

Net-Zero America - south carolina state report

2021-03-05

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

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Notes

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	15,755	17,550	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	32	46	79.9	86.5	86.9	86.9	86.9
Resistance (%)							
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Heat Pump (%)							
Sales of space heating units - Electric	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Resistance (%)							
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of space heating units - Gas Furnace	78.5	60.3	18.3	3.66	1.98	1.94	1.94
(%)							
Sales of water heating units - Electric	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Heat Pump (%)							
Sales of water heating units - Electric	7.81	11	28.4	32.3	32.5	32.5	32.5
Resistance (%)							
Sales of water heating units - Gas Furnace	88	74.5	14.1	0.593	0	0	0
(%)							
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.55	3.63	5.67	5.98	4.97	5.12
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)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.83	4.21	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	82.7	86.4	97.7	99.9	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	0	0	0
Sales of space heating units - Electric	37.5	51.9	80.7	87.2	87.5	87.4	87.4
Heat Pump (%)							
Sales of space heating units - Electric	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Resistance (%)							
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of water heating units - Electric	0	12.1	64.1	75.7	76.2	76.2	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Resistance (%)							
Sales of water heating units - Gas Furnace	28.2	14.7	2.78	0.118	0	0	0
(%)							
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	856	2,191	3,557	5,385	5,864	5,589
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.1	0	1.63	0	7.19	0	11.6
units)							
Public EV charging plugs - L2 (1000 units)	0.476	0	39.1	0	173	0	280
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 (%)	1.47	1.74	1.23	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.18	16	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.1	47.5	16	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.68	4.73	3.3	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.335	0.197	0.061	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.061	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	0	0	0	0	0	0	0
(billion \$2018)							
Capital invested - Biomass w/ccu allam	0	0	0	0	0	0.01	0
power plant (billion \$2018)							
Capital invested - Biomass w/ccu power	0	0	0	0	4.36	5.17	0
plant (billion \$2018)							
Capital invested - Offshore Wind - Base	0	0	0	0	3.68	14.2	0
(billion \$2018)							
Capital invested - Offshore Wind -	0	0	0	0	4.4	14.7	0
Constrained (billion \$2018)							
Capital invested - Solar PV - Base (billion	0	0	35.5	14.2	14.3	9.91	10
\$2018)							
Capital invested - Solar PV - Constrained	0	2.3	37.4	16.2	10.5	9.49	9.42
(billion \$2018)							
Installed (cumulative) - OffshoreWind -	0	0	0	0	2,121	11,769	11,769
Base land use assumptions (MW)							
Installed (cumulative) - Rooftop PV (MW)	353	569	805	1,146	1,626	2,248	3,044
Installed (cumulative) - Solar - Base land	1,484	1,484	31,133	43,988	57,737	67,834	78,662
use assumptions (MW)							
Installed (cumulative) - Wind - Base land	0	0	0	0	0	0	0
use assumptions (MW)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	10.4	10.4
Biomass w/ccu power plant (GWh)	0	0	0	0	4,889	10,689	10,689
OffshoreWind - Base land use	0	0	0	0	7,713	34,449	0
assumptions (GWh)							

Table 7: Eucopean	rio - PILLAR 2: Clean	Electricity	Cononation	loontinuedl
TADIC L. ET SCEITUL	IU - PILLAK Z. GIBUII	EIECLI ICILV -	Generation.	ICUIILIIIUEUI

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Constrained land use	0	0	0	0	7,713	34,449	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	3,487	0	58,756	25,393	27,100	19,925	21,386
Solar - Constrained land use assumptions	2,906	0	57,355	31,308	21,828	18,611	16,384
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)	0	0	0	0	175	556	808
Conversion capital investment -	0	0	0	0	3,995	8,172	4,970
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	1	1
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	4	9
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	4	8	8
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	1.72	9.44	19.9	26.4
Annual - BECCS (MMT)		0	0	0	4.67	15.4	21.7
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	1.72	1.45	1.11	1.12
Cumulative - All (MMT)		0	0	1.72	11.2	31	57.4
Cumulative - BECCS (MMT)		0	0	0	4.67	20	41.8
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)		0	0	1.72	3.17	4.28	5.4

