122
Final energy use - Residential (PJ)	126	122	118	106	90.4	79.2	72.3
Final energy use - Transportation (PJ)	304	290	260	223	188	168	161

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)		2.76	3.21				
Sales of cooking units - Electric Resistance (%)	37.1	50.5	91.5	99.6	100	100	100
Sales of cooking units - Gas (%)	62.9	49.5	8.47	0.426	0	0	0
Sales of space heating units - Electric Heat Pump (%)	3.03	9.9	34.8	79.5	87.6	88.4	88.2
Sales of space heating units - Electric Resistance (%)	3.81	7.35	5.69	2.51	1.97	1.95	1.97
Sales of space heating units - Fossil (%)	3.57	9.24	8.91	8.06	7.57	7.25	7.38
Sales of space heating units - Gas (%)	89.6	73.5	50.6	9.98	2.86	2.43	2.43
Sales of water heating units - Electric Heat Pump (%)	0	1.51	15.7	41.6	46.2	46.5	46.5
Sales of water heating units - Electric Resistance (%)	7.01	15.7	26.3	48.5	52.5	52.7	52.7
Sales of water heating units - Gas Furnace (%)	92.3	82	57.3	9.09	0.535	0	0
Sales of water heating units - Other (%)	0.642	0.79	0.79	0.787	0.779	0.778	0.778

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)		449	1,171	1,866	2,839	3,076	2,940
Public EV charging plugs - DC Fast (1000 units)	0.174		0.748		3.07		4.93
Public EV charging plugs - L2 (1000 units)	1.07		18		73.9		119
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 (%)	1.55	1.82	1.26	0.402	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.91	15.2	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78	48.8	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.42	4.54	3.21	1.19	0.291	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	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	0.003	0.029	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0.377
Capital invested - Solar PV - Base (billion $2018)		0	0	0	0	0	0.525
Capital invested - Solar PV - Constrained (billion $2018)		1.09	0	0	2.18	2.6	1.2
Capital invested - Wind - Base (billion $2018)		0.251	7.55	5.67	2.22	1.04	3.24
Capital invested - Wind - Constrained (billion $2018)		0.199	7.9	6.7	0.918	0.419	2.7
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 - Rooftop PV (MW)	540	833	1,113	1,450	1,851	2,318	2,871
Installed renewables - Solar - Base land use assumptions (MW)	899	899	899	899	899	899	1,563
Installed renewables - Solar - Constrained land use assumptions (MW)	897	897	897	897	8,974	10,189	11,449
Installed renewables - Wind - Base land use assumptions (MW)	547	717	6,391	10,963	12,838	13,762	16,825
Installed renewables - Wind - Constrained land use assumptions (MW)	1,234	1,969	7,960	12,142	13,037	13,410	15,929

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	4.9	61.8	61.8	61.8	61.8	61.8
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	423
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)	2,042	2,042	2,042	2,042	2,042	2,042	3,288
Solar - Constrained land use assumptions (GWh)	2,037	2,037	2,037	2,037	17,645	20,004	22,417
Wind - Base land use assumptions (GWh)	1,617	2,124	18,149	30,651	35,589	38,005	46,263
Wind - Constrained land use assumptions (GWh)	3,563	5,645	21,170	30,795	32,849	33,673	39,164

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		0.333	3.78	4.99	5.18	5.22	26.6
Conversion capital investment - Cumulative 5-yr (million $2018)		2.83	32.3	18.6	2.91	0.542	346
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
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	0	0	0	0	0.4
Annual - BECCS (MMT)		0	0	0	0	0	0.4
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0.4
Cumulative - BECCS (MMT)		0	0	0	0	0	0.4
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
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	0	0	0	0	22.6
Cumulative investment - All (million $2018)		0	0	0	0	0	13.5
Cumulative investment - Spur (million $2018)		0	0	0	0	0	13.5
Cumulative investment - Trunk (million $2018)		0	0	0	0	0	0
Spur (km)		0	0	0	0	0	22.6
Trunk (km)		0	0	0	0	0	0

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)							-360
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-15.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-376
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-184
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-7.84
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-192
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)							646
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							24.1
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							670
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)							329
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							12.1
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							341

