

# Net-Zero America - connecticut state report

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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 <a href="https://netzeroamerica.prince-ton.edu">https://netzeroamerica.prince-ton.edu</a>.
- 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	7,080	7,732	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric Heat Pump (%)	4.76	11	39.3	72.4	77.8	78.1	78.1
Sales of space heating units - Electric Resistance (%)	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0
Sales of space heating units - Gas Furnace (%)	50.7	53.4	38.2	6.11	0.363	0	0
Sales of water heating units - Electric Heat Pump (%)	2.81	3.52	15.9	41	45.5	45.9	45.9
Sales of water heating units - Electric Resistance (%)	13.8	12.6	24	48.1	52.3	52.5	52.5
Sales of water heating units - Gas Furnace (%)	78.2	80	58.2	9.28	0.549	0	0
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	1.59	1.61

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.3	1.34	3.78	4.11	3.37	3.57
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)	120	114	109	101	93.4	88.1	84.9
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Transportation (PJ)	228	212	186	152	122	104	95.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.13	3.5	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	71.8	77.8	96.2	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Sales of space heating units - Electric	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Heat Pump (%)							
Sales of space heating units - Electric	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Resistance (%)							
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of water heating units - Electric	0	1.56	13.2	30.7	33.7	33.9	33.9
Heat Pump (%)							
Sales of water heating units - Electric	35.5	54.6	60.4	65.2	66	66	66
Resistance (%)							
Sales of water heating units - Gas Furnace	46.8	33.5	24.3	3.88	0.229	0	0
(%)							
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	549	1,419	2,279	3,460	3,757	3,587
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.229	0	0.879	0	3.72	0	5.99
_units)							
Public EV charging plugs - L2 (1000 units)	0.794	0	21.1	0	89.3	0	144
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 (%)	1.31	1.6	1.16	0.37	0.071	0.013	0
Vehicle sales - Light-duty - EV (%)	4.71	17.6	50.1	83.2	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.6	75.2	45.1	15.1	3.1	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.19	5.1	3.47	1.26	0.312	0.069	0
Vehicle sales - Light-duty - hydrogen FC	0.109	0.326	0.184	0.056	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.091	0.086	0.054	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 (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
Capital invested - Solar PV - Base (billion \$2018)	0	0	3.53	1.92	1.05	1.09	0
Capital invested - Solar PV - Constrained (billion \$2018)	0	0.09	2.85	0.72	0.909	1.6	0
Capital invested - Wind - Base (billion \$2018)	0	0	0.755	0.336	0.169	0	0.073
Capital invested - Wind - Constrained (billion \$2018)	0	0	0.822	0.087	0.108	0	0
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Rooftop PV (MW)	770	1,341	1,570	1,838	2,141	2,479	2,857
Installed (cumulative) - Solar - Base land use assumptions (MW)	81.5	81.5	3,031	4,770	5,779	6,889	6,889
Installed (cumulative) - Wind - Base land use assumptions (MW)	5.8	5.8	321	472	551	551	590

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
Solar - Base land use assumptions (GWh)	169	0	5,252	3,057	1,764	1,943	0
Solar - Constrained land use assumptions (GWh)	112	167	6,115	4,036	2,955	1,265	220

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

	•	•					
Item	2020	2025	2030	2035	2040	2045	2050
Wind - Base land use assumptions (GWh)	24	0	1,129	523	279	0	133
Wind - Constrained land use assumptions	24	0	1,235	140	172	0	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	55
Conversion capital investment -	0	0	0	0	0	0	1,600
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	1
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	0	0	0.01
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0.01
Cumulative - All (MMT)		0	0	0	0	0	0.01
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0.01

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	146	146	146	146	146
Cumulative investment - All (million \$2018)		0	262	262	262	262	262
Cumulative investment - Spur (million \$2018)		0	0.702	0.702	0.702	0.702	0.703
Cumulative investment - Trunk (million \$2018)		0	262	262	262	262	262
Spur (km)		0	1.21	1.21	1.21	1.21	1.21
Trunk (km)		0	145	145	145	145	145

#### 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 tC02e/y)							
Carbon sink potential - Aggressive							-79
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-3.14
deployment - Permanent conservation							<b></b>
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-82.1
deployment - Total (1000 tC02e/y)							02.1
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							U
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-41.5
deployment - Cropland measures (1000							-41.5
tCO2e/y)							1 [7
Carbon sink potential - Moderate							-1.57
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-43.1
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 -							54.5
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							5.72
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							60.2
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							28.7
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							2.86
deployment - Permanent conservation							2.50
cover (1000 hectares)							
Land impacted for carbon sink - Moderate				+			31.5
deployment - Total (1000 hectares)							01.0
aspisyment Total (1000 neotal os)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-54.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-3,043
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-768
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,158
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-10.4
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-360
retention of HWP (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase	2020	2025	2030	2035	2040	2045	-143
trees outside forests (1000 tC02e/y)							-143
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							U
Carbon sink potential - High - Reforest							-224
pasture (1000 tCO2e/y)							-224
							205
Carbon sink potential - High - Restore							-325
productivity (1000 tC02e/y)							07./
Carbon sink potential - Low - Accelerate							-27.4
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-902
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-128
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-445
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-5.3
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-120
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-50.1
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							U
Carbon sink potential - Low - Reforest							-17
pasture (1000 tC02e/y)							-11
Carbon sink potential - Low - Restore							-109
•							-109
productivity (1000 tC02e/y)							
Carbon sink potential - Mid - Accelerate							-41
regeneration (1000 tC02e/y)							
Carbon sink potential - Mid - All (not							-1,973
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-448
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-801
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-7.77
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-240
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-96.7
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							Ū
Carbon sink potential - Mid - Reforest				+			-121
pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore							-217
productivity (1000 tC02e/y)							-217
							0.07
Land impacted for carbon sink potential -							8.94
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							104
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							591
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							3.84
High - Improve plantations (1000							
	I		1			1	

