

Net-Zero America - maryland 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.prince-ton.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 statelevel 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.

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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	21,776	24,347	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	2.22	28.1	70.4	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	2.54	8.39	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	11	4.19	0.8	0.034	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.3	18.3	3.58	1.9	1.86	1.85
Sales of water heating units - Electric Heat Pump (%)	0.097	10.5	54.4	64.3	64.7	64.8	64.7
Sales of water heating units - Electric Resistance (%)	2.5	10.8	28.3	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	93	74.5	14.3	0.646	0.003	0	0
Sales of water heating units - Other (%)	4.44	4.22	3.02	2.72	2.72	2.72	2.71

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.99	3.04	6	6.39	5.4	5.63
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	188	180	167	157	154	156
Final energy use - Industry (PJ)	130	132	132	141	151	159	167
Final energy use - Residential (PJ)	241	228	209	183	162	149	144
Final energy use - Transportation (PJ)	448	417	367	305	249	213	197

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	4.8	4.71	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	59.2	67.9	94.5	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	40.8	32.1	5.5	0.277	0	0	0
Sales of space heating units - Electric	17.4	35.6	79.7	89.7	90.1	90.1	90.1
Heat Pump (%)							
Sales of space heating units - Electric	13.2	13.8	5.81	3.98	3.89	3.95	3.95
Resistance (%)							
Sales of space heating units - Fossil (%)	14.3	18.9	5.51	2.51	2.38	2.35	2.35
Sales of space heating units - Gas (%)	55.1	31.6	8.99	3.84	3.61	3.62	3.62
Sales of water heating units - Electric	0	9.19	48.7	57.6	58	58	58
Heat Pump (%)							
Sales of water heating units - Electric	35.7	51	42.2	40.3	40.2	40.2	40.2
Resistance (%)							
Sales of water heating units - Gas Furnace	59.5	36.5	7.04	0.317	0.002	0	0
(%)							
Sales of water heating units - Other (%)	4.77	3.29	2.07	1.81	1.81	1.83	1.84

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	800	2,073	3,321	5,046	5,475	5,229
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.402	0	1.31	0	5.5	0	8.84
units)							
Public EV charging plugs - L2 (1000 units)	1.67	0	31.5	0	132	0	212
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 (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC	0.109	0.325	0.182	0.055	0.011	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	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	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
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	0	0	0	0	0	0	0
(billion \$2018)							
Capital invested - Biomass w/ccu allam	0	0	0	0	0	0	0
power plant (billion \$2018)							
Capital invested - Biomass w/ccu power	0	0	0	0	0	0	0
plant (billion \$2018)							
Capital invested - Offshore Wind - Base	0	0	0	0	0	6.33	14.7
(billion \$2018)							
Capital invested - Offshore Wind -	0	0	0	0	0	1.46	19.1
Constrained (billion \$2018)							
Capital invested - Solar PV - Base (billion	0	4.41	2.06	2.19	1.12	1.28	0.169
\$2018)							
Capital invested - Solar PV - Constrained	0	2.9	0.138	0.35	0	1.23	1.46
(billion \$2018)							
Capital invested - Wind - Constrained	0	0	0	0.457	3.71	0	0
(billion \$2018)							
Installed (cumulative) - OffshoreWind -	0	0	0	0	0	4,288	15,370
Base land use assumptions (MW)							
Installed (cumulative) - Rooftop PV (MW)	851	1,276	1,695	2,240	2,899	3,650	4,510
Installed (cumulative) - Solar - Base land	809	4,104	5,824	7,813	8,889	10,195	10,378
use assumptions (MW)							
Installed (cumulative) - Wind - Base land	191	191	191	191	191	191	191
use assumptions (MW)							

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	0	0	0	0	19,084	53,030
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	19,084	53,030
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	1,524	6,122	3,207	3,739	1,993	2,352	345
Solar - Constrained land use assumptions	845	6,139	947	2,025	1,017	2,336	1,070
(GWh)							
Wind - Base land use assumptions (GWh)	786	0	0	0	0	0	0
Wind - Constrained land use assumptions	786	0	0	263	8,465	1,221	0
(GWh)							

Table 8: E+ 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	222
Conversion capital investment -	0	0	0	0	0	0	4,833
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	0	4
(quantity)							
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	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
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 9: E+ scenario - PILLAR 4: CCUS - CO2 capture

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	3.32	3.42	9.75
Annual - BECCS (MMT)		0	0	0	0	0	6.21
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	3.32	6.74	16.5
Cumulative - BECCS (MMT)		0	0	0	0	0	6.21
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
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	112	197	197	429
Cumulative investment - All (million		0	0	667	748	749	961
\$2018)							
Cumulative investment - Spur (million		0	0	0	81.3	82.7	294
\$2018)							
Cumulative investment - Trunk (million		0	0	667	667	667	667
\$2018)							
Spur (km)		0	0	0	85.1	85.1	317
Trunk (km)		0	0	112	112	112	112

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							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-595
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-29
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-624
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-313
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-14.5
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-327
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							_
energy grasses (1000 hectares)							
Land impacted for carbon sink -							525
Aggressive deployment - Cropland							020
measures (1000 hectares)							
Land impacted for carbon sink -							52.7
Aggressive deployment - Permanent							02
conservation cover (1000 hectares)							
Land impacted for carbon sink -							578
Aggressive deployment - Total (1000							010
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							Ü
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							276
deployment - Cropland measures (1000							210
hectares)							
Land impacted for carbon sink - Moderate							26.4
deployment - Permanent conservation							20.4
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							302
deployment - Total (1000 hectares)							302
uepioyment - rotar (1000 nectares)							