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)							-1,412
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-18,580
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-838
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,600
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.6
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-29.8
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-332
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,378
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,329
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,651
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-707
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-6,755
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-140
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,919
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.38
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-9.92
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-116
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,189
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-101
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,568
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,060
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-12,667
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-489
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,260
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.89
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-19.8
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-224
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,783
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-715
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,109

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)							231
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							113
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,876
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.9
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)							31.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							37.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,542
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,992
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							116
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							106
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,485
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.95
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)							16.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							6.55
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							933
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,743
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							173

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)							110
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,680
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.93
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)							24.1
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							47.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,879
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,034

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		189	159	128	96	60.4	41.9
Natural gas consumption - Cumulative (tcf)							3,842
Natural gas production - Annual (tcf)		348	329	287	242	192	149
Oil consumption - Annual (million bbls)		53.1	45.7	34.9	24.7	16.6	10
Oil consumption - Cumulative (million bbls)							1,076
Oil production - Annual (million bbls)		48	48.2	48.1	38.1	31	20.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		158	0.183	0.183	0.163	0.107	0
Monetary damages from air pollution - Natural Gas (million 2019$)		38.7	29.3	22	19.4	15.2	11.3
Monetary damages from air pollution - Transportation (million 2019$)		745	724	572	341	160	64.3
Premature deaths from air pollution - Coal (deaths)		17.8	0.021	0.021	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		4.37	3.31	2.48	2.19	1.72	1.28
Premature deaths from air pollution - Transportation (deaths)		83.8	81.5	64.3	38.3	18	7.23

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		4.2	10.7	10.8	9.3	7.45	25
By economic sector - Construction (jobs)		4,630	7,652	8,842	8,198	7,716	9,218
By economic sector - Manufacturing (jobs)		4,247	5,979	6,951	6,077	5,186	5,480
By economic sector - Mining (jobs)		4,907	3,453	2,594	1,720	1,121	655

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		445	717	909	968	1,034	1,668
By economic sector - Pipeline (jobs)		401	356	302	229	161	108
By economic sector - Professional (jobs)		2,672	4,371	5,247	5,088	4,956	6,002
By economic sector - Trade (jobs)		2,730	3,174	3,505	3,276	3,138	3,829
By economic sector - Utilities (jobs)		3,947	7,062	7,742	6,905	6,562	6,858
By education level - All sectors - Associates degree or some college (jobs)		7,240	10,231	11,371	10,292	9,532	10,866
By education level - All sectors - Bachelors degree (jobs)		5,270	6,970	7,584	6,784	6,213	6,963
By education level - All sectors - Doctoral degree (jobs)		174	239	267	247	232	272
By education level - All sectors - High school diploma or less (jobs)		10,055	13,651	15,035	13,477	12,356	13,984
By education level - All sectors - Masters or professional degree (jobs)		1,243	1,684	1,846	1,670	1,547	1,759
By resource sector - Biomass (jobs)		18	29.5	30.7	28	27.2	107
By resource sector - CO2 (jobs)		0	0	0	0	0	29.4
By resource sector - Coal (jobs)		2,670	1,040	529	460	414	367
By resource sector - Grid (jobs)		4,799	11,712	13,605	12,053	11,417	12,440
By resource sector - Natural Gas (jobs)		4,855	4,123	3,305	2,617	2,125	1,300
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		6,802	5,928	5,041	3,591	2,603	1,588
By resource sector - Solar (jobs)		3,444	3,627	4,869	5,150	5,442	9,230
By resource sector - Wind (jobs)		1,395	6,316	8,723	8,572	7,853	8,782
Median wages - Annual - All ($2019 per job)		58,060	58,319	58,637	59,219	59,958	60,200
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		3,831	5,342	5,897	5,310	4,898	5,541
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		1,511	2,176	2,407	2,184	2,036	2,316
On-Site or In-Plant Training - Total jobs - None (jobs)		3,814	5,258	5,822	5,259	4,849	5,547
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		185	275	309	281	262	298
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		14,643	19,724	21,668	19,436	17,836	20,143
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,888	6,870	7,592	6,847	6,325	7,159
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,427	2,102	2,341	2,136	2,001	2,295
On-the-Job Training - All sectors - None (jobs)		1,313	1,756	1,928	1,736	1,599	1,840
On-the-Job Training - All sectors - Over 10 years (jobs)		229	316	351	315	287	327
On-the-Job Training - All sectors - Up to 1 year (jobs)		16,125	21,731	23,891	21,437	19,668	22,223
Related work experience - All sectors - 1 to 4 years (jobs)		8,827	11,924	13,081	11,745	10,800	12,185
Related work experience - All sectors - 4 to 10 years (jobs)		5,564	7,686	8,466	7,621	7,022	7,925
Related work experience - All sectors - None (jobs)		3,368	4,658	5,134	4,624	4,267	4,852
Related work experience - All sectors - Over 10 years (jobs)		1,527	2,084	2,288	2,047	1,870	2,092
Related work experience - All sectors - Up to 1 year (jobs)		4,696	6,424	7,134	6,434	5,921	6,789
Wage income - All (million $2019)		1,393	1,912	2,117	1,923	1,792	2,038