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000							0
hectares)							
Land impacted for carbon sink potential -							13.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
High - Reforest cropland (1000 hectares)  Land impacted for carbon sink potential -							6.37
High - Reforest pasture (1000 hectares)							0.31
Land impacted for carbon sink potential -							108
High - Restore productivity (1000							100
hectares)							
Land impacted for carbon sink potential -							835
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.47
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							97.6
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							226
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1.92
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 -							7.16
Low - Increase trees outside forests							1.10
(1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							· ·
Land impacted for carbon sink potential -							1.1
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							65.1
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							404
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							6.7
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							101
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							/ 00
Land impacted for carbon sink potential -							408
Mid - Extend rotation length (1000 hectares)							
Land impacted for carbon sink potential -							2.89
Mid - Improve plantations (1000 hectares)							2.07
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							10.4
Mid - Increase trees outside forests (1000							.0т
hectares)			<u> </u>			I	

Table 13: E+	ccanario -	DTII AD 6.	Land cinke	Enracte	(continued)
Table 13: <i>E+</i>	scenario -	PILLAR 6:	Luna sinks -	· Forests i	i continuea i

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							0
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							7.98
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							131
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							668
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		215	181	145	109	68.9	47.8
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	4,381
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		52.3	44.4	33	22.4	14.2	7.82
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	1,024
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\$)		361	0.581	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Natural Gas (million 2019\$)		224	119	82.9	82.1	54.6	23.3
Monetary damages from air pollution - Transportation (million 2019\$)		995	923	697	399	179	67.5
Premature deaths from air pollution - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Natural Gas (deaths)		25.2	13.4	9.36	9.27	6.16	2.63
Premature deaths from air pollution - Transportation (deaths)		112	104	78.3	44.9	20.2	7.59

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		79.2	161	61.4	47.7	35	122
By economic sector - Construction (jobs)		4,586	5,887	5,803	5,929	5,614	7,066
By economic sector - Manufacturing		2,163	3,528	3,391	3,758	4,876	7,051
(jobs)							
By economic sector - Mining (jobs)		1,037	732	463	271	142	70.8
By economic sector - Other (jobs)		613	907	885	922	987	1,477
By economic sector - Pipeline (jobs)		262	252	171	124	77.9	50.3
By economic sector - Professional (jobs)		1,973	2,470	2,382	2,473	2,388	3,228
By economic sector - Trade (jobs)		1,461	1,702	1,627	1,647	1,616	2,201
By economic sector - Utilities (jobs)		3,810	4,406	5,113	5,821	5,367	6,156
By education level - All sectors -		4,997	6,340	6,404	6,838	6,872	8,885
Associates degree or some college (jobs)							
By education level - All sectors -		3,309	3,996	3,879	4,039	4,054	5,278
Bachelors degree (jobs)							
By education level - All sectors - Doctoral		116	137	126	127	123	163
degree (jobs)							
By education level - All sectors - High		6,761	8,613	8,557	9,022	9,096	11,851
school diploma or less (jobs)							

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

Table 10. L+ 3certai 10 - 111FA010 - 3003 (coi	itiiiucuj						
Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Masters		800	958	932	969	957	1,245
or professional degree (jobs)							
By resource sector - Biomass (jobs)		340	443	175	143	128	520
By resource sector - CO2 (jobs)		0	258	0.7	1.78	1.77	1.31
By resource sector - Coal (jobs)		54.1	0	0	0	0	0
By resource sector - Grid (jobs)		3,873	5,650	8,553	10,078	9,742	11,892
By resource sector - Natural Gas (jobs)		2,665	2,096	1,726	2,137	1,482	950
By resource sector - Nuclear (jobs)		1,092	889	361	0	0	0
By resource sector - Oil (jobs)		2,327	1,811	1,242	785	463	240
By resource sector - Solar (jobs)		5,521	7,776	6,104	6,253	7,768	10,627
By resource sector - Wind (jobs)		111	1,120	1,735	1,597	1,519	3,191
Median wages - Annual - All (\$2019 per		69,495	69,357	70,702	71,735	71,921	72,238
job)							
On-Site or In-Plant Training - Total jobs - 1		2,614	3,286	3,307	3,513	3,505	4,507
to 4 years (jobs)							
On-Site or In-Plant Training - Total jobs - 4		1,100	1,358	1,377	1,462	1,406	1,764
to 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		2,611	3,278	3,205	3,361	3,399	4,455
None (jobs)							
On-Site or In-Plant Training - Total jobs -		134	171	176	191	189	240
Over 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		9,524	11,950	11,832	12,469	12,603	16,456
Up to 1 year (jobs)							
On-the-Job Training - All sectors - 1 to 4		3,369	4,229	4,263	4,533	4,510	5,780
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,076	1,339	1,368	1,458	1,400	1,755
years (jobs)							
On-the-Job Training - All sectors - None		891	1,101	1,066	1,104	1,112	1,463
(jobs)							
On-the-Job Training - All sectors - Over 10		162	206	197	204	210	277
years (jobs)							
On-the-Job Training - All sectors - Up to 1		10,485	13,168	13,004	13,696	13,870	18,147
year (jobs)							
Related work experience - All sectors - 1		5,753	7,164	7,115	7,504	7,518	9,742
to 4 years (jobs)							
Related work experience - All sectors - 4		3,727	4,633	4,616	4,881	4,875	6,284
to 10 years (jobs)							
Related work experience - All sectors -		2,301	2,900	2,900	3,076	3,078	3,991
None (jobs)							
Related work experience - All sectors -		992	1,238	1,227	1,296	1,318	1,713
Over 10 years (jobs)							
Related work experience - All sectors - Up		3,210	4,110	4,040	4,238	4,314	5,692
to 1 year (jobs)							
Wage income - All (million \$2019)		1,111	1,390	1,407	1,506	1,518	1,981