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

Table 13: E+ scenario - PILLAR 6: Land sin	ks - Forests						
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-37.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-5,324
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,101
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,332
rotation length (1000 tCO2e/y)							.,002
Carbon sink potential - High - Improve							-140
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-864
retention of HWP (1000 tCO2e/y)							-004
Carbon sink potential - High - Increase							-356
·							-336
trees outside forests (1000 tC02e/y)							(01
Carbon sink potential - High - Reforest							-62.1
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-886
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-546
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-18.8
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-1,480
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-183
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-511
rotation length (1000 tC02e/y)							311
Carbon sink potential - Low - Improve							-71.1
plantations (1000 tCO2e/y)							-11.1
Carbon sink potential - Low - Increase							-288
							-200
retention of HWP (1000 tC02e/y)							105
Carbon sink potential - Low - Increase							-125
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							-31.1
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-67.1
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-184
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-28.2
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-3,401
counting overlap) (1000 tCO2e/y)							-,
Carbon sink potential - Mid - Avoid							-642
deforestation (1000 tCO2e/y)							042
Carbon sink potential - Mid - Extend							-922
rotation length (1000 tCO2e/y)							-722
Carbon sink potential - Mid - Improve							-104
·							-104
plantations (1000 tC02e/y)							
Carbon sink potential - Mid - Increase							-576
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-240
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-46.6
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-477
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-365
productivity (1000 tCO2e/y)							
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Table 13: E+ scenario - PILLAR 6: Land sinks - Forests (continued)

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Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							6.15
High - Accelerate regeneration (1000							
hectares) Land impacted for carbon sink potential -							149
High - Avoid deforestation (over 30 years)							149
(1000 hectares)							
Land impacted for carbon sink potential -							679
High - Extend rotation length (1000							017
hectares)							
Land impacted for carbon sink potential -							51.5
High - Improve plantations (1000							31.3
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							33.8
High - Increase trees outside forests							33.0
(1000 hectares)							
Land impacted for carbon sink potential -							4.11
High - Reforest cropland (1000 hectares)							4.11
Land impacted for carbon sink potential -							25.2
High - Reforest pasture (1000 hectares)							23.2
Land impacted for carbon sink potential -							181
							101
High - Restore productivity (1000 hectares)							
Land impacted for carbon sink potential -							1,130
							1,130
High - Total impacted (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							3.08
							3.08
Low - Accelerate regeneration (1000							
hectares) Land impacted for carbon sink potential -							140
							140
Low - Avoid deforestation (over 30 years) (1000 hectares)							
							260
Land impacted for carbon sink potential -							260
Low - Extend rotation length (1000 hectares)							
Land impacted for carbon sink potential -							25.8
Low - Improve plantations (1000							23.0
•							
hectares)							0
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							17.8
							17.0
Low - Increase trees outside forests (1000 hectares)							
Land impacted for carbon sink potential -							2.05
·							2.05
Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential -							4.36
							4.30
Low - Reforest pasture (1000 hectares)							110
Land impacted for carbon sink potential -							110
Low - Restore productivity (1000							
hectares)							F/0
Land impacted for carbon sink potential -							563
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.61
Mid - Accelerate regeneration (1000							
hectares)							

Tahla 12. Fx	econario -	DILLAD 6.	Land sinks -	Enrecte	(continued)
Table 15. Et	SCEIIUI 10 -	PILLAK O.	LUIIU SIIIKS -	. คบา ยอเอา	COHUHUEUT

2020	2025	2030	2035	2040	2045	2050
						144
						470
						38.8
						0
						25.8
						3.08
						31.5
						221
						938
	2020	2020 2025	2020 2025 2030	2020 2025 2030 2035	2020 2025 2030 2035 2040	2020 2025 2030 2035 2040 2045

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		233	196	157	118	74.6	51.7
Natural gas consumption - Cumulative		0	0	0	0	0	4,741
(tcf)							
Natural gas production - Annual (tcf)		0.029	0.028	0.024	0.02	0.016	0.013
Oil consumption - Annual (million bbls)		69.1	59.1	44.6	31.1	20.6	12.5
Oil consumption - Cumulative (million		0	0	0	0	0	1,382
_bbls)							
Oil production - Annual (million bbls)		0	0	0	0	0	0

Table 15: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		743	0.504	0.499	0.457	0.318	0.027
Monetary damages from air pollution - Natural Gas (million 2019\$)		248	185	123	112	65.6	27.4
Monetary damages from air pollution - Transportation (million 2019\$)		2,187	2,036	1,542	889	398	147
Premature deaths from air pollution - Coal (deaths)		83.9	0.057	0.056	0.052	0.036	0.003
Premature deaths from air pollution - Natural Gas (deaths)		28	20.9	13.9	12.6	7.41	3.09
Premature deaths from air pollution - Transportation (deaths)		246	229	173	100	44.8	16.5

Table 16: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		49.8	101	38.7	30	22	324
By economic sector - Construction (jobs)		8,177	6,965	8,178	8,092	10,411	20,267
By economic sector - Manufacturing		6,920	12,734	12,785	10,098	11,764	11,071
(jobs)							
By economic sector - Mining (jobs)		1,387	923	589	350	190	100