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)		7,532	8,365				
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 (%)	0.749	7.59	10.3	19	39.5	64.5	79
Sales of space heating units - Electric Resistance (%)	0.855	3.35	3.5	4.01	5.26	6.85	7.79
Sales of space heating units - Fossil (%)	0	0.241	0.225	0.172	0.092	0.04	0.021
Sales of space heating units - Gas Furnace (%)	98.4	88.8	86	76.8	55.2	28.6	13.2
Sales of water heating units - Electric Heat Pump (%)	0.008	0.63	2.29	7.68	20	34.8	43.4
Sales of water heating units - Electric Resistance (%)	0.41	2	3.48	8.38	19.9	34.2	42.5
Sales of water heating units - Gas Furnace (%)	99.5	97	93.8	83.6	59.7	30.6	13.7
Sales of water heating units - Other (%)	0.1	0.381	0.381	0.382	0.381	0.381	0.381

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)		1.43	1.48	1.97	2.07	2.75	2.92

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	103	103	103	102	99.5	96.4	92.8
Final energy use - Industry (PJ)	86.5	89.4	90.4	97.9	112	117	124
Final energy use - Residential (PJ)	126	122	121	118	114	105	94.6
Final energy use - Transportation (PJ)	304	292	270	253	241	225	207

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)		2.75	3.16				
Sales of cooking units - Electric Resistance (%)	36.9	38.5	44.3	59.5	80.7	93.8	98.3
Sales of cooking units - Gas (%)	63.1	61.5	55.7	40.5	19.3	6.23	1.68
Sales of space heating units - Electric Heat Pump (%)	3.03	8.14	10.8	19.7	39.7	63.6	77.1
Sales of space heating units - Electric Resistance (%)	3.81	7.45	7.24	6.69	5.41	3.74	2.75
Sales of space heating units - Fossil (%)	3.57	9.27	9.34	9.11	8.39	7.66	7.61
Sales of space heating units - Gas (%)	89.6	75.1	72.6	64.6	46.5	25	12.6
Sales of water heating units - Electric Heat Pump (%)	0	0.562	2.11	7.14	18.6	32.3	40.2
Sales of water heating units - Electric Resistance (%)	7.01	15.2	16.4	20.2	29.3	40.6	47.3
Sales of water heating units - Gas Furnace (%)	92.3	83.4	80.7	71.9	51.3	26.3	11.8
Sales of water heating units - Other (%)	0.642	0.79	0.789	0.787	0.783	0.781	0.778

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	76.1	152	522	1,618	2,366
Public EV charging plugs - DC Fast (1000 units)	0.174		0.26		1.16		3.16
Public EV charging plugs - L2 (1000 units)	1.07		6.25		27.9		75.9
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 (%)	1.56	1.97	2.06	1.64	1.05	0.537	0.23
Vehicle sales - Light-duty - EV (%)	1.89	4.68	11.8	25.9	48.4	72	87.6
Vehicle sales - Light-duty - gasoline (%)	91.8	87.5	79.6	66.7	46.2	24.9	11
Vehicle sales - Light-duty - hybrid (%)	4.58	5.39	6.05	5.51	4.13	2.44	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.38	0.326	0.249	0.177	0.098	0.046
Vehicle sales - Light-duty - other (%)	0.103	0.106	0.097	0.084	0.061	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)							-360
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-15.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-376
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-184
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-7.84
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-192
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)							646
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							24.1

