

Net-Zero America - nevada state report

2021-03-15

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

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Notes

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		7,465	8,314				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	41.9	54.6	83	88.6	88.9	88.9	88.9
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric	3.34	20.2	63.4	88.9	92.5	92.6	92.7
Heat Pump (%)							
Sales of space heating units - Electric	3.3	3.45	4.17	6.37	6.82	6.85	6.84
Resistance (%)							
Sales of space heating units - Fossil (%)	0.985	0.209	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace	92.4	76.1	32.4	4.78	0.723	0.51	0.507
(%)							
Sales of water heating units - Electric	0.03	8.12	45.4	61.3	63.2	63.3	63.3
Heat Pump (%)							
Sales of water heating units - Electric	1.46	5.07	23	34.6	36.2	36.3	36.3
Resistance (%)							
Sales of water heating units - Gas Furnace	98.1	86.4	31.1	3.68	0.19	0	0
(%)							
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.23	2.35	3.09	3.28	3.08	3.22
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)	89.2	89	85.7	80.3	75.1	72.2	71.6
Final energy use - Industry (PJ)	73.7	73.6	72.2	72.9	75.5	77.3	79.1
Final energy use - Residential (PJ)	94.5	92.3	87.6	79.2	71.6	67.4	65.8
Final energy use - Transportation (PJ)	291	274	249	218	190	171	162

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.41	4.55				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.4	73.5	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.6	26.5	4.53	0.228	0	0	0
Sales of space heating units - Electric	9.66	27.4	68.8	88.9	91.4	91.5	91.4
Heat Pump (%)							
Sales of space heating units - Electric	13.5	20.2	10.8	6.22	5.65	5.68	5.75
Resistance (%)							
Sales of space heating units - Fossil (%)	2.25	3.38	1.94	1.18	1.02	0.999	1.02
Sales of space heating units - Gas (%)	74.6	49	18.5	3.73	1.9	1.81	1.81
Sales of water heating units - Electric	0	8.43	46.6	60.9	62.4	62.5	62.5
Heat Pump (%)							
Sales of water heating units - Electric	23.2	37.5	32.8	35.1	35.7	35.8	35.8
Resistance (%)							
Sales of water heating units - Gas Furnace	75.1	52.3	18.8	2.22	0.114	0	0
(%)							
Sales of water heating units - Other (%)	1.72	1.82	1.81	1.8	1.78	1.78	1.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		477	1,240	1,983	3,014	3,269	3,123
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.256		0.746		3.11		4.99
units)							
Public EV charging plugs - L2 (1000 units)	0.619		17.9		74.7		120
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 (%)	1.44	1.72	1.21	0.387	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.28	16.3	48.1	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.3	76.8	47.1	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.77	4.8	3.33	1.22	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.333	0.194	0.06	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.097	0.093	0.059	0.021	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	9.55	6.1	4.81	4.06
Capital invested - Solar PV - Constrained (billion \$2018)		3.93	0	4.62	3.7	2.12	1.58
Capital invested - Wind - Base (billion \$2018)		0.755	3.61	4.44	2.11	0.898	2.84
Capital invested - Wind - Constrained (billion \$2018)		0.262	1.01	0.429	0.94	0.089	0.787
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	675	1,040	1,389	1,810	2,310	2,893	3,583
Installed renewables - Solar - Base land use assumptions (MW)	5,422	5,422	5,422	15,563	22,435	28,170	33,300
Installed renewables - Solar - Constrained land use assumptions (MW)	5,272	5,272	5,272	7,109	9,380	10,984	15,428
Installed renewables - Wind - Base land use assumptions (MW)	822	1,335	4,050	7,632	9,418	10,219	12,897
Installed renewables - Wind - Constrained land use assumptions (MW)	222	437	1,128	1,610	2,374	2,417	3,217

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
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	13,021	13,021	13,021	34,562	49,077	61,165	71,940
Solar - Constrained land use assumptions	12,657	12,657	12,657	16,469	20,892	24,040	32,842
(GWh)							
Wind - Base land use assumptions (GWh)	2,421	3,919	11,540	21,442	26,325	28,482	35,708
Wind - Constrained land use assumptions	657	1,195	2,853	3,945	5,397	5,474	7,205
(GWh)							

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

	<i>J</i> ,					
2020	2025	2030	2035	2040	2045	2050
	0	0	0	0	0	0
	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.01	0.03	0.05	0.04	0.03
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0.01	0.03	0.05	0.04	0.03
Cumulative - All (MMT)		0	0.01	0.04	0.09	0.13	0.16
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0.01	0.04	0.09	0.13	0.16

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	51.1	102	102	102	102
Cumulative investment - All (million \$2018)		0	26.6	53.3	53.4	53.4	53.3
Cumulative investment - Spur (million \$2018)		0	26.6	53.3	53.4	53.4	53.3
Cumulative investment - Trunk (million \$2018)		0	0	0	0	0	0
Spur (km)		0	51.1	102	102	102	102
Trunk (km)		0	0	0	0	0	0

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

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

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

Table 12: E+ scenario - PILLAR 6: Lana sini			0000	0005	00/0	00/5	0050
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							-227
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-1.61
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-229
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-114
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-0.807
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-115
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 -							319
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							2.48
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							322
Aggressive deployment - Total (1000							022
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							U
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							160
deployment - Cropland measures (1000							100
hectares)							
,							1.24
Land impacted for carbon sink - Moderate							1.24
deployment - Permanent conservation							
cover (1000 hectares)							1/0
Land impacted for carbon sink - Moderate							162
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-1,579
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-10,254
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-691
deforestation (1000 tCO2e/y)							/ 700
Carbon sink potential - High - Extend							-4,703
rotation length (1000 tCO2e/y) Carbon sink potential - High - Improve							-2.49
plantations (1000 tC02e/y)							-2.49
Carbon sink potential - High - Increase							-4.57
retention of HWP (1000 tCO2e/y)							-4.57
Carbon sink potential - High - Increase							-186
trees outside forests (1000 tC02e/y)							-100
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							U
Carbon sink potential - High - Reforest							-593
pasture (1000 tCO2e/y)							070
Carbon sink potential - High - Restore							-2,495
productivity (1000 tCO2e/y)							_,
Carbon sink potential - Low - Accelerate							-791
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-3,666
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-115
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,806
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-1.27
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1.52
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-65.1
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tC02e/y)							// 0
Carbon sink potential - Low - Reforest							-44.9
pasture (1000 tC02e/y)							0/1
carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-841
Carbon sink potential - Mid - Accelerate							-1,185
regeneration (1000 tCO2e/y)							-1,100
Carbon sink potential - Mid - All (not							-6,960
counting overlap) (1000 tC02e/y)							-0,700
Carbon sink potential - Mid - Avoid							-403
deforestation (1000 tC02e/y)							400
Carbon sink potential - Mid - Extend							-3,254
rotation length (1000 tCO2e/y)							0,20 1
Carbon sink potential - Mid - Improve							-1.86
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-3.05
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-126
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-319
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-1,668
productivity (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							258
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							93.6
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,398
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							0.918
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 -							17.7
High - Increase trees outside forests							11.1
(1000 hectares)							
Land impacted for carbon sink potential -							0
							U
High - Reforest cropland (1000 hectares)							1/ 0
Land impacted for carbon sink potential -							16.8
High - Reforest pasture (1000 hectares)							007
Land impacted for carbon sink potential -							827
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,612
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							129
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							87.9
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							919
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							0.459
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							J
hectares)							
Land impacted for carbon sink potential -	+		+				9.3
Low - Increase trees outside forests							7.0
(1000 hectares)							
							0
Land impacted for carbon sink potential -							U
Low - Reforest cropland (1000 hectares)							0.00
Land impacted for carbon sink potential -							2.92
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							500
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,649
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							194
Mid - Accelerate regeneration (1000							
hectares)			 			I .	