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

Table 10. L+ Scellul 10 - IMPACTS - Jobs (col	•					
Item	2020 2025		2035	2040	2045	2050
By economic sector - Other (jobs)	1,195		1,308	1,398	1,767	3,128
By economic sector - Pipeline (jobs)	304		280	153	102	100
By economic sector - Professional (jobs)	3,366		3,203	3,313	4,882	11,061
By economic sector - Trade (jobs)	2,506		2,245	2,286	3,158	6,652
By economic sector - Utilities (jobs)	5,91 ⁻		6,814	7,153	9,692	20,441
By education level - All sectors -	9,450	10,362	11,399	10,661	13,643	23,749
Associates degree or some college (jobs)						
By education level - All sectors - Bachelors degree (jobs)	5,984	6,519	6,921	6,349	8,182	14,417
By education level - All sectors - Doctoral	193	3 180	190	181	248	507
degree (jobs) By education level - All sectors - High	12,803	3 14,136	15,396	14,236	18,005	30,863
school diploma or less (jobs)						
By education level - All sectors - Masters or professional degree (jobs)	1,392	1,433	1,535	1,446	1,912	3,608
By resource sector - Biomass (jobs)	214	+ 279	110	90.3	80.4	1,382
By resource sector - CO2 (jobs)) 0	655	56	72.2	326
			000	0		0
By resource sector - Coal (jobs)	803		_	_	10.077	_
By resource sector - Grid (jobs)	7,244		10,558	12,271	18,066	40,246
By resource sector - Natural Gas (jobs)	3,25		2,312	2,623	1,856	1,306
By resource sector - Nuclear (jobs)	923		527	0	0	0
By resource sector - Oil (jobs)	3,07		1,678	1,089	673	385
By resource sector - Solar (jobs)	14,159		19,117	15,493	15,638	16,688
By resource sector - Wind (jobs)	154		483	1,250	5,605	12,811
Median wages - Annual - All (\$2019 per job)	62,912	63,005	63,816	64,974	66,381	68,724
On-Site or In-Plant Training - Total jobs - 1	4,87	1 5,255	5,779	5,410	6,920	12,158
to 4 years (jobs)	10//	1.07/	0.107	0.070	0.400	F 100
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)	1,945	1,876	2,126	2,070	2,689	5,108
On-Site or In-Plant Training - Total jobs -	4,886	5,387	5,806	5,343	6,819	11,768
None (jobs) On-Site or In-Plant Training - Total jobs -	250) 267	299	286	369	666
Over 10 years (jobs)						
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)	17,869	19,847	21,430	19,763	25,192	43,444
On-the-Job Training - All sectors - 1 to 4	6,254	6,701	7,390	6,938	8,892	15,718
years (jobs)						
On-the-Job Training - All sectors - 4 to 10 years (jobs)	1,90	7 1,814	2,079	2,043	2,663	5,106
On-the-Job Training - All sectors - None	1,634	1,749	1,880	1,734	2,213	3,862
(jobs) On-the-Job Training - All sectors - Over 10	316	366	389	346	430	681
years (jobs)						
On-the-Job Training - All sectors - Up to 1 year (jobs)	19,71	1 22,000	23,702	21,811	27,792	47,778
Related work experience - All sectors - 1	10,646	5 11,563	12,549	11,667	14,937	26,208
to 4 years (jobs)						
Related work experience - All sectors - 4 to 10 years (jobs)	6,894	7,454	8,119	7,559	9,697	17,070
Related work experience - All sectors -	4,279	9 4,641	5,082	4,756	6,065	10,645
None (jobs) Related work experience - All sectors -	1,876	5 2,138	2,297	2,094	2,666	4,500
Over 10 years (jobs)						
Related work experience - All sectors - Up	6,12	7 6,835	7,394	6,797	8,625	14,720
to 1 year (jobs) Wage income - All (million \$2019)	1,876	5 2,056	2,262	2,136	2,788	5,027
	,,,,,	1 1 1 1 1				· · · · · · · · · · · · · · · · · · ·

 $\underline{ \text{Table 17: } \textit{E-scenario - PILLAR 1: Efficiency/Electrification - Commercial } }$

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	21,752	24,163	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric Heat Pump (%)	2.22	20.1	24.9	38.9	61	76.7	82.8
Sales of space heating units - Electric Resistance (%)	2.54	8.05	8.31	9.13	10.6	12	12.8
Sales of space heating units - Fossil (%)	11	4.85	4.51	3.43	1.69	0.531	0.139
Sales of space heating units - Gas Furnace (%)	84.3	67	62.3	48.5	26.7	10.8	4.34
Sales of water heating units - Electric Heat Pump (%)	0.097	2.03	7.02	21.4	43.5	57.9	63
Sales of water heating units - Electric Resistance (%)	2.5	7.39	9.34	15.1	24	29.8	31.8
Sales of water heating units - Gas Furnace (%)	93	86.1	79.2	59.6	29.2	9.38	2.45
Sales of water heating units - Other (%)	4.44	4.46	4.4	3.91	3.31	2.91	2.76

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.54	2.53	3.68	3.81	5.55	5.88
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	189	186	183	177	171	167
Final energy use - Industry (PJ)	130	132	133	143	154	162	170
Final energy use - Residential (PJ)	241	229	222	214	200	183	167
Final energy use - Transportation (PJ)	449	421	386	356	331	302	268

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	4.8	4.72	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	59	60.1	63.8	73.7	87.5	96	98.9
Resistance (%)							
Sales of cooking units - Gas (%)	41	39.9	36.2	26.3	12.5	4.04	1.09
Sales of space heating units - Electric	17.4	27.2	32.2	46.7	68.8	83.3	88.3
Heat Pump (%)							
Sales of space heating units - Electric	13.2	15.3	14.3	11.6	7.67	5.11	4.2
Resistance (%)							
Sales of space heating units - Fossil (%)	14.3	21.5	20.1	15.7	8.92	4.46	2.92
Sales of space heating units - Gas (%)	55.1	36	33.4	26	14.6	7.13	4.52
Sales of water heating units - Electric	0	1.58	6.08	19	38.9	51.9	56.4
Heat Pump (%)							
Sales of water heating units - Electric	35.7	52.7	51.6	48.7	44.3	41.5	40.5
Resistance (%)							
Sales of water heating units - Gas Furnace	59.5	42.2	38.9	29.2	14.4	4.62	1.21
(%)							
Sales of water heating units - Other (%)	4.77	3.53	3.4	3	2.4	2.02	1.89