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	7,079	7,740	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Sales of space heating units - Electric	4.76	7.71	11	20.9	40.9	61.8	73
Heat Pump (%)							
Sales of space heating units - Electric	2.29	2.3	3.61	7.63	14.2	19.1	21
Resistance (%)							
Sales of space heating units - Fossil (%)	42.2	36.1	33.8	25.4	12.4	3.94	1.03
Sales of space heating units - Gas Furnace	50.7	53.9	51.7	46	32.5	15.2	4.94
(%)							

Table 17: E- scenario -	DILLAR 1. Efficience	//Electrification -	Commercial	continued
Table II. E- Scellul IO -	PILLAK I. EIIILIEIIL	// EIECH 111CUHUH -	CUITITIETCIULT	Continueur

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric	2.81	2.92	4.33	9.01	20.1	33.9	42
Heat Pump (%)							
Sales of water heating units - Electric	13.8	12	13	17.7	28.2	41.2	48.8
Resistance (%)							
Sales of water heating units - Gas Furnace	78.2	80.8	78.7	69.9	49.2	23	7.51
(%)							
Sales of water heating units - Other (%)	5.24	4.31	3.95	3.35	2.49	1.86	1.68

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.975	0.97	1.63	1.7	3.09	3.32
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)	120	114	111	108	105	101	96.5
Final energy use - Industry (PJ)	64.9	63.5	62.9	62.4	62.9	63.5	63.2
Final energy use - Residential (PJ)	155	144	135	128	118	105	91.1
Final energy use - Transportation (PJ)	228	214	195	179	167	152	134

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	3.14	3.73	0	0	0	0
Sales of cooking units - Electric Resistance (%)	71.7	72.5	75.1	81.9	91.4	97.2	99.2
Sales of cooking units - Gas (%)	28.3	27.5	24.9	18.1	8.64	2.79	0.75
Sales of space heating units - Electric Heat Pump (%)	7.5	7.1	12.5	28.5	55.7	78.2	88.3
Sales of space heating units - Electric Resistance (%)	4.92	6.49	6.23	5.8	4.6	2.99	2.13
Sales of space heating units - Fossil (%)	53.1	66.3	61.9	48.5	27.6	13.1	7.61
Sales of space heating units - Gas (%)	34.4	20.1	19.4	17.2	12.1	5.68	1.98
Sales of water heating units - Electric Heat Pump (%)	0	0.484	1.83	6.09	15.2	25.5	31.2
Sales of water heating units - Electric Resistance (%)	35.5	53.7	54.4	56.4	60.1	63.5	65.2
Sales of water heating units - Gas Furnace (%)	46.8	33.9	32.8	29.2	20.5	9.58	3.12
Sales of water heating units - Other (%)	17.6	11.9	11	8.3	4.13	1.41	0.461

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	0	91	186	634	1,979	2,888
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.229	0	0.29	0	1.39	0	3.84
units)							
Public EV charging plugs - L2 (1000 units)	0.794	0	6.97	0	33.5	0	92.2
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 (%)	1.33	1.78	2.01	1.59	0.999	0.509	0.219

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	2.17	5.3	13.1	27.8	50.5	73.4	88.1
Vehicle sales - Light-duty - gasoline (%)	90.9	86.3	77.7	64.2	43.8	23.4	10.4
Vehicle sales - Light-duty - hybrid (%)	5.4	6.17	6.83	6.1	4.45	2.56	1.22
Vehicle sales - Light-duty - hydrogen FC	0.112	0.373	0.312	0.234	0.163	0.089	0.042
(%)							
Vehicle sales - Light-duty - other (%)	0.093	0.096	0.086	0.074	0.053	0.029	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 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 tCO2e/y)							
Carbon sink potential - Aggressive							-79
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-3.14
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-82.1
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-41.5
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-1.57
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-43.1
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 -							54.5
Aggressive deployment - Cropland							0
measures (1000 hectares)							
Land impacted for carbon sink -							5.72
Aggressive deployment - Permanent							0.12
conservation cover (1000 hectares)							
Land impacted for carbon sink -							60.2
Aggressive deployment - Total (1000							00.2
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							U
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							28.7
deployment - Cropland measures (1000							20.1
hectares)							
Land impacted for carbon sink - Moderate							2.86
deployment - Permanent conservation							2.00
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 - Moderate							31.5
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						20.0	-54.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-3,043
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - High - Avoid							-768
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,158
rotation length (1000 tCO2e/y)							,
Carbon sink potential - High - Improve							-10.4
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-360
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-143
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-224
pasture (1000 tC02e/y)							
Carbon sink potential - High - Restore							-325
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-27.4
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-902
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-128
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-445
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-5.3
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-120
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-50.1
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							-
Carbon sink potential - Low - Reforest							-17
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-109
productivity (1000 tCO2e/y)							,
Carbon sink potential - Mid - Accelerate							-41
regeneration (1000 tCO2e/y)							•••
Carbon sink potential - Mid - All (not							-1,973
counting overlap) (1000 tCO2e/y)							1,710
Carbon sink potential - Mid - Avoid							-448
deforestation (1000 tCO2e/y)							1.10
Carbon sink potential - Mid - Extend							-801
rotation length (1000 tC02e/y)							301
Carbon sink potential - Mid - Improve				+			-7.77
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase		+					-240
retention of HWP (1000 tCO2e/y)							240
Carbon sink potential - Mid - Increase				+			-96.7
trees outside forests (1000 tC02e/y)							70.1
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Table 23: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest							C
cropland (1000 tC02e/y)							101
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore							-217
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							8.94
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							104
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							591
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							3.84
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							C
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							13.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							C
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							6.37
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							108
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							835
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.47
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							97.6
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							226
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1.92
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							С
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							7.16
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							C
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							1.
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							65.
Low - Restore productivity (1000							00.
			1				