					_
Table 13: F+:	scenaria -	PTII AR 6.	I and sinks -	. Forests i	(continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							90.7
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,658
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							0.69
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 -							13.5
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 -							21.1
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,008
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,986
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)		232	196	157	118	74.3	51.5
Natural gas consumption - Cumulative (tcf)							4,725
Natural gas production - Annual (tcf)		0.004	0.003	0.003	0.003	0.002	0.002
Oil consumption - Annual (million bbls)		44.9	38.5	29.3	20.6	13.8	8.32
Oil consumption - Cumulative (million bbls)							906
Oil production - Annual (million bbls)		0.33	0.332	0.331	0.262	0.213	0.142

Table 15: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		49.7	0.067	0.067	0.044	0.027	0
Monetary damages from air pollution - Natural Gas (million 2019\$)		40.7	21.6	18.5	17.4	11.7	4.81
Monetary damages from air pollution - Transportation (million 2019\$)		473	466	372	224	105	40.3
Premature deaths from air pollution - Coal (deaths)		5.62	0.008	0.008	0.005	0.003	0
Premature deaths from air pollution - Natural Gas (deaths)		4.59	2.44	2.09	1.96	1.32	0.543
Premature deaths from air pollution - Transportation (deaths)		53.2	52.4	41.8	25.2	11.8	4.54

Table 16: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		4.73	9.61	3.67	2.85	2.09	1.56
By economic sector - Construction (jobs)		6,041	7,276	15,232	15,004	14,345	16,626
By economic sector - Manufacturing		3,127	5,003	6,673	6,273	5,545	6,319
(jobs)							
By economic sector - Mining (jobs)		1,000	705	460	278	154	81.4

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

ontinueaj						
2020	2025	2030	2035	2040	2045	2050
						3,658
						61.4
						8,679
						5,832
						12,433
	6,552	8,394	15,220	15,480	15,019	17,509
	4,039	5,140	9,091	9,253	8,989	10,525
	133	169	330	337	332	398
	8,698	11,043	19,997	20,143	19,413	22,591
	968	1,232	2,246	2,308	2,263	2,668
	20.3	26.5	10.5	8.58	7.64	6.65
	0	116	233	232	231	61.2
	173	32.1	0	0	0	0
	7,640	10,855	19,010	20,735	20,480	23,582
	2,984	2,544	2,232	2,373	2,272	1,564
	0	0.004	0.007	0	0	0
	2,072	1,639	1,165	767	485	276
						21,032
						7,168
						64,215
			0.4.01		00,000	- 1,=10
	3.400	4.322	7.823	7.938	7.685	8,928
	, , , , ,	.,	,,,,,	,,,,,,,	,,,,,	-7
	1.442	1,792	3.345	3.406	3.309	3,829
	.,	.,	5,5 15	5,155	5,551	-,
	3,281	4.192	7.631	7,716	7,472	8,753
	-,	.,	,,,,,,	,,,,,	.,	
	181	232	422	432	419	485
				.52		.00
	12.085	15,439	27.663	28.029	27.131	31,695
	,000	.0, .0,	2.,000	20,027	2.7.0	0.7070
	4 393	5 582	10 115	10 274	9 9 5 1	11,548
	1,070	0,002	10,110	10,211	,,,,,,	11,0 10
	1 427	1775	3 353	3 417	3 324	3,851
	.,	.,	0,000	0,	0,02 .	0,001
	1 091	1 375	2 542	2 566	2 490	2,936
	1,071	1,010	2,042	2,000	2,470	2,700
	202	259	468	464	442	513
	202	207	400	404	772	010
	13 275	16 988	30 / 07	30.800	29.809	34,842
	10,210	10,700	55,451	30,000	27,007	04,042
	7 31/1	9 297	16 720	16 981	16 / 166	19,218
	1,514	7,271	10,120	10,701	10,400	17,210
	/, 77/,	6 077	10 02/	11 005	10.750	12,504
	4,114	0,011	10,724	11,093	10,130	12,504
	2062	2 750	4 O1/.	6 022	4 717	7,840
	۷,703	3,137	0,014	0,722	0,(1/	1,040
	10/0	1 40/	0.055	2 000	0.707	3,239
	1,∠6U	1,024	۷,000	2,090	2,181	3,239
	/. 070	E 000	0.570	0.400	0.007	10,890
	4,079	5,220	7,512	7,032	7,276	10,670
	1 000	1 500	0.0/0	20/2	0.010	3,448
	1,230	1,360	2,000	۷,۶۵۵	۷,۶۱۶	3,448
		2020 2025 731 264 2,457 1,734 5,031 6,552 4,039 133 8,698 968 20.3 0 173 7,640 2,984 0	2020 2025 2030 731 874 264 236 2,457 3,297 1,734 2,077 5,031 6,499 6,552 8,394 4,039 5,140 133 169 8,698 11,043 968 1,232 20.3 26.5 0 116 173 32.1 7,640 10,855 2,984 2,544 0 0.004 2,072 1,639 5,502 5,726 1,998 5,038 60,296 60,802 3,400 4,322 1,442 1,792 3,281 4,192 12,085 15,439 4,393 5,582 1,427 1,775 1,091 1,375 202 259 13,275 16,988 7,314 9,297 4,774	2020 2025 2030 2035 731 874 2,560 264 236 203 2,457 3,297 6,883 1,734 2,077 4,320 5,031 6,499 10,552 6,552 8,394 15,220 4,039 5,140 9,091 133 169 330 8,698 11,043 19,997 968 1,232 2,246 20.3 26.5 10.5 0 116 233 173 32.1 0 7,640 10,855 19,010 2,984 2,544 2,232 0 0.004 0.007 2,072 1,639 1,165 5,502 5,726 17,180 1,998 5,038 7,054 60,296 60,802 61,169 3,400 4,322 7,823 1,442 1,792 3,345 1,439	2020 2025 2030 2035 2040 731 874 2,560 2,642 264 236 203 156 2,457 3,297 6,883 7,165 1,734 2,077 4,320 4,514 5,031 6,499 10,552 11,485 6,552 8,394 15,220 15,480 4,039 5,140 9,091 9,253 133 169 330 337 8,698 11,043 19,997 20,143 968 1,232 2,246 2,308 20.3 26.5 10.5 8.58 0 116 233 233 173 32.1 0 0 7,640 10,855 19,010 20,735 2,984 2,544 2,232 2,373 0 0,004 0,007 0 2,072 1,639 1,165 767 5,502 5,726 17,180 </td <td>731 874 2,560 2,642 2,750 264 236 203 156 109 2,457 3,297 6,883 7,165 7,159 1,734 2,077 4,320 4,514 4,619 5,031 6,499 10,552 11,485 11,333 6,552 8,394 15,220 15,480 15,019 4,039 5,140 9,091 9,253 8,989 133 169 330 337 332 8,698 11,043 19,997 20,143 19,413 968 1,232 2,246 2,308 2,263 20.3 26.5 10.5 8.58 7.64 0 116 233 232 231 173 32.1 0 0 0 7,640 10,855 19,010 20,735 20,480 2,984 2,544 2,232 2,373 2,272 0 0,004 0,007</td>	731 874 2,560 2,642 2,750 264 236 203 156 109 2,457 3,297 6,883 7,165 7,159 1,734 2,077 4,320 4,514 4,619 5,031 6,499 10,552 11,485 11,333 6,552 8,394 15,220 15,480 15,019 4,039 5,140 9,091 9,253 8,989 133 169 330 337 332 8,698 11,043 19,997 20,143 19,413 968 1,232 2,246 2,308 2,263 20.3 26.5 10.5 8.58 7.64 0 116 233 232 231 173 32.1 0 0 0 7,640 10,855 19,010 20,735 20,480 2,984 2,544 2,232 2,373 2,272 0 0,004 0,007