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	133	271	925	2,883	4,210
Public EV charging plugs - DC Fast (1000 units)	0.402	0	0.44	0	2.06	0	5.66
Public EV charging plugs - L2 (1000 units)	1.67	0	10.6	0	49.6	0	136
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 (%)	1.3	1.76	2.01	1.59	0.995	0.506	0.218
Vehicle sales - Light-duty - EV (%)	2.19	5.36	13.2	28	50.7	73.5	88.2
Vehicle sales - Light-duty - gasoline (%)	90.8	86.2	77.5	63.9	43.6	23.3	10.3
Vehicle sales - Light-duty - hybrid (%)	5.48	6.24	6.9	6.15	4.48	2.57	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.373	0.311	0.232	0.161	0.088	0.041
Vehicle sales - Light-duty - other (%)	0.092	0.095	0.085	0.073	0.052	0.028	0.013
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							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-595
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-29
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-624
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-313
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-14.5
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-327
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							525
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							52.7
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							578
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							276
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							26.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							302
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate	2020	2023	2030	2033	2040	2045	-37.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-5,324
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,101
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,332
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-140
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-864
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-356
trees outside forests (1000 tC02e/y)							
Carbon sink potential - High - Reforest							-62.1
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-886
pasture (1000 tC02e/y)							
Carbon sink potential - High - Restore							-546
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-18.8
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-1,480
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - Low - Avoid							-183
deforestation (1000 tC02e/y)							
Carbon sink potential - Low - Extend							-511
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-71.1
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-288
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-125
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-31.1
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-67.1
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-184
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-28.2
regeneration (1000 tCO2e/y)							

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

Carbon sink potential - Mid - All (not	2020	2025	2030	2035	2040	2045	2050 -3,401
counting overlap) (1000 tC02e/y)							-3,401
Carbon sink potential - Mid - Avoid							-642
deforestation (1000 tC02e/y)							-042
Carbon sink potential - Mid - Extend							-922
rotation length (1000 tCO2e/y)							,,,
Carbon sink potential - Mid - Improve							-104
plantations (1000 tCO2e/y)							10-1
Carbon sink potential - Mid - Increase							-576
retention of HWP (1000 tCO2e/y)							0.0
Carbon sink potential - Mid - Increase							-240
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest						+	-46.6
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-477
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-365
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							6.15
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							149
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							679
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							51.5
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							33.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							4.11
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							25.2
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							181
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,130
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3.08
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							140
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							260
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							25.8
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -	2020	2023	2030	2000	2040	2043	17.8
Low - Increase trees outside forests							11.0
(1000 hectares)							
Land impacted for carbon sink potential -							2.05
Low - Reforest cropland (1000 hectares)							2.05
							/ 0/
Land impacted for carbon sink potential -							4.36
Low - Reforest pasture (1000 hectares)							440
Land impacted for carbon sink potential -							110
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							563
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.61
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							144
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							470
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							38.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							25.8
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							3.08
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							31.5
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							221
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							938
Mid - Total impacted (over 30 years) (1000							,50
hectares)							

Table 24: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		743	0.504	0.499	0.457	0.318	0.027
Coal (million 2019\$)							
Monetary damages from air pollution -		248	162	73.2	34.7	11.7	7.64
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		2,231	2,262	2,199	1,975	1,567	1,069
Transportation (million 2019\$)							
Premature deaths from air pollution -		83.9	0.057	0.056	0.052	0.036	0.003
Coal (deaths)							
Premature deaths from air pollution -		28	18.3	8.27	3.91	1.32	0.863
Natural Gas (deaths)							
Premature deaths from air pollution -		251	254	247	222	176	120
Transportation (deaths)							

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	21,776	24,347	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	2.22	28.1	70.4	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	2.54	8.39	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	11	4.19	0.8	0.034	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.3	18.3	3.58	1.9	1.86	1.85
Sales of water heating units - Electric Heat Pump (%)	0.097	10.5	54.4	64.3	64.7	64.8	64.7
Sales of water heating units - Electric Resistance (%)	2.5	10.8	28.3	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	93	74.5	14.3	0.646	0.003	0	0
Sales of water heating units - Other (%)	4.44	4.22	3.02	2.72	2.72	2.72	2.71

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.99	3.04	6	6.39	5.4	5.63
Cumulative 5-yr (billion \$2018)							

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

	,, =						
Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	188	180	167	157	154	156
Final energy use - Industry (PJ)	130	132	132	141	151	159	167
Final energy use - Residential (PJ)	241	228	209	183	162	149	144
Final energy use - Transportation (PJ)	448	417	367	305	249	213	197

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	4.8	4.71	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	59.2	67.9	94.5	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	40.8	32.1	5.5	0.277	0	0	0
Sales of space heating units - Electric	17.4	35.6	79.7	89.7	90.1	90.1	90.1
Heat Pump (%)							
Sales of space heating units - Electric	13.2	13.8	5.81	3.98	3.89	3.95	3.95
Resistance (%)							
Sales of space heating units - Fossil (%)	14.3	18.9	5.51	2.51	2.38	2.35	2.35
Sales of space heating units - Gas (%)	55.1	31.6	8.99	3.84	3.61	3.62	3.62
Sales of water heating units - Electric	0	9.19	48.7	57.6	58	58	58
Heat Pump (%)							
Sales of water heating units - Electric	35.7	51	42.2	40.3	40.2	40.2	40.2
Resistance (%)							
Sales of water heating units - Gas Furnace	59.5	36.5	7.04	0.317	0.002	0	0
(%)							
Sales of water heating units - Other (%)	4.77	3.29	2.07	1.81	1.81	1.83	1.84