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							404
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							6.7
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							101
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							408
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							2.89
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 -							10.4
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							0
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							7.98
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							131
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							668
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		361	0.581	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Natural Gas (million 2019\$)		221	95.2	40.4	16.6	4.81	5.98
Monetary damages from air pollution - Transportation (million 2019\$)		1,013	1,020	985	880	695	473
Premature deaths from air pollution - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Natural Gas (deaths)		25	10.8	4.57	1.88	0.543	0.675
Premature deaths from air pollution - Transportation (deaths)		114	115	111	99	78.2	53.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	7,080	7,732	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric	4.76	11	39.3	72.4	77.8	78.1	78.1
Heat Pump (%)							
Sales of space heating units - Electric	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Resistance (%)							
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0

Table 25: F+RF+	scenario - DIII AR 1	Efficiency/Electrification -	Commercial (continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	50.7	53.4	38.2	6.11	0.363	0	0
Sales of water heating units - Electric Heat Pump (%)	2.81	3.52	15.9	41	45.5	45.9	45.9
Sales of water heating units - Electric Resistance (%)	13.8	12.6	24	48.1	52.3	52.5	52.5
Sales of water heating units - Gas Furnace (%)	78.2	80	58.2	9.28	0.549	0	0
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	1.59	1.61

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.3	1.34	3.78	4.11	3.37	3.57
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)	120	114	109	101	93.4	88.1	84.9
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Transportation (PJ)	228	212	186	152	122	104	95.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	3.13	3.5	0	0	0	0
Sales of cooking units - Electric Resistance (%)	71.8	77.8	96.2	99.8	100	100	100
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Sales of space heating units - Electric Resistance (%)	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of water heating units - Electric Heat Pump (%)	0	1.56	13.2	30.7	33.7	33.9	33.9
Sales of water heating units - Electric Resistance (%)	35.5	54.6	60.4	65.2	66	66	66
Sales of water heating units - Gas Furnace (%)	46.8	33.5	24.3	3.88	0.229	0	0
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	549	1,419	2,279	3,460	3,757	3,587
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000 units)	0.229	0	0.879	0	3.72	0	5.99
,	0.707	0	01.1	0	00.0	0	1//
Public EV charging plugs - L2 (1000 units)	0.794	0	21.1	0	89.3	0	144
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC	0.392	2.54	12.7	30.4	38.2	39.7	40
(%)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.31	1.6	1.16	0.37	0.071	0.013	0
Vehicle sales - Light-duty - EV (%)	4.71	17.6	50.1	83.2	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.6	75.2	45.1	15.1	3.1	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.19	5.1	3.47	1.26	0.312	0.069	0
Vehicle sales - Light-duty - hydrogen FC	0.109	0.326	0.184	0.056	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.091	0.086	0.054	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

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Item	2020	2025	2030	2035	2040	2045	2050			
Capital invested - Solar PV - Base (billion \$2018)	0	0	3.3	0.826	0.459	0	0			
Capital invested - Wind - Base (billion \$2018)	0	0	0.755	0.336	0.169	0	0.073			
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0			
Installed (cumulative) - Solar - Base land use assumptions (MW)	81.5	81.5	2,839	3,588	4,030	4,030	4,030			
Installed (cumulative) - Wind - Base land use assumptions (MW)	5.8	5.8	321	472	551	551	590			

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	169		4,930	1,310	771		0
Solar - Constrained land use assumptions (GWh)	169		7,480	3,086	1,563		0
Wind - Base land use assumptions (GWh)	24		1,129	523	279		133
Wind - Constrained land use assumptions (GWh)	24		1,235	140	172		114

#### 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 tCO2e/y)							
Carbon sink potential - Aggressive							-79
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-3.14
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-82.1
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-41.5
deployment - Cropland measures (1000							
tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-1.57
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-43.1
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 -							54.5
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							5.72
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							60.2
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							28.7
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							2.86
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							31.5
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 regeneration (1000 tCO2e/y)							-54.6
Carbon sink potential - High - All (not counting overlap) (1000 tC02e/y)							-3,043
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tC02e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tC02e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore productivity (1000 tC02e/y)							-325
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Improve							-5.3
plantations (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase		+				+	-50.1
trees outside forests (1000 tC02e/y)							-50.1
Carbon sink potential - Low - Reforest		+				+	0
cropland (1000 tCO2e/y)							U
Carbon sink potential - Low - Reforest		+				+	-17
pasture (1000 tC02e/y)							"
Carbon sink potential - Low - Restore							-109
productivity (1000 tCO2e/y)							107
Carbon sink potential - Mid - Accelerate							-41
regeneration (1000 tCO2e/y)							71
Carbon sink potential - Mid - All (not		+					-1,973
counting overlap) (1000 tCO2e/y)							1,710
Carbon sink potential - Mid - Avoid							-448
deforestation (1000 tC02e/y)							7-70
Carbon sink potential - Mid - Extend							-801
rotation length (1000 tC02e/y)							001
Carbon sink potential - Mid - Improve							-7.77
plantations (1000 tC02e/y)							
Carbon sink potential - Mid - Increase							-240
retention of HWP (1000 tC02e/y)							-240
Carbon sink potential - Mid - Increase		+					-96.7
trees outside forests (1000 tC02e/y)							70.1
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							O
Carbon sink potential - Mid - Reforest							-121
pasture (1000 tC02e/y)							121
Carbon sink potential - Mid - Restore							-217
productivity (1000 tCO2e/y)							211
Land impacted for carbon sink potential -		+				+	8.94
High - Accelerate regeneration (1000							0.7 1
hectares)							
Land impacted for carbon sink potential -		+				+	104
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -		+				+	591
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							3.84
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 -							13.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							6.37
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							108
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							835
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Table 33. ETRET Section 10 TILLAN 6. Ear	ia siriks i o	1 6010 (601111	Hacaj				
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							4.47
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							97.6
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							226
Low - Extend rotation length (1000							
hectares)							1.00
Land impacted for carbon sink potential -							1.92
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000							0
•							
hectares) Land impacted for carbon sink potential -							7.16
Low - Increase trees outside forests							7.10
(1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							U
Land impacted for carbon sink potential -							1.1
Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential -			+				65.1
Low - Restore productivity (1000							00.1
hectares)							
Land impacted for carbon sink potential -							404
Low - Total impacted (over 30 years)							707
(1000 hectares)							
Land impacted for carbon sink potential -							6.7
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							101
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							408
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							2.89
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 -							10.4
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							0
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -			T				7.98
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							131
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							668
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 - Coal (million 2019\$)		361	0.581	0.58	0.562	0.335	0.01