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		7,460	8,285				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Sales of space heating units - Electric	3.34	13	18	32.6	57.8	78.9	88.5
Heat Pump (%)							
Sales of space heating units - Electric	3.3	3.43	3.51	3.82	4.64	5.8	6.5
Resistance (%)							
Sales of space heating units - Fossil (%)	0.985	0.242	0.226	0.167	0.082	0.026	0.007
Sales of space heating units - Gas Furnace	92.4	83.3	78.3	63.4	37.5	15.3	4.96
(%)							
Sales of water heating units - Electric	0.03	1.53	5.79	18.2	38.6	54.2	60.6
Heat Pump (%)							
Sales of water heating units - Electric	1.46	2.2	4.25	10.4	21	30.2	34.5
Resistance (%)							
Sales of water heating units - Gas Furnace	98.1	95.9	89.6	71	39.9	15.3	4.5
(%)							
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2	2.09	2.43	2.55	2.99	3.14
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)	89.2	89.2	88.5	87.3	84.9	81.8	79
Final energy use - Industry (PJ)	73.7	73.6	72.4	73.5	76.5	78.3	80
Final energy use - Residential (PJ)	94.5	92.7	91.9	90.1	85.9	79.9	74.4
Final energy use - Transportation (PJ)	291	276	258	242	229	214	195

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.39	4.49				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.2	67.1	70.2	78.4	89.7	96.7	99.1
Resistance (%)							
Sales of cooking units - Gas (%)	33.8	32.9	29.8	21.6	10.3	3.33	0.896
Sales of space heating units - Electric	9.66	20.3	25	38.9	62.1	80.4	88.2
Heat Pump (%)							
Sales of space heating units - Electric	13.5	21.8	20.6	17.6	12.4	8.21	6.44
Resistance (%)							
Sales of space heating units - Fossil (%)	2.25	3.63	3.53	2.94	1.99	1.35	1.13
Sales of space heating units - Gas (%)	74.6	54.3	50.8	40.6	23.5	10.1	4.22
Sales of water heating units - Electric	0	1.53	5.88	18.5	39	54	60.1
Heat Pump (%)							
Sales of water heating units - Electric	23.2	38.6	38.2	36.7	35.1	35	35.4
Resistance (%)							
Sales of water heating units - Gas Furnace	75.1	58	54.2	42.9	24.1	9.21	2.71
(%)							
Sales of water heating units - Other (%)	1.72	1.82	1.82	1.82	1.8	1.79	1.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		0	80.1	162	553	1,721	2,514
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.256		0.253		1.17		3.2
units)							
Public EV charging plugs - L2 (1000 units)	0.619		6.09		28.1		76.9
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC	0.332	0.969	2.74	7.17	15.7	26.3	34
(%)							
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.45	1.88	2.04	1.61	1.02	0.524	0.225
Vehicle sales - Light-duty - EV (%)	2.01	4.96	12.4	26.8	49.4	72.7	87.8
Vehicle sales - Light-duty - gasoline (%)	91.4	86.9	78.7	65.5	45.1	24.2	10.7
Vehicle sales - Light-duty - hybrid (%)	4.96	5.74	6.41	5.78	4.28	2.5	1.2
Vehicle sales - Light-duty - hydrogen FC	0.112	0.377	0.32	0.242	0.17	0.094	0.044
(%)							
Vehicle sales - Light-duty - other (%)	0.098	0.102	0.092	0.08	0.057	0.031	0.014
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 tC02e/y)							
Carbon sink potential - Aggressive							-227
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-1.61
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-229
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-114
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-0.807
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-115
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 -							319
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							2.48
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							322
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							160
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							1.24
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							162
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							-1,579
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-10,254
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-691
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-4,703
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-2.49
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4.57
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-186
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-593
pasture (1000 tC02e/y)							
Carbon sink potential - High - Restore							-2,495
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-791
regeneration (1000 tC02e/y)							
Carbon sink potential - Low - All (not							-3,666
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-115
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,806
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-1.27
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1.52
retention of HWP (1000 tC02e/y)							
Carbon sink potential - Low - Increase							-65.1
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-44.9
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-841
productivity (1000 tCO2e/y)							J
Carbon sink potential - Mid - Accelerate							-1,185
regeneration (1000 tCO2e/y)							.,.00

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

Item Carbon sink potential - Mid - All (not	2020	2025	2030	2035	2040	2045	2050 -6,960
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-3,254
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1.86
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3.05
Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y)							-126
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y)							-319
Carbon sink potential - Mid - Restore productivity (1000 tC02e/y)							-1,668
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							258
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							2,398
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0.918
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							17.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							16.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							827
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							3,612
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							129
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							919
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0.459
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							9.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							2.92
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							500
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,649
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							194
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							90.7
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,658
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							0.69
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 -							13.5
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 -							21.1
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,008
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,986
Mid - Total impacted (over 30 years) (1000							
hectares)							