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	800	2,073	3,321	5,046	5,475	5,229
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.402	0	1.31	0	5.5	0	8.84
units)							
Public EV charging plugs - L2 (1000 units)	1.67	0	31.5	0	132	0	212
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 (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC	0.109	0.325	0.182	0.055	0.011	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	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	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
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 - Offshore Wind - Base (billion \$2018)	0	0	0	0	1.71	17.2	3.59
Capital invested - Solar PV - Base (billion \$2018)	0	4.53	0.414	2.16	2.49	3.65	14.9
Capital invested - Wind - Base (billion \$2018)	0	0	0	0	0	2.43	6.5
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	987	12,663	15,370
Installed (cumulative) - Solar - Base land use assumptions (MW)	972	4,354	4,700	6,660	9,052	12,770	28,882
Installed (cumulative) - Wind - Base land use assumptions (MW)	191	191	191	191	191	1,394	4,802

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	0	0	0	4,268	54,657	13,188
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	4,276	0	67,845
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	1,833	6,232	655	3,541	4,173	6,377	29,914
Solar - Constrained land use assumptions	2,449	3,162	3,022	4,628	2,879	475	36,372
(GWh)							
Wind - Base land use assumptions (GWh)	786	0	0	0	0	4,164	9,643
Wind - Constrained land use assumptions	786	0	0	5,492	4,458	0	0
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-595
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-29
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-624
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-313
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-14.5
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-327
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							525
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							52.7
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							578
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							276
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							26.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							302
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-37.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-5,324
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,101
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,332
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-140
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-864
retention of HWP (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase							-356
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-62.1
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend							-511
rotation length (1000 tC02e/y) Carbon sink potential - Low - Improve							-71.1
plantations (1000 tC02e/y) Carbon sink potential - Low - Increase							-288
retention of HWP (1000 tC02e/y) Carbon sink potential - Low - Increase							-125
trees outside forests (1000 tCO2e/y) Carbon sink potential - Low - Reforest							-31.1
cropland (1000 tCO2e/y) Carbon sink potential - Low - Reforest							-67.1
pasture (1000 tCO2e/y) Carbon sink potential - Low - Restore							-184
productivity (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate							-28.2
regeneration (1000 tCO2e/y) Carbon sink potential - Mid - All (not							-3,401
counting overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Avoid							-642
deforestation (1000 tC02e/y) Carbon sink potential - Mid - Extend							-922
rotation length (1000 tC02e/y) Carbon sink potential - Mid - Improve							-104
plantations (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-576
retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-240
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-46.6
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-477
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000							6.15
hectares) Land impacted for carbon sink potential -							149
High - Avoid deforestation (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							679
Land impacted for carbon sink potential - High - Improve plantations (1000							51.5

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

Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050
High - Increase retention of HWP (1000							(
hectares)							
Land impacted for carbon sink potential -							33.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							4.1
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							25.2
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							18
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,130
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3.08
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							140
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							260
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							25.8
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							17.8
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							2.05
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							4.36
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							110
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							563
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							144
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							470
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -	T						38.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							25.8
Mid - Increase trees outside forests (1000							
hectares)							

Table 33: E+RE+	. cronario -	DTII AD A.	I and cinke -	Forests	(continued)
14018 33. E+KE+	· SCEHUITO -	PILLAR O.	LUHU SHIKS -	FULESTS	COMUNICEUR

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							3.08
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							31.5
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							221
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							938
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		743	0.504	0.499	0.457	0.318	0.027
Coal (million 2019\$)							
Monetary damages from air pollution -		228	159	99	69.7	24.4	4.65
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		2,187	2,036	1,542	889	398	147
Transportation (million 2019\$)							
Premature deaths from air pollution -		83.9	0.057	0.056	0.052	0.036	0.003
Coal (deaths)							
Premature deaths from air pollution -		25.7	18	11.2	7.87	2.76	0.525
Natural Gas (deaths)							
Premature deaths from air pollution -		246	229	173	100	44.8	16.5
Transportation (deaths)							

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	21,776	24,347	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	2.22	28.1	70.4	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	2.54	8.39	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	11	4.19	0.8	0.034	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.3	18.3	3.58	1.9	1.86	1.85
Sales of water heating units - Electric Heat Pump (%)	0.097	10.5	54.4	64.3	64.7	64.8	64.7
Sales of water heating units - Electric Resistance (%)	2.5	10.8	28.3	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	93	74.5	14.3	0.646	0.003	0	0
Sales of water heating units - Other (%)	4.44	4.22	3.02	2.72	2.72	2.72	2.71

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.99	3.04	6	6.39	5.4	5.63
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	188	180	167	157	154	156

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	130	132	132	141	151	159	167
Final energy use - Residential (PJ)	241	228	209	183	162	149	144
Final energy use - Transportation (PJ)	448	417	367	305	249	213	197

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	4.8	4.71	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	59.2	67.9	94.5	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	40.8	32.1	5.5	0.277	0	0	0
Sales of space heating units - Electric	17.4	35.6	79.7	89.7	90.1	90.1	90.1
Heat Pump (%)							
Sales of space heating units - Electric	13.2	13.8	5.81	3.98	3.89	3.95	3.95
Resistance (%)							
Sales of space heating units - Fossil (%)	14.3	18.9	5.51	2.51	2.38	2.35	2.35
Sales of space heating units - Gas (%)	55.1	31.6	8.99	3.84	3.61	3.62	3.62
Sales of water heating units - Electric	0	9.19	48.7	57.6	58	58	58
Heat Pump (%)							
Sales of water heating units - Electric	35.7	51	42.2	40.3	40.2	40.2	40.2
Resistance (%)							
Sales of water heating units - Gas Furnace	59.5	36.5	7.04	0.317	0.002	0	0
(%)							
Sales of water heating units - Other (%)	4.77	3.29	2.07	1.81	1.81	1.83	1.84