Table 34:	E+RE+ scenario -	· IMPACTS -	Health	l continued l

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		210	108	60.8	50.2	18.8	6.07
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		995	923	697	399	179	67.5
Transportation (million 2019\$)							
Premature deaths from air pollution -		40.8	0.066	0.065	0.063	0.038	0.001
Coal (deaths)							
Premature deaths from air pollution -		23.8	12.1	6.86	5.66	2.12	0.685
Natural Gas (deaths)							
Premature deaths from air pollution -		112	104	78.3	44.9	20.2	7.59
Transportation (deaths)							

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

- <u>-</u> .	,,						
Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	7,080	7,732	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric	4.76	11	39.3	72.4	77.8	78.1	78.1
Heat Pump (%)							
Sales of space heating units - Electric	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Resistance (%)							
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0
Sales of space heating units - Gas Furnace	50.7	53.4	38.2	6.11	0.363	0	0
(%)							
Sales of water heating units - Electric	2.81	3.52	15.9	41	45.5	45.9	45.9
Heat Pump (%)							
Sales of water heating units - Electric	13.8	12.6	24	48.1	52.3	52.5	52.5
Resistance (%)							
Sales of water heating units - Gas Furnace	78.2	80	58.2	9.28	0.549	0	0
(%)							
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	1.59	1.61

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.3	1.34	3.78	4.11	3.37	3.57
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)	120	114	109	101	93.4	88.1	84.9
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Transportation (PJ)	228	212	186	152	122	104	95.6

#### 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	3.13	3.5	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	71.8	77.8	96.2	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Sales of space heating units - Electric	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Heat Pump (%)							
Sales of space heating units - Electric	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Resistance (%)							

Table 38: E+RE-	acanania DII	IAD 1. Eff	icionou/Floota	ification	Dooidontial	(continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of water heating units - Electric Heat Pump (%)	0	1.56	13.2	30.7	33.7	33.9	33.9
Sales of water heating units - Electric Resistance (%)	35.5	54.6	60.4	65.2	66	66	66
Sales of water heating units - Gas Furnace (%)	46.8	33.5	24.3	3.88	0.229	0	0
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	549	1,419	2,279	3,460	3,757	3,587
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.229	0	0.879	0	3.72	0	5.99
units)							
Public EV charging plugs - L2 (1000 units)	0.794	0	21.1	0	89.3	0	144
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 (%)	1.31	1.6	1.16	0.37	0.071	0.013	0
Vehicle sales - Light-duty - EV (%)	4.71	17.6	50.1	83.2	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.6	75.2	45.1	15.1	3.1	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.19	5.1	3.47	1.26	0.312	0.069	0
Vehicle sales - Light-duty - hydrogen FC	0.109	0.326	0.184	0.056	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.091	0.086	0.054	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 - Solar PV - Base (billion \$2018)		3.19	0	0	0.619	0	0
Capital invested - Solar PV - Constrained (billion \$2018)		1.64	1.06	0	1.56	0	0.347
Capital invested - Wind - Base (billion \$2018)		0	0.273	0	0	0.106	0.283
Capital invested - Wind - Constrained (billion \$2018)		0	0.396	0	0	0	0.338

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	2,320	4,229	0		1,041	0	0
Solar - Constrained land use assumptions	3,653	2,172	1,579		2,641	0	662
(GWh)							
Wind - Base land use assumptions (GWh)	24	0	409		0	192	528
Wind - Constrained land use assumptions	24	0	604		0	0	631
(GWh)							

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							-79
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-3.14
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-82.1
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-41.5
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-1.57
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-43.1
deployment - Total (1000 tCO2e/y)							70.1
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							U
energy grasses (1000 hectares)							
Land impacted for carbon sink -							54.5
Aggressive deployment - Cropland							54.5
measures (1000 hectares)							
Land impacted for carbon sink -							5.72
Aggressive deployment - Permanent							J.1 Z
conservation cover (1000 hectares)							
Land impacted for carbon sink -							60.2
Aggressive deployment - Total (1000							00.2
,							
hectares)  Land impacted for carbon sink - Moderate							0
							U
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							00.7
Land impacted for carbon sink - Moderate							28.7
deployment - Cropland measures (1000							
hectares)							0.07
Land impacted for carbon sink - Moderate							2.86
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							31.5
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							-54.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-3,043
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-768
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,158
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-10.4
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-360
retention of HWP (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase							-143
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore productivity (1000 tC02e/y)							-325
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - All (not							-902
counting overlap) (1000 tCO2e/y) Carbon sink potential - Low - Avoid							-128
deforestation (1000 tC02e/y)  Carbon sink potential - Low - Extend							-445
rotation length (1000 tC02e/y)  Carbon sink potential - Low - Improve							-5.3
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore							-109
productivity (1000 tCO2e/y)  Carbon sink potential - Mid - Accelerate							-41
regeneration (1000 tCO2e/y)  Carbon sink potential - Mid - All (not							-1,973
counting overlap) (1000 tCO2e/y)  Carbon sink potential - Mid - Avoid							-448
deforestation (1000 tCO2e/y) Carbon sink potential - Mid - Extend							-801
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest							-121
pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore							-217
productivity (1000 tCO2e/y)  Land impacted for carbon sink potential -							8.94
High - Accelerate regeneration (1000 hectares)							
Land impacted for carbon sink potential -	+				+		104
High - Avoid deforestation (over 30 years) (1000 hectares)							10-1
Land impacted for carbon sink potential -							591
High - Extend rotation length (1000 hectares)							J71
Land impacted for carbon sink potential -							3.84
High - Improve plantations (1000 hectares)							