Table 24: E- scenario - IMPACTS - Health

Table 24. L- Scellal lo - IMPACIS - Health							
Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		49.7	0.067	0.067	0.044	0.027	0
Coal (million 2019\$)							
Monetary damages from air pollution -		41.5	16.3	10.7	5.53	2.61	1.34
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		482	515	527	497	413	295
Transportation (million 2019\$)							
Premature deaths from air pollution -		5.62	0.008	0.008	0.005	0.003	0
Coal (deaths)							
Premature deaths from air pollution -		4.68	1.85	1.21	0.624	0.295	0.151
Natural Gas (deaths)							
Premature deaths from air pollution -		54.2	57.9	59.3	55.9	46.5	33.1
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		7,465	8,314				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	41.9	54.6	83	88.6	88.9	88.9	88.9
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric	3.34	20.2	63.4	88.9	92.5	92.6	92.7
Heat Pump (%)							
Sales of space heating units - Electric	3.3	3.45	4.17	6.37	6.82	6.85	6.84
Resistance (%)							
Sales of space heating units - Fossil (%)	0.985	0.209	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace	92.4	76.1	32.4	4.78	0.723	0.51	0.507
(%)							
Sales of water heating units - Electric	0.03	8.12	45.4	61.3	63.2	63.3	63.3
Heat Pump (%)							
Sales of water heating units - Electric	1.46	5.07	23	34.6	36.2	36.3	36.3
Resistance (%)							
Sales of water heating units - Gas Furnace	98.1	86.4	31.1	3.68	0.19	0	0
(%)							
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.23	2.35	3.09	3.28	3.08	3.22
Guindiative 3-yr (billion \$2016)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	89.2	89	85.7	80.3	75.1	72.2	71.6
Final energy use - Industry (PJ)	73.7	73.6	72.2	72.9	75.5	77.3	79.1
Final energy use - Residential (PJ)	94.5	92.3	87.6	79.2	71.6	67.4	65.8
Final energy use - Transportation (PJ)	291	274	249	218	190	171	162

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.41	4.55				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.4	73.5	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.6	26.5	4.53	0.228	0	0	0
Sales of space heating units - Electric	9.66	27.4	68.8	88.9	91.4	91.5	91.4
Heat Pump (%)							
Sales of space heating units - Electric	13.5	20.2	10.8	6.22	5.65	5.68	5.75
Resistance (%)							
Sales of space heating units - Fossil (%)	2.25	3.38	1.94	1.18	1.02	0.999	1.02
Sales of space heating units - Gas (%)	74.6	49	18.5	3.73	1.9	1.81	1.81
Sales of water heating units - Electric	0	8.43	46.6	60.9	62.4	62.5	62.5
Heat Pump (%)							
Sales of water heating units - Electric	23.2	37.5	32.8	35.1	35.7	35.8	35.8
Resistance (%)							
Sales of water heating units - Gas Furnace	75.1	52.3	18.8	2.22	0.114	0	0
(%)							
Sales of water heating units - Other (%)	1.72	1.82	1.81	1.8	1.78	1.78	1.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		477	1,240	1,983	3,014	3,269	3,123
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.256		0.746		3.11		4.99
units)							
Public EV charging plugs - L2 (1000 units)	0.619		17.9		74.7		120
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 (%)	1.44	1.72	1.21	0.387	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.28	16.3	48.1	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.3	76.8	47.1	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.77	4.8	3.33	1.22	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.333	0.194	0.06	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.097	0.093	0.059	0.021	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion		0	1.54	12.5	7.67	7.2	6.58
\$2018)							
Capital invested - Wind - Base (billion		1.35	3.98	5.69	4.12	3.06	6.92
\$2018)							
Installed renewables - OffshoreWind -	0	0	0	0	0	0	0
Base land use assumptions (MW)							
Installed renewables - OffshoreWind -	0	0	0	0	0	0	0
Constrained land use assumptions (MW)							
Installed renewables - Solar - Base land	5,422	5,422	6,930	20,186	28,824	37,420	45,733
use assumptions (MW)							
Installed renewables - Solar -	10,845	10,845	13,478	18,315	25,740	36,048	49,143
Constrained land use assumptions (MW)							
Installed renewables - Wind - Base land	822	1,738	4,729	9,316	12,802	15,530	22,067
use assumptions (MW)							
Installed renewables - Wind - Constrained	444	1,582	2,500	4,836	5,608	5,812	6,809
land use assumptions (MW)							

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	13,021	13,021	16,228	44,271	62,484	80,384	97,813
Solar - Constrained land use assumptions	26,042	26,042	31,596	41,365	56,454	77,211	103,659
(GWh)							
Wind - Base land use assumptions (GWh)	2,421	5,086	13,422	26,074	35,514	42,609	58,960
Wind - Constrained land use assumptions	1,314	4,057	6,274	11,021	12,636	13,105	15,221
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-227
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-1.61
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-229
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-114
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-0.807
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-115
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 -							319
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							2.48
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							322
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							160
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							1.24
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							162
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							-1,579
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-10,254
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-691
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-4,703
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-2.49
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4.57
retention of HWP (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase							-186
trees outside forests (1000 tC02e/y)							
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							(
Carbon sink potential - High - Reforest pasture (1000 tC02e/y)							-593
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,49
Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y)							-79
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-3,666
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,806
Carbon sink potential - Low - Improve plantations (1000 tC02e/y)							-1.2
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-1.5
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)							-65.
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							(
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-44.9
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-84
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,18
Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)							-6,96
Carbon sink potential - Mid - Avoid deforestation (1000 tC02e/y)							-40
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-3,25
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1.8
Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)							-3.0
Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y)							-12
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-31
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,66
Land impacted for carbon sink potential - High - Accelerate regeneration (1000							25
nectares) Land impacted for carbon sink potential -							93.
High - Avoid deforestation (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential - High - Extend rotation length (1000							2,39
hectares) Land impacted for carbon sink potential - High - Improve plantations (1000							0.91