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)							670
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)							329
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							12.1
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							341

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)							-1,412
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-18,580
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-838
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,600
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.6
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-29.8
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-332
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,378
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,329
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,651
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-707
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-6,755
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-140
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,919
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.38
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-9.92
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-116
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,189
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-101
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,568
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,060

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)							-12,667
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-489
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,260
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.89
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-19.8
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-224
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,783
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-715
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,109
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							231
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							113
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,876
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.9
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)							31.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							37.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,542
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,992
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							116
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							106
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,485
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.95
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)							16.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							6.55
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							933
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,743
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							173
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							110
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,680
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.93
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)							24.1
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							47.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,879
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,034

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		158	0.183	0.183	0.163	0.107	0
Monetary damages from air pollution - Natural Gas (million 2019$)		42.5	21.4	14.9	8.71	4.13	4.99
Monetary damages from air pollution - Transportation (million 2019$)		757	796	806	751	617	436
Premature deaths from air pollution - Coal (deaths)		17.8	0.021	0.021	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		4.79	2.42	1.68	0.983	0.467	0.563
Premature deaths from air pollution - Transportation (deaths)		85.1	89.6	90.6	84.5	69.4	49.1

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)		7,533	8,381				
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 (%)	0.749	8.98	33.5	81.9	90.4	91	91
Sales of space heating units - Electric Resistance (%)	0.855	3.41	4.83	7.94	8.5	8.54	8.55
Sales of space heating units - Fossil (%)	0	0.208	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	98.4	87.4	61.6	10.2	1.06	0.491	0.49
Sales of water heating units - Electric Heat Pump (%)	0.008	1.61	16.7	45	50	50.3	50.3
Sales of water heating units - Electric Resistance (%)	0.41	2.69	16.3	44.1	49	49.3	49.3
Sales of water heating units - Gas Furnace (%)	99.5	95.3	66.6	10.6	0.622	0	0
Sales of water heating units - Other (%)	0.1	0.381	0.381	0.382	0.381	0.381	0.381

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)		1.72	1.81	3.2	3.44	3.67	3.91

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	103	103	101	94.8	87.6	82.5	80.3
Final energy use - Industry (PJ)	86.5	89.3	90.2	96.9	111	116	122
Final energy use - Residential (PJ)	126	122	118	106	90.4	79.2	72.3
Final energy use - Transportation (PJ)	304	290	260	223	188	168	161

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)		2.76	3.21				
Sales of cooking units - Electric Resistance (%)	37.1	50.5	91.5	99.6	100	100	100
Sales of cooking units - Gas (%)	62.9	49.5	8.47	0.426	0	0	0
Sales of space heating units - Electric Heat Pump (%)	3.03	9.9	34.8	79.5	87.6	88.4	88.2
Sales of space heating units - Electric Resistance (%)	3.81	7.35	5.69	2.51	1.97	1.95	1.97
Sales of space heating units - Fossil (%)	3.57	9.24	8.91	8.06	7.57	7.25	7.38
Sales of space heating units - Gas (%)	89.6	73.5	50.6	9.98	2.86	2.43	2.43
Sales of water heating units - Electric Heat Pump (%)	0	1.51	15.7	41.6	46.2	46.5	46.5
Sales of water heating units - Electric Resistance (%)	7.01	15.7	26.3	48.5	52.5	52.7	52.7
Sales of water heating units - Gas Furnace (%)	92.3	82	57.3	9.09	0.535	0	0
Sales of water heating units - Other (%)	0.642	0.79	0.79	0.787	0.779	0.778	0.778

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)		449	1,171	1,866	2,839	3,076	2,940
Public EV charging plugs - DC Fast (1000 units)	0.174		0.748		3.07		4.93
Public EV charging plugs - L2 (1000 units)	1.07		18		73.9		119
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 (%)	1.55	1.82	1.26	0.402	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.91	15.2	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78	48.8	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.42	4.54	3.21	1.19	0.291	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	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	0	7.15
Capital invested - Wind - Base (billion $2018)		0.668	8.7	6.39	4.89	2.47	3.24
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)	899	899	899	899	899	899	9,933
Installed renewables - Solar - Constrained land use assumptions (MW)	1,798	1,798	1,798	13,026	17,751	22,858	40,476
Installed renewables - Wind - Base land use assumptions (MW)	547	1,001	7,535	12,685	16,824	19,028	22,089
Installed renewables - Wind - Constrained land use assumptions (MW)	2,468	5,346	19,155	26,152	30,488	32,201	36,878