Table 43: 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 -							13.6
High - Increase trees outside forests							13.0
(1000 hectares)							
Land impacted for carbon sink potential -						+	(
High - Reforest cropland (1000 hectares)							,
Land impacted for carbon sink potential -						+	6.3
High - Reforest pasture (1000 hectares)							0.01
Land impacted for carbon sink potential -							108
High - Restore productivity (1000							100
hectares)							
Land impacted for carbon sink potential -							835
High - Total impacted (over 30 years)							000
(1000 hectares)							
Land impacted for carbon sink potential -						+	4.4
Low - Accelerate regeneration (1000							4.41
hectares)							
Land impacted for carbon sink potential -							97.6
Low - Avoid deforestation (over 30 years)							71.0
(1000 hectares)							
Land impacted for carbon sink potential -							226
Low - Extend rotation length (1000							220
hectares)							
Land impacted for carbon sink potential -							1.92
Low - Improve plantations (1000							1.74
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							,
hectares)							
Land impacted for carbon sink potential -							7.16
Low - Increase trees outside forests							7.10
(1000 hectares)							
Land impacted for carbon sink potential -							(
Low - Reforest cropland (1000 hectares)							·
Land impacted for carbon sink potential -							1.
·							l.
Low - Reforest pasture (1000 hectares)							/ [
Land impacted for carbon sink potential -							65.
Low - Restore productivity (1000							
hectares)							/ 0
Land impacted for carbon sink potential -							404
Low - Total impacted (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							,-
·							6.7
Mid - Accelerate regeneration (1000							
hectares)							10
Land impacted for carbon sink potential -							10
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							408
Mid - Extend rotation length (1000							
hectares)							2.5
Land impacted for carbon sink potential -							2.89
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							10.4
Mid - Increase trees outside forests (1000							
hectares)		[					

Table 43: E+RE-	econario -	DTIIADA	· I and einke .	Enrecte	(continued)
1auit 45. E+KE-	SCEIIUI 10 -	PILLAR	o. Luiiu Siiiks ·	- ศบาษธเธา	CUILLIIUEUI

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							0
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							7.98
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							131
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							668
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 -		361	0.581	0.58	0.562	0.335	0.01
Coal (million 2019\$)							
Monetary damages from air pollution -		218	117	135	105	56.9	11.6
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		995	923	697	399	179	67.5
Transportation (million 2019\$)							
Premature deaths from air pollution -		40.8	0.066	0.065	0.063	0.038	0.001
Coal (deaths)							
Premature deaths from air pollution -		24.6	13.2	15.2	11.9	6.42	1.31
Natural Gas (deaths)							
Premature deaths from air pollution -		112	104	78.3	44.9	20.2	7.59
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	7,079	7,740	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Sales of space heating units - Electric	4.76	7.71	11	20.9	40.9	61.8	73
Heat Pump (%)							
Sales of space heating units - Electric	2.29	2.3	3.61	7.63	14.2	19.1	21
Resistance (%)							
Sales of space heating units - Fossil (%)	42.2	36.1	33.8	25.4	12.4	3.94	1.03
Sales of space heating units - Gas Furnace	50.7	53.9	51.7	46	32.5	15.2	4.94
(%)							
Sales of water heating units - Electric	2.81	2.92	4.33	9.01	20.1	33.9	42
Heat Pump (%)							
Sales of water heating units - Electric	13.8	12	13	17.7	28.2	41.2	48.8
Resistance (%)							
Sales of water heating units - Gas Furnace	78.2	80.8	78.7	69.9	49.2	23	7.51
(%)							
Sales of water heating units - Other (%)	5.24	4.31	3.95	3.35	2.49	1.86	1.68

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.975	0.97	1.63	1.7	3.09	3.32
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)	120	114	111	108	105	101	96.5

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

The state of the s							
Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	64.9	63.5	62.9	62.4	62.9	63.5	63.2
Final energy use - Residential (PJ)	155	144	135	128	118	105	91.1
Final energy use - Transportation (PJ)	228	214	195	179	167	152	134

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	3.14	3.73	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	71.7	72.5	75.1	81.9	91.4	97.2	99.2
Resistance (%)							
Sales of cooking units - Gas (%)	28.3	27.5	24.9	18.1	8.64	2.79	0.75
Sales of space heating units - Electric	7.5	7.1	12.5	28.5	55.7	78.2	88.3
Heat Pump (%)							
Sales of space heating units - Electric	4.92	6.49	6.23	5.8	4.6	2.99	2.13
Resistance (%)							
Sales of space heating units - Fossil (%)	53.1	66.3	61.9	48.5	27.6	13.1	7.61
Sales of space heating units - Gas (%)	34.4	20.1	19.4	17.2	12.1	5.68	1.98
Sales of water heating units - Electric	0	0.484	1.83	6.09	15.2	25.5	31.2
Heat Pump (%)							
Sales of water heating units - Electric	35.5	53.7	54.4	56.4	60.1	63.5	65.2
Resistance (%)							
Sales of water heating units - Gas Furnace	46.8	33.9	32.8	29.2	20.5	9.58	3.12
(%)							
Sales of water heating units - Other (%)	17.6	11.9	11	8.3	4.13	1.41	0.461