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

Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050
High - Increase retention of HWP (1000							·
hectares) Land impacted for carbon sink potential -							17.
High - Increase trees outside forests							11.
(1000 hectares)							
Land impacted for carbon sink potential -							(
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							16.8
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							82
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,612
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							129
Low - Accelerate regeneration (1000							
hectares)							071
Land impacted for carbon sink potential -							87.9
Low - Avoid deforestation (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							919
Low - Extend rotation length (1000							71
hectares)							
Land impacted for carbon sink potential -							0.45
Low - Improve plantations (1000							00
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							9.:
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							(
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							2.95
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							500
Low - Restore productivity (1000							
hectares) Land impacted for carbon sink potential -							1,64
Low - Total impacted (over 30 years)							1,64
(1000 hectares)							
Land impacted for carbon sink potential -							194
Mid - Accelerate regeneration (1000							17-
hectares)							
Land impacted for carbon sink potential -							90.
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,65
Mid - Extend rotation length (1000							·
hectares)							
Land impacted for carbon sink potential -							0.6
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							13.
Mid - Increase trees outside forests (1000							
hectares)							

Table 33: F+RF+ scenario -	DILLAD 6. Land sinks	Enracte (continued)

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 -							21.1
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,008
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,986
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 -		49.7	0.067	0.067	0.044	0.027	0
Coal (million 2019\$)							
Monetary damages from air pollution -		37.3	19.5	10.2	6.87	3.43	1.19
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		473	466	372	224	105	40.3
Transportation (million 2019\$)							
Premature deaths from air pollution -		5.62	0.008	0.008	0.005	0.003	0
Coal (deaths)							
Premature deaths from air pollution -		4.21	2.21	1.15	0.775	0.387	0.134
Natural Gas (deaths)							
Premature deaths from air pollution -		53.2	52.4	41.8	25.2	11.8	4.54
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		7,465	8,314				
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	3.34	20.2	63.4	88.9	92.5	92.6	92.7
Sales of space heating units - Electric Resistance (%)	3.3	3.45	4.17	6.37	6.82	6.85	6.84
Sales of space heating units - Fossil (%)	0.985	0.209	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	92.4	76.1	32.4	4.78	0.723	0.51	0.507
Sales of water heating units - Electric Heat Pump (%)	0.03	8.12	45.4	61.3	63.2	63.3	63.3
Sales of water heating units - Electric Resistance (%)	1.46	5.07	23	34.6	36.2	36.3	36.3
Sales of water heating units - Gas Furnace (%)	98.1	86.4	31.1	3.68	0.19	0	0
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.23	2.35	3.09	3.28	3.08	3.22
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)	89.2	89	85.7	80.3	75.1	72.2	71.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	73.7	73.6	72.2	72.9	75.5	77.3	79.1
Final energy use - Residential (PJ)	94.5	92.3	87.6	79.2	71.6	67.4	65.8
Final energy use - Transportation (PJ)	291	274	249	218	190	171	162

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.41	4.55				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.4	73.5	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.6	26.5	4.53	0.228	0	0	0
Sales of space heating units - Electric	9.66	27.4	68.8	88.9	91.4	91.5	91.4
Heat Pump (%)							
Sales of space heating units - Electric	13.5	20.2	10.8	6.22	5.65	5.68	5.75
Resistance (%)							
Sales of space heating units - Fossil (%)	2.25	3.38	1.94	1.18	1.02	0.999	1.02
Sales of space heating units - Gas (%)	74.6	49	18.5	3.73	1.9	1.81	1.81
Sales of water heating units - Electric	0	8.43	46.6	60.9	62.4	62.5	62.5
Heat Pump (%)							
Sales of water heating units - Electric	23.2	37.5	32.8	35.1	35.7	35.8	35.8
Resistance (%)							
Sales of water heating units - Gas Furnace	75.1	52.3	18.8	2.22	0.114	0	0
(%)							
Sales of water heating units - Other (%)	1.72	1.82	1.81	1.8	1.78	1.78	1.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		477	1,240	1,983	3,014	3,269	3,123
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.256		0.746		3.11		4.99
units)							
Public EV charging plugs - L2 (1000 units)	0.619		17.9		74.7		120
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 (%)	1.44	1.72	1.21	0.387	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.28	16.3	48.1	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.3	76.8	47.1	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.77	4.8	3.33	1.22	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.333	0.194	0.06	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.097	0.093	0.059	0.021	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)		1.02	1.25	4.31	3.28	1.17	0
Capital invested - Solar PV - Constrained (billion \$2018)		1.21	1.27	1.83	1.36	0.252	0
Capital invested - Wind - Base (billion \$2018)		0.732	0.847	2.48	2.62	1.24	1.86
Capital invested - Wind - Constrained (billion \$2018)		0.158	0.176	0.868	0.274	0.093	0.954
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	5,422	6,314	7,541	12,120	15,811	17,206	17,206
Installed renewables - Solar - Constrained land use assumptions (MW)	5,422	6,480	7,718	9,664	11,200	11,500	11,500
Installed renewables - Wind - Base land use assumptions (MW)	672	1,169	1,806	3,801	6,015	7,122	8,877
Installed renewables - Wind - Constrained land use assumptions (MW)	152	259	391	1,091	1,323	1,406	2,307

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	13,021	14,913	17,524	27,219	34,994	37,937	37,937
Solar - Constrained land use assumptions	13,021	15,248	17,820	21,754	24,732	25,315	25,315
(GWh)							
Wind - Base land use assumptions (GWh)	1,971	3,423	5,281	10,860	16,962	20,030	24,862
Wind - Constrained land use assumptions	448	757	1,085	2,768	3,322	3,520	5,281
(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							-227
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-1.61
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-229
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-114
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-0.807
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-115
deployment - Total (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							319
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							2.48
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							322
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							160
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							1.24
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							162
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							-1,579
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-10,254
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-691
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-4,703
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-2.49
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4.57
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-186
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-593
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,495
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-791
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-3,666
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-115
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,806
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-1.27
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1.52
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-65.1
trees outside forests (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	205
Carbon sink potential - Low - Reforest							
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-44.
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-84
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-1,18
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-6,96
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-40
deforestation (1000 tC02e/y)							
Carbon sink potential - Mid - Extend							-3,25
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-1.8
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-3.0
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-12
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-31
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-1,66
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							25
High - Accelerate regeneration (1000							
nectares)							
Land impacted for carbon sink potential -							93.
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,39
High - Extend rotation length (1000							
nectares)							
Land impacted for carbon sink potential -							0.91
High - Improve plantations (1000							
nectares)							
Land impacted for carbon sink potential -							
High - Increase retention of HWP (1000							
nectares)							
Land impacted for carbon sink potential -							17
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -		-				+	16.
High - Reforest pasture (1000 hectares)							10.
Land impacted for carbon sink potential -						+	82
High - Restore productivity (1000							02
nectares)							
Land impacted for carbon sink potential -	-						3,6
High - Total impacted (over 30 years)							3,0
1000 hectares)							
•							12
Land impacted for carbon sink potential -							12
Low - Accelerate regeneration (1000							
nectares)							
Land impacted for carbon sink potential -							87
Low - Avoid deforestation (over 30 years)	1	1	1				