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)	2,042	2,042	2,042	2,042	2,042	2,042	18,184
Solar - Constrained land use assumptions (GWh)	4,085	4,085	4,085	25,752	34,830	44,503	76,079
Wind - Base land use assumptions (GWh)	1,617	2,948	21,310	35,224	46,069	51,530	59,186
Wind - Constrained land use assumptions (GWh)	7,126	15,214	49,826	65,862	75,327	78,528	87,375

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)							-360
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-15.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-376
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-184
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-7.84
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-192
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)							646
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							24.1
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							670
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)							329
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							12.1
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							341

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)							-1,412
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-18,580
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-838
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,600
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.6
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-29.8

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)							-332
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,378
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,329
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,651
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-707
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-6,755
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-140
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,919
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.38
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-9.92
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-116
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,189
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-101
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,568
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,060
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-12,667
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-489
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,260
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.89
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-19.8
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-224
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,783
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-715
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,109
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							231
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							113
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,876
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.9

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)							31.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							37.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,542
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,992
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							116
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							106
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,485
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.95
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)							16.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							6.55
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							933
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,743
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							173
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							110
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,680
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.93
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)							24.1

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)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							47.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,879
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,034

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		158	0.183	0.183	0.163	0.107	0
Monetary damages from air pollution - Natural Gas (million 2019$)		37.2	22.7	13	9.6	4.4	3.47
Monetary damages from air pollution - Transportation (million 2019$)		745	724	572	341	160	64.3
Premature deaths from air pollution - Coal (deaths)		17.8	0.021	0.021	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		4.2	2.57	1.46	1.08	0.496	0.392
Premature deaths from air pollution - Transportation (deaths)		83.8	81.5	64.3	38.3	18	7.23

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)		7,533	8,381				
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 (%)	0.749	8.98	33.5	81.9	90.4	91	91
Sales of space heating units - Electric Resistance (%)	0.855	3.41	4.83	7.94	8.5	8.54	8.55
Sales of space heating units - Fossil (%)	0	0.208	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	98.4	87.4	61.6	10.2	1.06	0.491	0.49
Sales of water heating units - Electric Heat Pump (%)	0.008	1.61	16.7	45	50	50.3	50.3
Sales of water heating units - Electric Resistance (%)	0.41	2.69	16.3	44.1	49	49.3	49.3
Sales of water heating units - Gas Furnace (%)	99.5	95.3	66.6	10.6	0.622	0	0
Sales of water heating units - Other (%)	0.1	0.381	0.381	0.382	0.381	0.381	0.381

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)		1.72	1.81	3.2	3.44	3.67	3.91

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	103	103	101	94.8	87.6	82.5	80.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	86.5	89.3	90.2	96.9	111	116	122
Final energy use - Residential (PJ)	126	122	118	106	90.4	79.2	72.3
Final energy use - Transportation (PJ)	304	290	260	223	188	168	161

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)		2.76	3.21				
Sales of cooking units - Electric Resistance (%)	37.1	50.5	91.5	99.6	100	100	100
Sales of cooking units - Gas (%)	62.9	49.5	8.47	0.426	0	0	0
Sales of space heating units - Electric Heat Pump (%)	3.03	9.9	34.8	79.5	87.6	88.4	88.2
Sales of space heating units - Electric Resistance (%)	3.81	7.35	5.69	2.51	1.97	1.95	1.97
Sales of space heating units - Fossil (%)	3.57	9.24	8.91	8.06	7.57	7.25	7.38
Sales of space heating units - Gas (%)	89.6	73.5	50.6	9.98	2.86	2.43	2.43
Sales of water heating units - Electric Heat Pump (%)	0	1.51	15.7	41.6	46.2	46.5	46.5
Sales of water heating units - Electric Resistance (%)	7.01	15.7	26.3	48.5	52.5	52.7	52.7
Sales of water heating units - Gas Furnace (%)	92.3	82	57.3	9.09	0.535	0	0
Sales of water heating units - Other (%)	0.642	0.79	0.79	0.787	0.779	0.778	0.778