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	91	186	634	1,979	2,888
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.229	0	0.29	0	1.39	0	3.84
_units)							
Public EV charging plugs - L2 (1000 units)	0.794	0	6.97	0	33.5	0	92.2
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 (%)	1.33	1.78	2.01	1.59	0.999	0.509	0.219
Vehicle sales - Light-duty - EV (%)	2.17	5.3	13.1	27.8	50.5	73.4	88.1
Vehicle sales - Light-duty - gasoline (%)	90.9	86.3	77.7	64.2	43.8	23.4	10.4
Vehicle sales - Light-duty - hybrid (%)	5.4	6.17	6.83	6.1	4.45	2.56	1.22
Vehicle sales - Light-duty - hydrogen FC	0.112	0.373	0.312	0.234	0.163	0.089	0.042
(%)							
Vehicle sales - Light-duty - other (%)	0.093	0.096	0.086	0.074	0.053	0.029	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	142
Conversion capital investment -	0	0	0	0	0	0	2,269
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	2
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	0	0	0.01
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0.01
Cumulative - All (MMT)		0	0	0	0	0	0.01
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0.01

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	146	146	146	146	146
Cumulative investment - All (million \$2018)		0	262	262	262	262	262
Cumulative investment - Spur (million \$2018)		0	0.702	0.702	0.702	0.702	0.703
Cumulative investment - Trunk (million \$2018)		0	262	262	262	262	262
Spur (km)		0	1.21	1.21	1.21	1.21	1.21
Trunk (km)		0	145	145	145	145	145

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

Table 56: E-B+ scenario - PILLAR 6: Land	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive						20.0	0
deployment - Corn-ethanol to energy							· ·
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-79
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 tC02e/y)							
Carbon sink potential - Aggressive							-3.14
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-82.1
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							-
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-41.5
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							-
crops (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Moderate							-1.57
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-43.1
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 -							134
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							0.313
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							5.72
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							141
Aggressive deployment - Total (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							28.7
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							0.313
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							2.86
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							31.8
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-54.6
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-3,043
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-768
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-1,158
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-10.4
plantations (1000 tC02e/y)							
Carbon sink potential - High - Increase							-360
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-143
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							C
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-224
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-325
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-27.4
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-902
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-128
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-445
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-5.3
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-120
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-50.
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							(
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-1
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-109
productivity (1000 tCO2e/y)							

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

Iable 57: E-B+ scenario - PILLAR 6: Land s Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate	2020	2023	2000	2000	2040	2043	-41
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-1,973
counting overlap) (1000 tC02e/y)							1,710
Carbon sink potential - Mid - Avoid							-448
deforestation (1000 tC02e/y)							-440
Carbon sink potential - Mid - Extend		-					-801
rotation length (1000 tCO2e/y)							-001
Carbon sink potential - Mid - Improve							-7.77
							-1.11
plantations (1000 tC02e/y)							0/0
Carbon sink potential - Mid - Increase							-240
retention of HWP (1000 tC02e/y)							0/7
Carbon sink potential - Mid - Increase							-96.7
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-121
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-217
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							8.94
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							104
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							591
High - Extend rotation length (1000							071
hectares)							
Land impacted for carbon sink potential -							3.84
High - Improve plantations (1000							5.04
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							U
-							
hectares)							10 /
Land impacted for carbon sink potential -							13.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							6.37
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							108
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							835
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.47
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							97.6
Low - Avoid deforestation (over 30 years)							, 1.0
(1000 hectares)							
Land impacted for carbon sink potential -						-	226
Low - Extend rotation length (1000							220
hectares)							100
Land impacted for carbon sink potential -							1.92
Low - Improve plantations (1000							
hectares)							

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

			2045	2050
				0
				7.16
				0
				1.1
				65.1
				404
				6.7
				101
				408
				2.89
				0
				10.4
				0
				_
				7.98
				131
				.51
-				668
				550

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		361	0.581	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Natural Gas (million 2019\$)		222	90.9	47.2	37.1	23	8.13
Monetary damages from air pollution - Transportation (million 2019\$)		1,013	1,020	985	880	695	473
Premature deaths from air pollution - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Natural Gas (deaths)		25.1	10.3	5.33	4.18	2.6	0.918
Premature deaths from air pollution - Transportation (deaths)		114	115	111	99	78.2	53.2

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	6,993	7,196	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	39	38.6	38.5	38.3	38.5	38.4
Sales of cooking units - Gas (%)	63.1	61	61.4	61.5	61.7	61.5	61.6
Sales of space heating units - Electric Heat Pump (%)	4.76	13	41.2	64.2	67.9	68.3	68.4
Sales of space heating units - Electric Resistance (%)	2.29	2.72	7.48	19.8	29.9	31.6	31.6
Sales of space heating units - Fossil (%)	42.2	34.8	24.4	9.58	1.37	0.108	0
Sales of space heating units - Gas Furnace (%)	50.7	49.5	26.9	6.44	0.813	0.044	0
Sales of water heating units - Electric Heat Pump (%)	2.81	2.41	2.38	2.38	2.36	2.39	2.38
Sales of water heating units - Electric Resistance (%)	13.8	11.5	11.2	11.4	11.4	11.2	11.3
Sales of water heating units - Gas Furnace (%)	78.2	81.7	82.2	82	82	82.3	82.2
Sales of water heating units - Other (%)	5.24	4.38	4.24	4.21	4.3	4.08	4.12

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.02	1.02	2.7	2.9	2.76	2.92
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)	120	116	117	116	115	117	121
Final energy use - Industry (PJ)	64.9	65.9	67.9	70.3	74.3	78.9	82.7
Final energy use - Residential (PJ)	155	145	139	135	132	130	128
Final energy use - Transportation (PJ)	228	214	197	187	187	193	200