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							919
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							0.459
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 -							9.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							2.92
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							500
Low - Restore productivity (1000							000
hectares)							
Land impacted for carbon sink potential -		+					1,649
Low - Total impacted (over 30 years)							1,047
(1000 hectares)							
Land impacted for carbon sink potential -		+					194
Mid - Accelerate regeneration (1000							174
hectares)							
Land impacted for carbon sink potential -							90.7
Mid - Avoid deforestation (over 30 years)							70.1
(1000 hectares)							
Land impacted for carbon sink potential -							1/50
							1,658
Mid - Extend rotation length (1000							
hectares)							0.70
Land impacted for carbon sink potential -							0.69
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 -							13.5
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 -							21.1
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,008
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,986
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 -		49.7	0.067	0.067	0.044	0.027	0
Coal (million 2019\$)							
Monetary damages from air pollution -		46.7	28.6	29.1	34.3	22.5	5.07
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		473	466	372	224	105	40.3
Transportation (million 2019\$)							
Premature deaths from air pollution -		5.62	0.008	0.008	0.005	0.003	0
Coal (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		5.27	3.23	3.28	3.87	2.54	0.573
Natural Gas (deaths)							
Premature deaths from air pollution -		53.2	52.4	41.8	25.2	11.8	4.54
Transportation (deaths)							

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

2020	2025	2030	2035	2040	2045	2050
	7,460	8,285				
41.9	46.2	50.2	60.8	75.4	84.6	87.8
58.1	53.8	49.8	39.2	24.6	15.4	12.2
3.34	13	18	32.6	57.8	78.9	88.5
3.3	3.43	3.51	3.82	4.64	5.8	6.5
0.985	0.242	0.226	0.167	0.082	0.026	0.007
92.4	83.3	78.3	63.4	37.5	15.3	4.96
0.03	1.53	5.79	18.2	38.6	54.2	60.6
1.46	2.2	4.25	10.4	21	30.2	34.5
98.1	95.9	89.6	71	39.9	15.3	4.5
0.365	0.384	0.383	0.384	0.383	0.384	0.383
	2020 41.9 58.1 3.34 3.3 0.985 92.4 0.03 1.46	2020 2025 7,460 41.9 46.2 58.1 53.8 3.34 13 3.3 3.43 0.985 0.242 92.4 83.3 0.03 1.53 1.46 2.2 98.1 95.9	2020 2025 2030 7,460 8,285 41.9 46.2 50.2 58.1 53.8 49.8 3.34 13 18 3.3 3.43 3.51 0.985 0.242 0.226 92.4 83.3 78.3 0.03 1.53 5.79 1.46 2.2 4.25 98.1 95.9 89.6	2020 2025 2030 2035 7,460 8,285 2030 2035 41.9 46.2 50.2 60.8 58.1 53.8 49.8 39.2 3.34 13 18 32.6 3.3 3.43 3.51 3.82 0.985 0.242 0.226 0.167 92.4 83.3 78.3 63.4 0.03 1.53 5.79 18.2 1.46 2.2 4.25 10.4 98.1 95.9 89.6 71	2020 2025 2030 2035 2040 7,460 8,285 2040 41.9 46.2 50.2 60.8 75.4 58.1 53.8 49.8 39.2 24.6 3.34 13 18 32.6 57.8 3.3 3.43 3.51 3.82 4.64 0.985 0.242 0.226 0.167 0.082 92.4 83.3 78.3 63.4 37.5 0.03 1.53 5.79 18.2 38.6 1.46 2.2 4.25 10.4 21 98.1 95.9 89.6 71 39.9	7,460 8,285 41.9 46.2 50.2 60.8 75.4 84.6 58.1 53.8 49.8 39.2 24.6 15.4 3.34 13 18 32.6 57.8 78.9 3.3 3.43 3.51 3.82 4.64 5.8 0.985 0.242 0.226 0.167 0.082 0.026 92.4 83.3 78.3 63.4 37.5 15.3 0.03 1.53 5.79 18.2 38.6 54.2 1.46 2.2 4.25 10.4 21 30.2 98.1 95.9 89.6 71 39.9 15.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2	2.09	2.43	2.55	2.99	3.14
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)	89.2	89.2	88.5	87.3	84.9	81.8	79
Final energy use - Industry (PJ)	73.7	73.6	72.4	73.5	76.5	78.3	80
Final energy use - Residential (PJ)	94.5	92.7	91.9	90.1	85.9	79.9	74.4
Final energy use - Transportation (PJ)	291	276	258	242	229	214	195

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.39	4.49				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.2	67.1	70.2	78.4	89.7	96.7	99.1
Resistance (%)							
Sales of cooking units - Gas (%)	33.8	32.9	29.8	21.6	10.3	3.33	0.896
Sales of space heating units - Electric	9.66	20.3	25	38.9	62.1	80.4	88.2
Heat Pump (%)							
Sales of space heating units - Electric	13.5	21.8	20.6	17.6	12.4	8.21	6.44
Resistance (%)							
Sales of space heating units - Fossil (%)	2.25	3.63	3.53	2.94	1.99	1.35	1.13
Sales of space heating units - Gas (%)	74.6	54.3	50.8	40.6	23.5	10.1	4.22
Sales of water heating units - Electric	0	1.53	5.88	18.5	39	54	60.1
Heat Pump (%)							
Sales of water heating units - Electric	23.2	38.6	38.2	36.7	35.1	35	35.4
Resistance (%)							

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

	-	-	•	-			
Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	75.1	58	54.2	42.9	24.1	9.21	2.71
Sales of water heating units - Other (%)	1.72	1.82	1.82	1.82	1.8	1.79	1.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		0	80.1	162	553	1,721	2,514
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.256		0.253		1.17		3.2
units)							
Public EV charging plugs - L2 (1000 units)	0.619		6.09		28.1		76.9
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC	0.332	0.969	2.74	7.17	15.7	26.3	34
(%)							
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.45	1.88	2.04	1.61	1.02	0.524	0.225
Vehicle sales - Light-duty - EV (%)	2.01	4.96	12.4	26.8	49.4	72.7	87.8
Vehicle sales - Light-duty - gasoline (%)	91.4	86.9	78.7	65.5	45.1	24.2	10.7
Vehicle sales - Light-duty - hybrid (%)	4.96	5.74	6.41	5.78	4.28	2.5	1.2
Vehicle sales - Light-duty - hydrogen FC	0.112	0.377	0.32	0.242	0.17	0.094	0.044
(%)							
Vehicle sales - Light-duty - other (%)	0.098	0.102	0.092	0.08	0.057	0.031	0.014
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	0	0	0	0	0	0	0
(billion \$2018)							
Capital invested - Biomass w/ccu allam	0	0	0	0	0	0	0
power plant (billion \$2018)							
Capital invested - Biomass w/ccu power	0	0	0	0	0	0	0
plant (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)		0	0	0	0	0	0
Conversion capital investment -		0	0	0	0	0	0
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							