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	800	2,073	3,321	5,046	5,475	5,229
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.402	0	1.31	0	5.5	0	8.84
units)							
Public EV charging plugs - L2 (1000 units)	1.67	0	31.5	0	132	0	212
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 (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC	0.109	0.325	0.182	0.055	0.011	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	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	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
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 - Offshore Wind -		0	0	0	0	0.383	0.427
Constrained (billion \$2018)							
Capital invested - Solar PV - Base (billion		1.12	0.84	0.53	0.29	0	0
\$2018)							
Capital invested - Solar PV - Constrained		1.2	1.38	0.17	0.879	0.198	0
(billion \$2018)							
Capital invested - Wind - Base (billion		0	0	0	0	0	0
\$2018)							
Capital invested - Wind - Constrained		0	0	0	0	0	0
(billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	1,098	1,388
Solar - Base land use assumptions (GWh)	1,078	1,541	1,311	891	525	0	0
Solar - Constrained land use assumptions (GWh)	1,345	1,662	2,107	293	1,561	369	0
Wind - Base land use assumptions (GWh)	786	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	786	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-595
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-29
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-624
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-313
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-14.5
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-327
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							525
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							52.7
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							578
Aggressive deployment - Total (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							276
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							26.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							302
deployment - Total (1000 hectares)							

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)							-37.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-5,324
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,101
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,332
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-140
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-864
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-356
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-62.1
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-511
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-71.1
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-288
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-125
Carbon sink potential - Low - Reforest cropland (1000 tC02e/y)							-31.1
Carbon sink potential - Low - Reforest pasture (1000 tC02e/y)							-67.1
Carbon sink potential - Low - Restore productivity (1000 tC02e/y)							-184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-28.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)							-3,401
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-642

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

Item Conhon sink notantial, Mid. Extend	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend							-922
rotation length (1000 tC02e/y)							10/
Carbon sink potential - Mid - Improve							-104
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-576
retention of HWP (1000 tCO2e/y)							0.1.0
Carbon sink potential - Mid - Increase							-240
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-46.6
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-477
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-365
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							6.15
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							149
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							679
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							51.5
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							33.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							4.1
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							25.2
High - Reforest pasture (1000 hectares)							20.2
Land impacted for carbon sink potential -							18
High - Restore productivity (1000							10
hectares)							
Land impacted for carbon sink potential -							1,130
High - Total impacted (over 30 years)							1,130
(1000 hectares)							
Land impacted for carbon sink potential -							3.08
Low - Accelerate regeneration (1000							3.00
hectares)							
Land impacted for carbon sink potential -							14(
							140
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							0//
Land impacted for carbon sink potential -							260
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							25.8
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							17.8
Low - Increase trees outside forests							
(1000 hectares)							

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 -							2.05
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							4.36
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							110
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							563
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.61
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							144
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							470
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							38.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							C
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							25.8
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							3.08
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							31.5
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							22
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							938
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		743	0.504	0.499	0.457	0.318	0.027
Monetary damages from air pollution - Natural Gas (million 2019\$)		202	159	206	157	54.8	16.7
Monetary damages from air pollution - Transportation (million 2019\$)		2,187	2,036	1,542	889	398	147
Premature deaths from air pollution - Coal (deaths)		83.9	0.057	0.056	0.052	0.036	0.003
Premature deaths from air pollution - Natural Gas (deaths)		22.9	18	23.2	17.7	6.19	1.89
Premature deaths from air pollution - Transportation (deaths)		246	229	173	100	44.8	16.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	21,752	24,163	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	32	36.2	40.9	53.4	71	81.7	85.5
Resistance (%)							

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Table 45' F-B+ scenario -	- PTLLAR 1 [,] Efficiency/Flectrification -	- Commercial Icontinued I

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric	2.22	20.1	24.9	38.9	61	76.7	82.8
Heat Pump (%)							
Sales of space heating units - Electric	2.54	8.05	8.31	9.13	10.6	12	12.8
Resistance (%)							
Sales of space heating units - Fossil (%)	11	4.85	4.51	3.43	1.69	0.531	0.139
Sales of space heating units - Gas Furnace	84.3	67	62.3	48.5	26.7	10.8	4.34
(%)							
Sales of water heating units - Electric	0.097	2.03	7.02	21.4	43.5	57.9	63
Heat Pump (%)							
Sales of water heating units - Electric	2.5	7.39	9.34	15.1	24	29.8	31.8
Resistance (%)							
Sales of water heating units - Gas Furnace	93	86.1	79.2	59.6	29.2	9.38	2.45
(%)							
Sales of water heating units - Other (%)	4.44	4.46	4.4	3.91	3.31	2.91	2.76

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.54	2.53	3.68	3.81	5.55	5.88
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	189	186	183	177	171	167
Final energy use - Industry (PJ)	130	132	133	143	154	162	170
Final energy use - Residential (PJ)	241	229	222	214	200	183	167
Final energy use - Transportation (PJ)	449	421	386	356	331	302	268

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	4.8	4.72	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	59	60.1	63.8	73.7	87.5	96	98.9
Resistance (%)							
Sales of cooking units - Gas (%)	41	39.9	36.2	26.3	12.5	4.04	1.09
Sales of space heating units - Electric	17.4	27.2	32.2	46.7	68.8	83.3	88.3
Heat Pump (%)							
Sales of space heating units - Electric	13.2	15.3	14.3	11.6	7.67	5.11	4.2
Resistance (%)							
Sales of space heating units - Fossil (%)	14.3	21.5	20.1	15.7	8.92	4.46	2.92
Sales of space heating units - Gas (%)	55.1	36	33.4	26	14.6	7.13	4.52
Sales of water heating units - Electric	0	1.58	6.08	19	38.9	51.9	56.4
Heat Pump (%)							
Sales of water heating units - Electric	35.7	52.7	51.6	48.7	44.3	41.5	40.5
Resistance (%)							
Sales of water heating units - Gas Furnace	59.5	42.2	38.9	29.2	14.4	4.62	1.21
(%)							
Sales of water heating units - Other (%)	4.77	3.53	3.4	3	2.4	2.02	1.89