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)		449	1,171	1,866	2,839	3,076	2,940
Public EV charging plugs - DC Fast (1000 units)	0.174		0.748		3.07		4.93
Public EV charging plugs - L2 (1000 units)	1.07		18		73.9		119
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 (%)	1.55	1.82	1.26	0.402	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.91	15.2	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78	48.8	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.42	4.54	3.21	1.19	0.291	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	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)		1.57	1.01	0.394	0.559	0.839	0
Capital invested - Solar PV - Constrained (billion $2018)		0.463	0	0	2.75	2.17	0
Capital invested - Wind - Base (billion $2018)		0.149	2.14	4.88	3.54	1.7	1.52
Capital invested - Wind - Constrained (billion $2018)		0.838	1.8	5.5	3.35	1.73	0.966
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)	2,643	4,015	5,005	5,423	6,053	7,055	7,055
Installed renewables - Solar - Constrained land use assumptions (MW)	989	1,394	1,394	1,394	4,488	7,075	7,075
Installed renewables - Wind - Base land use assumptions (MW)	547	648	2,256	6,188	9,180	10,692	12,128
Installed renewables - Wind - Constrained land use assumptions (MW)	1,102	1,672	3,024	7,459	10,294	11,835	12,748

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)	5,120	7,580	9,365	10,069	11,200	12,995	12,995
Solar - Constrained land use assumptions (GWh)	2,203	2,914	2,914	2,914	8,694	13,579	13,579
Wind - Base land use assumptions (GWh)	1,617	1,915	6,527	17,598	25,700	29,753	33,712
Wind - Constrained land use assumptions (GWh)	3,189	4,803	8,587	19,993	26,629	30,153	32,202

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)							-360
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-15.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-376
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-184
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-7.84
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-192

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)							646
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							24.1
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							670
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)							329
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							12.1
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							341

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)							-1,412
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-18,580
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-838
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,600
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.6
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-29.8
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-332
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,378
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,329
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,651
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-707
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-6,755
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-140
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,919
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.38
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-9.92
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-116

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)							-1,189
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-101
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,568
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,060
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-12,667
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-489
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,260
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.89
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-19.8
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-224
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,783
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-715
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,109
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							231
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							113
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,876
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.9
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)							31.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							37.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,542
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,992
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							116
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							106

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)							1,485
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.95
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)							16.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							6.55
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							933
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,743
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							173
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							110
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,680
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.93
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)							24.1
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							47.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,879
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,034

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		158	0.183	0.183	0.163	0.107	0
Monetary damages from air pollution - Natural Gas (million 2019$)		41.6	28.3	24.9	28.7	21.3	6.72
Monetary damages from air pollution - Transportation (million 2019$)		745	724	572	341	160	64.3
Premature deaths from air pollution - Coal (deaths)		17.8	0.021	0.021	0.018	0.012	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Natural Gas (deaths)		4.69	3.19	2.81	3.24	2.4	0.758
Premature deaths from air pollution - Transportation (deaths)		83.8	81.5	64.3	38.3	18	7.23

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)		7,532	8,365				
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 (%)	0.749	7.59	10.3	19	39.5	64.5	79
Sales of space heating units - Electric Resistance (%)	0.855	3.35	3.5	4.01	5.26	6.85	7.79
Sales of space heating units - Fossil (%)	0	0.241	0.225	0.172	0.092	0.04	0.021
Sales of space heating units - Gas Furnace (%)	98.4	88.8	86	76.8	55.2	28.6	13.2
Sales of water heating units - Electric Heat Pump (%)	0.008	0.63	2.29	7.68	20	34.8	43.4
Sales of water heating units - Electric Resistance (%)	0.41	2	3.48	8.38	19.9	34.2	42.5
Sales of water heating units - Gas Furnace (%)	99.5	97	93.8	83.6	59.7	30.6	13.7
Sales of water heating units - Other (%)	0.1	0.381	0.381	0.382	0.381	0.381	0.381