Table 52: <i>E-B+ scenario</i>	- PTI I AR 3º Clean tuels -	Rineneray (continued)

Item	2020	2025	2030	2035	2040	2045	2050
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	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.01	0.04	0.06	0.04	0.05
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0.01	0.04	0.06	0.04	0.05
Cumulative - All (MMT)		0	0.01	0.05	0.11	0.15	0.2
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0.01	0.05	0.11	0.15	0.2

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	51.1	102	102	102	102
Cumulative investment - All (million \$2018)		0	26.6	53.4	53.5	53.4	53.4
Cumulative investment - Spur (million \$2018)		0	26.6	53.4	53.5	53.4	53.4
Cumulative investment - Trunk (million \$2018)		0	0	0	0	0	0
Spur (km)		0	51.1	102	102	102	102
Trunk (km)		0	0	0	0	0	0

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-227
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0

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

Than		•	2030	2025	207.0	204.5	2050
Item Carbon sink potential - Aggressive	2020	2025	2030	2035	2040	2045	2050
							U
deployment - Pasture to energy crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1.61
deployment - Permanent conservation							-1.01
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-229
deployment - Total (1000 tCO2e/y)							-227
Carbon sink potential - Moderate						+	0
deployment - Corn-ethanol to energy							U
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate						+	-114
deployment - Cropland measures (1000							-114
tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							U
crops (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							U
(1000 tC02e/y)							
Carbon sink potential - Moderate							-0.807
deployment - Permanent conservation							-0.001
cover (1000 tC02e/y)							
Carbon sink potential - Moderate						+	-115
deployment - Total (1000 tCO2e/y)							-113
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							U
energy grasses (1000 hectares)							
Land impacted for carbon sink -						+	789
Aggressive deployment - Cropland							107
measures (1000 hectares)							
Land impacted for carbon sink -						+	0
Aggressive deployment - Cropland to							U
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Pasture to							U
energy crops (1000 hectares)							
Land impacted for carbon sink -							2.48
Aggressive deployment - Permanent							2.40
conservation cover (1000 hectares)							
Land impacted for carbon sink -							791
Aggressive deployment - Total (1000							171
hectares)							
Land impacted for carbon sink - Moderate						+	0
deployment - Corn-ethanol to energy							U
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							160
deployment - Cropland measures (1000							100
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Cropland to woody energy							U
crops (1000 hectares)							
							0
Land impacted for carbon sink - Moderate							U
deployment - Pasture to energy crops							
(1000 hectares)							4.07
Land impacted for carbon sink - Moderate							1.24
deployment - Permanent conservation							
cover (1000 hectares)							4/0
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							162
naninymant - Iotal I IIIII hactaraal			I .				

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate	2020	2025	2030	2035	2040	2045	-1,579
regeneration (1000 tC02e/y)							-1,317
Carbon sink potential - High - All (not							10 0E/
							-10,254
counting overlap) (1000 tC02e/y)							/01
Carbon sink potential - High - Avoid							-691
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-4,703
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-2.49
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4.57
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-186
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							Ü
Carbon sink potential - High - Reforest							-593
pasture (1000 tC02e/y)							-373
							0.405
Carbon sink potential - High - Restore							-2,495
productivity (1000 tC02e/y)							704
Carbon sink potential - Low - Accelerate							-791
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-3,666
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-115
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,806
rotation length (1000 tC02e/y)							1,000
Carbon sink potential - Low - Improve							-1.27
·							-1.21
plantations (1000 tCO2e/y)							1.50
Carbon sink potential - Low - Increase							-1.52
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-65.1
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-44.9
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-841
productivity (1000 tCO2e/y)							.
Carbon sink potential - Mid - Accelerate							-1,185
regeneration (1000 tCO2e/y)							-1,103
Carbon sink potential - Mid - All (not							-6,960
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-403
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-3,254
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-1.86
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-3.05
retention of HWP (1000 tCO2e/y)							0.00
Carbon sink potential - Mid - Increase							-126
							-126
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-319
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-1,668
productivity (1000 tCO2e/y)							•
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Table 57: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							258
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							93.6
High - Avoid deforestation (over 30 years)							
(1000 hectares)							0 200
Land impacted for carbon sink potential - High - Extend rotation length (1000							2,398
hectares)							
Land impacted for carbon sink potential -							0.918
High - Improve plantations (1000							0.710
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							17.7
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 -							16.8
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							827
High - Restore productivity (1000							
hectares)							0 (10
Land impacted for carbon sink potential -							3,612
High - Total impacted (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							129
Low - Accelerate regeneration (1000							127
hectares)							
Land impacted for carbon sink potential -							87.9
Low - Avoid deforestation (over 30 years)							01.7
(1000 hectares)							
Land impacted for carbon sink potential -							919
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							0.459
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 -							9.3
Low - Increase trees outside forests							
(1000 hectares) Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							U
Land impacted for carbon sink potential -							2.92
Low - Reforest pasture (1000 hectares)							2.72
Land impacted for carbon sink potential -							500
Low - Restore productivity (1000							550
hectares)							
Land impacted for carbon sink potential -							1,649
Low - Total impacted (over 30 years)							-
(1000 hectares)							
Land impacted for carbon sink potential -							194
Mid - Accelerate regeneration (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							90.7
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,658
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							0.69
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 -							13.5
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 -							21.1
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,008
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,986
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		49.7	0.067	0.067	0.044	0.027	0
Coal (million 2019\$)							
Monetary damages from air pollution -		39.2	16.1	11.5	9.69	6.41	3.23
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		482	515	527	497	413	295
Transportation (million 2019\$)							
Premature deaths from air pollution -		5.62	0.008	0.008	0.005	0.003	0
Coal (deaths)							
Premature deaths from air pollution -		4.43	1.82	1.3	1.09	0.723	0.365
Natural Gas (deaths)							
Premature deaths from air pollution -		54.2	57.9	59.3	55.9	46.5	33.1
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		7,365	7,706				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	41.9	44.7	44.7	44.6	44.4	44.5	44.6
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	55.3	55.3	55.4	55.6	55.5	55.4
Sales of space heating units - Electric	3.34	23.9	63.4	77.1	78.7	78.8	78.8
Heat Pump (%)							
Sales of space heating units - Electric	3.3	5.04	10.6	16	20	20.6	20.7
Resistance (%)							
Sales of space heating units - Fossil (%)	0.985	0.211	0.092	0.03	0.004	0	0
Sales of space heating units - Gas Furnace	92.4	70.9	25.9	6.85	1.34	0.57	0.508
(%)							
Sales of water heating units - Electric	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Heat Pump (%)							
Sales of water heating units - Electric	1.46	1.47	1.47	1.48	1.47	1.48	1.47
Resistance (%)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	98.1	98.1	98.1	98.1	98.1	98.1	98.1
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.15	2.25	2.49	2.61	2.9	3.04
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)	89.2	90.9	92	92.1	92.8	95.6	100
Final energy use - Industry (PJ)	73.8	76.5	78.3	81.6	85.7	92	98.7
Final energy use - Residential (PJ)	94.5	93.4	95	97.3	101	105	108
Final energy use - Transportation (PJ)	291	280	269	263	267	277	288