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	0	133	271	925	2,883	4,210
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.402	0	0.44	0	2.06	0	5.66
units)							
Public EV charging plugs - L2 (1000 units)	1.67	0	10.6	0	49.6	0	136

Table 49: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)

	•	•	•	•			
Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	1.3	1.76	2.01	1.59	0.995	0.506	0.218
Vehicle sales - Light-duty - EV (%)	2.19	5.36	13.2	28	50.7	73.5	88.2
Vehicle sales - Light-duty - gasoline (%)	90.8	86.2	77.5	63.9	43.6	23.3	10.3
Vehicle sales - Light-duty - hybrid (%)	5.48	6.24	6.9	6.15	4.48	2.57	1.22
Vehicle sales - Light-duty - hydrogen FC	0.112	0.373	0.311	0.232	0.161	0.088	0.041
(%)							
Vehicle sales - Light-duty - other (%)	0.092	0.095	0.085	0.073	0.052	0.028	0.013
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	0.166	0.485	1.37	3.58	7.86	13.2	17
FC (%)							
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	476
Conversion capital investment -	0	0	0	0	0	0	5,252
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	0	0
(quantity)							
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	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	6
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
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	3.32	3.42	3.53
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	3.32	6.74	10.3
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
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	112	197	197	257
Cumulative investment - All (million \$2018)		0	0	667	748	749	820
Cumulative investment - Spur (million \$2018)		0	0	0	81.3	82.7	153
Cumulative investment - Trunk (million \$2018)		0	0	667	667	667	667
Spur (km)		0	0	0	85.1	85.1	145
Trunk (km)		0	0	112	112	112	112

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							-140
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-526
deployment - Cropland measures (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Aggressive							-25.2
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-691
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-140
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-276
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate	2020	2023	2030	2000	2040	2043	2000
deployment - Pasture to energy crops (1000 tC02e/y)							Ü
Carbon sink potential - Moderate							-12.6
deployment - Permanent conservation							12.0
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-429
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							66.5
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,142
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							24.8
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							15.5
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							45.8
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,295
Aggressive deployment - Total (1000							•
hectares)							
Land impacted for carbon sink - Moderate							66.5
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							243
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							24.8
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							15.5
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							22.9
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							372
deployment - Total (1000 hectares)							0.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-37.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-5,324
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,101
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,332
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-140
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-864
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-356
trees outside forests (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest							-62.1
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest	,						-886
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore	,						-546
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-18.8
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-1,480
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-183
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-511
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-71.1
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-288
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-125
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-31.1
cropland (1000 tCO2e/y)							•
Carbon sink potential - Low - Reforest							-67.1
pasture (1000 tCO2e/y)							0111
Carbon sink potential - Low - Restore							-184
productivity (1000 tC02e/y)							10-1
Carbon sink potential - Mid - Accelerate							-28.2
regeneration (1000 tCO2e/y)							-20.2
Carbon sink potential - Mid - All (not							-3,401
counting overlap) (1000 tC02e/y)							-3,401
Carbon sink potential - Mid - Avoid						+	-642
deforestation (1000 tC02e/y)							-042
Carbon sink potential - Mid - Extend							-922
							-922
rotation length (1000 tCO2e/y)							10/
Carbon sink potential - Mid - Improve							-104
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-576
retention of HWP (1000 tC02e/y)							
Carbon sink potential - Mid - Increase							-240
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-46.6
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-477
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-365
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							6.15
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							149
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							679
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							51.5
High - Improve plantations (1000	1				1		
= ' ' ' '							
hectares)							0
= ' ' ' '							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 -							33.8
High - Increase trees outside forests							
(1000 hectares) Land impacted for carbon sink potential -							4.11
High - Reforest cropland (1000 hectares)							4.11
Land impacted for carbon sink potential -							25.2
High - Reforest pasture (1000 hectares)							20.2
Land impacted for carbon sink potential -							181
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,130
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3.08
Low - Accelerate regeneration (1000							
hectares) Land impacted for carbon sink potential -							140
Low - Avoid deforestation (over 30 years)							140
(1000 hectares)							
Land impacted for carbon sink potential -							260
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							25.8
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							17.0
Land impacted for carbon sink potential - Low - Increase trees outside forests							17.8
(1000 hectares)							
Land impacted for carbon sink potential -							2.05
Low - Reforest cropland (1000 hectares)							2.00
Land impacted for carbon sink potential -							4.36
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							110
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							563
Low - Total impacted (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							4.61
Mid - Accelerate regeneration (1000							4.01
hectares)							
Land impacted for carbon sink potential -							144
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							470
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							38.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000 hectares)							
Land impacted for carbon sink potential -							25.8
Mid - Increase trees outside forests (1000							25.8
hectares)							
Land impacted for carbon sink potential -							3.08
Mid - Reforest cropland (1000 hectares)							2.00
Mia - Reforest cropland (1000 hectares)							

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 - Reforest pasture (1000 hectares)							31.5
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							938

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		743	0.504	0.499	0.457	0.318	0.027
Coal (million 2019\$)							
Monetary damages from air pollution -		241	149	85.6	67.2	39.7	11.7
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		2,231	2,262	2,199	1,975	1,567	1,069
Transportation (million 2019\$)							
Premature deaths from air pollution -		83.9	0.057	0.056	0.052	0.036	0.003
Coal (deaths)							
Premature deaths from air pollution -		27.2	16.8	9.67	7.59	4.48	1.32
Natural Gas (deaths)							
Premature deaths from air pollution -		251	254	247	222	176	120
Transportation (deaths)							