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)		1.43	1.48	1.97	2.07	2.75	2.92

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	103	103	103	102	99.5	96.4	92.8
Final energy use - Industry (PJ)	86.5	89.4	90.4	97.9	112	117	124
Final energy use - Residential (PJ)	126	122	121	118	114	105	94.6
Final energy use - Transportation (PJ)	304	292	270	253	241	225	207

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)		2.75	3.16				
Sales of cooking units - Electric Resistance (%)	36.9	38.5	44.3	59.5	80.7	93.8	98.3
Sales of cooking units - Gas (%)	63.1	61.5	55.7	40.5	19.3	6.23	1.68
Sales of space heating units - Electric Heat Pump (%)	3.03	8.14	10.8	19.7	39.7	63.6	77.1
Sales of space heating units - Electric Resistance (%)	3.81	7.45	7.24	6.69	5.41	3.74	2.75
Sales of space heating units - Fossil (%)	3.57	9.27	9.34	9.11	8.39	7.66	7.61
Sales of space heating units - Gas (%)	89.6	75.1	72.6	64.6	46.5	25	12.6
Sales of water heating units - Electric Heat Pump (%)	0	0.562	2.11	7.14	18.6	32.3	40.2
Sales of water heating units - Electric Resistance (%)	7.01	15.2	16.4	20.2	29.3	40.6	47.3

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 (%)	92.3	83.4	80.7	71.9	51.3	26.3	11.8
Sales of water heating units - Other (%)	0.642	0.79	0.789	0.787	0.783	0.781	0.778

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	76.1	152	522	1,618	2,366
Public EV charging plugs - DC Fast (1000 units)	0.174		0.26		1.16		3.16
Public EV charging plugs - L2 (1000 units)	1.07		6.25		27.9		75.9
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 (%)	1.56	1.97	2.06	1.64	1.05	0.537	0.23
Vehicle sales - Light-duty - EV (%)	1.89	4.68	11.8	25.9	48.4	72	87.6
Vehicle sales - Light-duty - gasoline (%)	91.8	87.5	79.6	66.7	46.2	24.9	11
Vehicle sales - Light-duty - hybrid (%)	4.58	5.39	6.05	5.51	4.13	2.44	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.38	0.326	0.249	0.177	0.098	0.046
Vehicle sales - Light-duty - other (%)	0.103	0.106	0.097	0.084	0.061	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	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0

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	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0

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	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0

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	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
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	0	0	0	0	0
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
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	0	0	0	0	0
Cumulative investment - All (million $2018)		0	0	0	0	0	0
Cumulative investment - Spur (million $2018)		0	0	0	0	0	0
Cumulative investment - Trunk (million $2018)		0	0	0	0	0	0
Spur (km)		0	0	0	0	0	0
Trunk (km)		0	0	0	0	0	0

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)							-360
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)							-15.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-376
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-184
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)							-7.84
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-192
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)							1,595
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							0.002
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							1.05
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							24.1
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,620
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)							329
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							0.002
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							1.05
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							12.1
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							342

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)							-1,412
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-18,580
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-838
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,600
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.6
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-29.8
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-332
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,378
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,329
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,651
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-707
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-6,755
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-140
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,919
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.38
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-9.92
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-116
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,189
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-101
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,568
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,060
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-12,667
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-489
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,260
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.89
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-19.8
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-224
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,783
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-715
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,109

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)							231
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							113
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,876
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.9
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)							31.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							37.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,542
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,992
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							116
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							106
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,485
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.95
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)							16.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							6.55
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							933
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,743
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							173

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)							110
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,680
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.93
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)							24.1
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							47.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,879
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,034

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		158	0.183	0.183	0.163	0.107	0
Monetary damages from air pollution - Natural Gas (million 2019$)		40.1	23.8	17.5	14.1	8.86	8.42
Monetary damages from air pollution - Transportation (million 2019$)		757	796	806	751	617	436
Premature deaths from air pollution - Coal (deaths)		17.8	0.021	0.021	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		4.53	2.69	1.98	1.59	1	0.951
Premature deaths from air pollution - Transportation (deaths)		85.1	89.6	90.6	84.5	69.4	49.1