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.21	3.39				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	65.9	65.9	65.9	65.9	65.9	65.9	65.9
Resistance (%)							
Sales of cooking units - Gas (%)	34.1	34.1	34.1	34.1	34.1	34.1	34.1
Sales of space heating units - Electric	8.46	27.8	28.5	29.6	30.6	31.8	33.4
Heat Pump (%)							
Sales of space heating units - Electric	13.8	20.2	19.9	19.6	18.9	17.9	16.3
Resistance (%)							
Sales of space heating units - Fossil (%)	2.27	2.79	2.82	2.75	2.59	2.52	2.58
Sales of space heating units - Gas (%)	75.5	49.2	48.8	48.1	47.9	47.8	47.7
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	23.2	38.8	38.9	38.9	39	39	39
Resistance (%)							
Sales of water heating units - Gas Furnace	75.1	59.4	59.3	59.3	59.2	59.2	59.2
(%)							
Sales of water heating units - Other (%)	1.72	1.82	1.82	1.82	1.81	1.81	1.81

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 (%)	1.45	1.88	2.17	2.02	1.81	1.69	1.6
Vehicle sales - Light-duty - EV (%)	3.92	6.06	6.87	8.47	10.3	11.8	13
Vehicle sales - Light-duty - gasoline (%)	89.6	86	83.7	81.7	79.6	77.6	76.1
Vehicle sales - Light-duty - hybrid (%)	4.79	5.62	6.85	7.41	7.95	8.48	8.86
Vehicle sales - Light-duty - hydrogen FC	0.11	0.373	0.34	0.3	0.296	0.296	0.306
(%)							
Vehicle sales - Light-duty - other (%)	0.097	0.101	0.097	0.098	0.097	0.096	0.098
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate	2020	2023	2030	2000	2040	2040	-1,579
regeneration (1000 tC02e/y)							1,017
Carbon sink potential - High - All (not				+			-10,254
counting overlap) (1000 tC02e/y)							-10,204
Carbon sink potential - High - Avoid				-			-691
deforestation (1000 tC02e/y)							-071
Carbon sink potential - High - Extend							-4,703
rotation length (1000 tC02e/y)							-4,103
Carbon sink potential - High - Improve							-2.49
plantations (1000 tC02e/y)							-2.47
Carbon sink potential - High - Increase							-4.57
retention of HWP (1000 tC02e/y)							-4.51
Carbon sink potential - High - Increase							-186
trees outside forests (1000 tC02e/y)							-100
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							U
Carbon sink potential - High - Reforest							-593
pasture (1000 tCO2e/y)							-593
							-2,495
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,495
							-791
Carbon sink potential - Low - Accelerate							-791
regeneration (1000 tC02e/y)							0 / / /
Carbon sink potential - Low - All (not							-3,666
counting overlap) (1000 tC02e/y)							44.5
Carbon sink potential - Low - Avoid							-115
deforestation (1000 tC02e/y)							1.007
Carbon sink potential - Low - Extend							-1,806
rotation length (1000 tC02e/y)							1.07
Carbon sink potential - Low - Improve							-1.27
plantations (1000 tC02e/y)							1 50
Carbon sink potential - Low - Increase							-1.52
retention of HWP (1000 tCO2e/y)							/ - 1
Carbon sink potential - Low - Increase							-65.1
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							-44.9
pasture (1000 tC02e/y)							0/1
Carbon sink potential - Low - Restore							-841
productivity (1000 tCO2e/y)							1105
Carbon sink potential - Mid - Accelerate regeneration (1000 tC02e/y)							-1,185
Carbon sink potential - Mid - All (not							-6,960
,							-0,900
counting overlap) (1000 tC02e/y)							-403
Carbon sink potential - Mid - Avoid							-403
deforestation (1000 tC02e/y)							0.057
Carbon sink potential - Mid - Extend							-3,254
rotation length (1000 tC02e/y)							10/
Carbon sink potential - Mid - Improve							-1.86
plantations (1000 tC02e/y)							0.05
Carbon sink potential - Mid - Increase							-3.05
retention of HWP (1000 tC02e/y)							

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

Item	2020	2025					
Carbon sink potential - Mid - Increase			2030	2035	2040	2045	2050 -126
trees outside forests (1000 tC02e/y)							-120
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							U
Carbon sink potential - Mid - Reforest							-319
pasture (1000 tCO2e/y)							-317
Carbon sink potential - Mid - Restore							-1,668
							-1,000
productivity (1000 tC02e/y)							050
Land impacted for carbon sink potential -							258
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							93.6
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,398
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							0.918
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 -							17.7
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 -							16.8
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							827
High - Restore productivity (1000							02.
hectares)							
Land impacted for carbon sink potential -							3,612
High - Total impacted (over 30 years)							0,012
(1000 hectares)							
Land impacted for carbon sink potential -							129
Low - Accelerate regeneration (1000							127
hectares)							
Land impacted for carbon sink potential -							87.9
Low - Avoid deforestation (over 30 years)							01.7
(1000 hectares)							
`							919
Land impacted for carbon sink potential -							919
Low - Extend rotation length (1000							
hectares)							0.750
Land impacted for carbon sink potential -							0.459
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 -							9.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							2.92
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -			1		+		500
Low - Restore productivity (1000							300
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 - Low - Total impacted (over 30 years) (1000 hectares)							1,649
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							194
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,658
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0.69
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							13.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,008
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,986

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

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	0.51		1.5				0.43
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.001		-0.003				-0.003
Business-as-usual carbon sink - Total (Mt CO2e/y)	0.509		1.5				0.428

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		79.7	47.1	25.4	19.3	18	16.9
Coal (million 2019\$)							
Monetary damages from air pollution -		47.8	32.2	35	32.9	50.9	46.9
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		480	521	561	604	648	695
Transportation (million 2019\$)							
Premature deaths from air pollution -		9.01	5.31	2.87	2.18	2.03	1.91
Coal (deaths)							
Premature deaths from air pollution -		5.4	3.64	3.95	3.71	5.74	5.29
Natural Gas (deaths)							
Premature deaths from air pollution -		54	58.6	63.1	67.9	72.9	78.1
Transportation (deaths)							