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	21,455	22,311	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	34.3	34.3	34.3	34.4	34.3	34.3
Sales of cooking units - Gas (%)	68	65.7	65.7	65.7	65.6	65.7	65.7
Sales of space heating units - Electric Heat Pump (%)	2.22	24.1	48.5	68.5	71.8	72.2	72.1
Sales of space heating units - Electric Resistance (%)	2.54	8.78	12.8	20.1	25.2	25.9	26
Sales of space heating units - Fossil (%)	11	4.72	3.48	1.49	0.219	0.018	0
Sales of space heating units - Gas Furnace (%)	84.3	62.4	35.2	9.92	2.85	1.92	1.85
Sales of water heating units - Electric Heat Pump (%)	0.097	0.269	0.266	0.268	0.269	0.268	0.269
Sales of water heating units - Electric Resistance (%)	2.5	6.69	6.63	6.64	6.67	6.65	6.66
Sales of water heating units - Gas Furnace (%)	93	88.5	88.5	88.6	88.5	88.5	88.6
Sales of water heating units - Other (%)	4.44	4.5	4.6	4.5	4.54	4.55	4.51

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.72	2.74	4.82	5.09	5.1	5.33
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	191	193	193	194	199	210
Final energy use - Industry (PJ)	130	136	143	150	159	169	180
Final energy use - Residential (PJ)	241	228	225	225	227	233	239
Final energy use - Transportation (PJ)	449	422	391	372	373	384	398

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	4.7	4.34	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	58.7	58.7	58.7	58.7	58.7	58.7	58.7
Resistance (%)							
Sales of cooking units - Gas (%)	41.3	41.3	41.3	41.3	41.3	41.3	41.3
Sales of space heating units - Electric	15	40.3	41.5	42.8	43.7	44.6	45.9
Heat Pump (%)							
Sales of space heating units - Electric	13.7	12.7	12.4	12	11.7	10.8	9.45
Resistance (%)							
Sales of space heating units - Fossil (%)	14.7	16.1	7.71	4.03	3.79	3.76	3.81
Sales of space heating units - Gas (%)	56.6	31	38.4	41.1	40.8	40.8	40.9
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	35.7	53	53	52.9	52.9	52.8	52.8
Resistance (%)							
Sales of water heating units - Gas Furnace	59.5	43.4	43.4	43.5	43.5	43.6	43.6
(%)							
Sales of water heating units - Other (%)	4.77	3.57	3.58	3.59	3.6	3.6	3.61

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 (%)	1.29	1.75	2.14	2	1.79	1.66	1.58
Vehicle sales - Light-duty - EV (%)	4.42	6.72	7.55	9.34	11.3	12.8	14.1
Vehicle sales - Light-duty - gasoline (%)	88.8	85	82.5	80.4	78.1	76.3	74.8
Vehicle sales - Light-duty - hybrid (%)	5.29	6.1	7.38	7.93	8.43	8.88	9.17
Vehicle sales - Light-duty - hydrogen FC	0.109	0.367	0.331	0.29	0.286	0.285	0.294
(%)							
Vehicle sales - Light-duty - other (%)	0.09	0.094	0.09	0.091	0.09	0.088	0.091
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	0.175	0.208	0.242	0.285	0.339	0.409	0.487
FC (%)							
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							-37.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-5,324
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,101
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,332
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-140
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-864
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-356
trees outside forests (1000 tCO2e/y)							

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

Item Carbon sink potential - High - Reforest	2020	2025	2030	2035	2040	2045	2050 -62.1
cropland (1000 tCO2e/y)							02
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-511
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-71.1
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-288
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)							-125
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-31.1
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-67.1
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-184
Carbon sink potential - Mid - Accelerate regeneration (1000 tC02e/y)							-28.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)							-3,401
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-642
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-104
Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)							-576
Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y)							-240
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-46.6
Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y)							-477
Carbon sink potential - Mid - Restore productivity (1000 tC02e/y)							-365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							6.15
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							149
Land impacted for carbon sink potential - High - Extend rotation length (1000							679
hectares) Land impacted for carbon sink potential - High - Improve plantations (1000							51.5
hectares) Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							33.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							4.11
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							25.2
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							181
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,130
High - Total impacted (over 30 years)							
(1000 hectares)							0.00
Land impacted for carbon sink potential -							3.08
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							140
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							260
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							25.8
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							17.8
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							2.05
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							4.36
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							110
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							563
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.61
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							144
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							470
Mid - Extend rotation length (1000							710
hectares)							
Land impacted for carbon sink potential -							38.8
Mid - Improve plantations (1000 hectares)							30.0
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							U
hectares)							05.0
Land impacted for carbon sink potential -							25.8
Mid - Increase trees outside forests (1000							
hectares)							0.00
Land impacted for carbon sink potential -							3.08
Mid - Reforest cropland (1000 hectares)	I	1	1		ı	1	

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							31.5
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							221
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							938
Mid - Total impacted (over 30 years) (1000							
hectares)							

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	-4.41		-2.14				-1.92
uptake (Mt CO2e/y)							
Business-as-usual carbon sink - Retained	-0.235		-0.423				-0.44
in Hardwood Products (Mt CO2e/y)							
Business-as-usual carbon sink - Total (Mt	-4.65		-2.57				-2.36
CO2e/y)							

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		1,938	1,218	1,140	1,108	1,087	997
Monetary damages from air pollution - Natural Gas (million 2019\$)		199	221	263	277	254	246
Monetary damages from air pollution - Transportation (million 2019\$)		2,223	2,284	2,337	2,400	2,459	2,517
Premature deaths from air pollution - Coal (deaths)		219	138	129	125	123	113
Premature deaths from air pollution - Natural Gas (deaths)		22.4	24.9	29.7	31.3	28.6	27.7
Premature deaths from air pollution - Transportation (deaths)		250	257	263	270	277	283