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.06	3.2	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	71.5	71.5	71.5	71.5	71.5	71.5	71.5
Resistance (%)							
Sales of cooking units - Gas (%)	28.5	28.5	28.5	28.5	28.5	28.5	28.5
Sales of space heating units - Electric	7.29	8.79	9.1	9.58	9.77	9.98	10.3
Heat Pump (%)							
Sales of space heating units - Electric	4.95	6.28	6.15	6.11	6.12	5.85	5.64
Resistance (%)							
Sales of space heating units - Fossil (%)	53.3	57.9	31.1	12.3	11.1	11	11
Sales of space heating units - Gas (%)	34.5	27.1	53.6	72	73	73.2	73.1
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	35.5	53.5	53.4	53.5	53.4	53.4	53.4
Resistance (%)							
Sales of water heating units - Gas Furnace	46.8	34.3	34.3	34.2	34.2	34.2	34.2
(%)							
Sales of water heating units - Other (%)	17.6	12.3	12.3	12.3	12.3	12.3	12.3

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 (%)	1.32	1.76	2.14	2	1.79	1.67	1.58
Vehicle sales - Light-duty - EV (%)	4.35	6.62	7.45	9.21	11.1	12.7	13.9
Vehicle sales - Light-duty - gasoline (%)	88.9	85.1	82.7	80.6	78.3	76.5	75
Vehicle sales - Light-duty - hybrid (%)	5.22	6.03	7.31	7.85	8.36	8.82	9.12
Vehicle sales - Light-duty - hydrogen FC	0.109	0.368	0.332	0.292	0.287	0.286	0.296
(%)							
Vehicle sales - Light-duty - other (%)	0.091	0.095	0.091	0.092	0.091	0.09	0.092
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 regeneration (1000 tCO2e/y)							-54.6
Carbon sink potential - High - All (not							-3,043
counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Avoid							-768
deforestation (1000 tC02e/y)							-100
Carbon sink potential - High - Extend							-1,158
rotation length (1000 tC02e/y)							-1,100
Carbon sink potential - High - Improve							-10.4
plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase							-360
retention of HWP (1000 tC02e/y)							-300
Carbon sink potential - High - Increase							-143
trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							U
Carbon sink potential - High - Reforest							-224
pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore							-325
productivity (1000 tCO2e/y)							-323
Carbon sink potential - Low - Accelerate							-27.4
regeneration (1000 tCO2e/y)							-21.4
Carbon sink potential - Low - All (not							-902
counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Low - Avoid							-128
deforestation (1000 tC02e/y)							-120
Carbon sink potential - Low - Extend							-445
·							-445
rotation length (1000 tC02e/y)  Carbon sink potential - Low - Improve							-5.3
·							-5.3
plantations (1000 tC02e/y)  Carbon sink potential - Low - Increase							-120
·							-120
retention of HWP (1000 tC02e/y)							FO 1
Carbon sink potential - Low - Increase							-50.1
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest							-1
pasture (1000 tC02e/y)							10
Carbon sink potential - Low - Restore							-109
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-4
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-1,973
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-448
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-80
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-7.77
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-240
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-96.7
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							C
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-12
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-217
productivity (1000 tC02e/y)							
Land impacted for carbon sink potential -							8.94
High - Accelerate regeneration (1000							0.7
hectares)							
Land impacted for carbon sink potential -							104
High - Avoid deforestation (over 30 years)							10-
(1000 hectares)							
Land impacted for carbon sink potential -							59
High - Extend rotation length (1000							07
hectares)							
Land impacted for carbon sink potential -	+						3.84
High - Improve plantations (1000							0.0-
hectares)							
Land impacted for carbon sink potential -							C
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							13.6
High - Increase trees outside forests							13.0
(1000 hectares)							
,							
Land impacted for carbon sink potential -							C
High - Reforest cropland (1000 hectares)							/ 0-
Land impacted for carbon sink potential -							6.37
High - Reforest pasture (1000 hectares)							100
Land impacted for carbon sink potential -							108
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							835
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4.47
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							97.6
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							226
Low - Extend rotation length (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							1.92
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 -							7.16
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							11
Land impacted for carbon sink potential -							1.1
Low - Reforest pasture (1000 hectares)							/ - 1
Land impacted for carbon sink potential -							65.1
Low - Restore productivity (1000							
hectares) Land impacted for carbon sink potential -							101
							404
Low - Total impacted (over 30 years)							
(1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000							0.7
hectares)							
Land impacted for carbon sink potential -							101
Mid - Avoid deforestation (over 30 years)							101
(1000 hectares)							
Land impacted for carbon sink potential -							408
Mid - Extend rotation length (1000							400
hectares)							
Land impacted for carbon sink potential -							2.89
Mid - Improve plantations (1000 hectares)							2.07
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							J
hectares)							
Land impacted for carbon sink potential -							10.4
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							0
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							7.98
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							131
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							668
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 uptake (Mt CO2e/y)	-10.2		-1.57				-1.41
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.098		-0.176				-0.183
Business-as-usual carbon sink - Total (Mt CO2e/y)	-10.3		-1.75				-1.59

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		996	649	609	593	582	521
Monetary damages from air pollution - Natural Gas (million 2019\$)		149	122	158	173	182	172
Monetary damages from air pollution - Transportation (million 2019\$)		1,011	1,031	1,048	1,068	1,088	1,109
Premature deaths from air pollution - Coal (deaths)		112	73.4	68.8	67	65.8	58.8
Premature deaths from air pollution - Natural Gas (deaths)		16.8	13.7	17.9	19.5	20.6	19.5
Premature deaths from air pollution - Transportation (deaths)		114	116	118	120	122	125