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)		7,440	7,806				
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 (%)	0.749	14.6	48.1	74.1	78.4	78.8	78.8
Sales of space heating units - Electric Resistance (%)	0.855	4.29	8.82	15.6	19.9	20.6	20.7
Sales of space heating units - Fossil (%)	0	0.225	0.13	0.037	0.005	0	0
Sales of space heating units - Gas Furnace (%)	98.4	80.9	43	10.2	1.68	0.552	0.49
Sales of water heating units - Electric Heat Pump (%)	0.008	0.03	0.03	0.03	0.03	0.03	0.03
Sales of water heating units - Electric Resistance (%)	0.41	1.46	1.46	1.47	1.46	1.47	1.46

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 (%)	99.5	98.1	98.1	98.1	98.1	98.1	98.1
Sales of water heating units - Other (%)	0.1	0.381	0.381	0.382	0.381	0.381	0.381

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)		1.54	1.6	1.88	1.97	2.43	2.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	103	105	107	106	106	108	113
Final energy use - Industry (PJ)	86.4	92	95.3	99.3	105	112	121
Final energy use - Residential (PJ)	126	123	123	125	127	130	132
Final energy use - Transportation (PJ)	304	294	276	267	271	282	297

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)		2.68	2.8				
Sales of cooking units - Electric Resistance (%)	36.3	36.3	36.3	36.3	36.3	36.3	36.3
Sales of cooking units - Gas (%)	63.7	63.7	63.7	63.7	63.7	63.7	63.7
Sales of space heating units - Electric Heat Pump (%)	2.42	11.3	11.7	12.3	12.7	13	13.3
Sales of space heating units - Electric Resistance (%)	3.86	7.17	7.1	7.05	7.03	6.83	6.47
Sales of space heating units - Fossil (%)	3.61	9.13	9.24	9.18	8.79	8.45	8.65
Sales of space heating units - Gas (%)	90.1	72.4	72	71.5	71.5	71.7	71.5
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	7.01	14.8	14.8	14.8	14.9	14.9	14.9
Sales of water heating units - Gas Furnace (%)	92.3	84.4	84.4	84.4	84.4	84.4	84.3
Sales of water heating units - Other (%)	0.642	0.79	0.789	0.787	0.784	0.782	0.78

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 (%)	1.56	1.97	2.18	2.03	1.83	1.71	1.62
Vehicle sales - Light-duty - EV (%)	3.56	5.59	6.37	7.84	9.55	11	12.2
Vehicle sales - Light-duty - gasoline (%)	90.2	86.7	84.5	82.7	80.6	78.7	77.1
Vehicle sales - Light-duty - hybrid (%)	4.44	5.28	6.46	7.03	7.6	8.18	8.63
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.377	0.346	0.307	0.304	0.305	0.316
Vehicle sales - Light-duty - other (%)	0.102	0.106	0.102	0.103	0.102	0.101	0.104
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)							-1,412
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-18,580
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-838
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,600
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.6
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-29.8
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-332
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,378
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,329
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,651
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-707
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-6,755
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-140
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,919
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.38
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-9.92
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-116
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,189
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-101
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,568
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,060
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-12,667
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-489
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,260
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.89
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-19.8

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)							-224
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,783
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-715
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,109
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							231
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							113
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,876
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.9
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)							31.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							37.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,542
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,992
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							116
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							106
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,485
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.95
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)							16.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							6.55
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							933

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)							2,743
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							173
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							110
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,680
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.93
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)							24.1
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							47.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,879
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,034

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)	-0.72		2.42				0.695
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.008		-0.017				-0.018
Business-as-usual carbon sink - Total (Mt CO2e/y)	-0.728		2.41				0.677

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		203	155	74.4	59.8	56.1	52.8
Monetary damages from air pollution - Natural Gas (million 2019$)		36.9	33.8	56.3	38.8	54.1	51.2
Monetary damages from air pollution - Transportation (million 2019$)		757	808	859	914	969	1,026
Premature deaths from air pollution - Coal (deaths)		22.9	17.5	8.4	6.75	6.34	5.97
Premature deaths from air pollution - Natural Gas (deaths)		4.17	3.81	6.36	4.38	6.11	5.78
Premature deaths from air pollution - Transportation (deaths)		85.1	90.8	96.6	103	109	115