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	178	849	1,457	1,776
Cumulative investment - All (million \$2018)		0	0	962	1,718	2,258	2,606
Cumulative investment - Spur (million \$2018)		0	0	11.3	767	1,307	1,655
Cumulative investment - Trunk (million \$2018)		0	0	951	951	951	951
Spur (km)		0	0	18.7	690	1,298	1,616
Trunk (km)		0	0	159	159	159	159

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	2	2
Resource characterization, appraisal, permitting costs (million \$2020)		3.29	7.9	10.5	10.5	10.5	10.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Wells and facilities construction costs		0	4.11	16	28.5	47.7	59.2
(million \$2020)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-81.8
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,291
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-38.7
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,411
deployment - Total (1000 tC02e/y)							•
Carbon sink potential - Moderate							-81.8
deployment - Corn-ethanol to energy							00
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-677
deployment - Cropland measures (1000							011
tCO2e/y)							
Carbon sink potential - Moderate							-19.4
deployment - Permanent conservation							-17.4
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-778
							-118
deployment - Total (1000 tC02e/y)							// 0
Land impacted for carbon sink -							46.8
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							707
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -	\neg					T	70.4
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							824
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							46.8
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							371
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate						+	35.2
deployment - Permanent conservation							00.2
cover (1000 hectares)							
Land impacted for carbon sink - Moderate		-				+	453
deployment - Total (1000 hectares)							400
deployment - Total (1000 nectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tC02e/y)							-315
Carbon sink potential - High - All (not counting overlap) (1000 tC02e/y)							-36,273
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646

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

Iable 13: <i>E+ scenario - PILLAR 6: Land sin</i> Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend	2020	2020	2000	2000	2040	2040	-7,310
rotation length (1000 tCO2e/y)							.,0.0
Carbon sink potential - High - Improve							-2,791
plantations (1000 tCO2e/y)							2,171
Carbon sink potential - High - Increase							-17,707
retention of HWP (1000 tCO2e/y)							-11,101
Carbon sink potential - High - Increase							-534
							-554
trees outside forests (1000 tC02e/y)							010
Carbon sink potential - High - Reforest							-813
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-2,422
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,736
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-158
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,261
counting overlap) (1000 tCO2e/y)							,
Carbon sink potential - Low - Avoid							-274
deforestation (1000 tC02e/y)							-214
1 12							0.000
Carbon sink potential - Low - Extend							-2,808
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-1,420
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-5,902
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-187
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-407
cropland (1000 tCO2e/y)							701
Carbon sink potential - Low - Reforest							-183
							-103
pasture (1000 tC02e/y)							000
Carbon sink potential - Low - Restore							-922
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-236
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-24,243
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-960
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,059
rotation length (1000 tCO2e/y)							-0,007
							0.001
Carbon sink potential - Mid - Improve							-2,081
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-11,805
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-360
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-610
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,303
pasture (1000 tC02e/y)							1,000
							-1,829
Carbon sink potential - Mid - Restore							-1,829
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							51.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							223
High - Avoid deforestation (over 30 years)							_
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Table 13: E+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000							3,727
hectares)							
Land impacted for carbon sink potential -							1,028
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							F0.7
Land impacted for carbon sink potential -							50.7
High - Increase trees outside forests (1000 hectares)							
Land impacted for carbon sink potential -							53.8
High - Reforest cropland (1000 hectares)							33.0
Land impacted for carbon sink potential -							68.8
High - Reforest pasture (1000 hectares)							00.0
Land impacted for carbon sink potential -							907
High - Restore productivity (1000							, .
hectares)							
Land impacted for carbon sink potential -							6,110
High - Total impacted (over 30 years)							-,
(1000 hectares)							
Land impacted for carbon sink potential -							25.7
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							209
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,428
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							514
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 -							26.7
Low - Increase trees outside forests							20.7
(1000 hectares)							
Land impacted for carbon sink potential -							26.9
Low - Reforest cropland (1000 hectares)							20.7
Land impacted for carbon sink potential -							11.9
Low - Reforest pasture (1000 hectares)							,
Land impacted for carbon sink potential -							549
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,791
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							38.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							216
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,578
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							774
Mid - Improve plantations (1000 hectares)							

Table 13: E+	econario -	DTIIAP 6.	I and cinke -	Enrocte	(continued)
1aule 15: <i>E+</i>	SCEHUITO -	PILLAR O:	LUIIU SIIIKS -	FULESTS	COMUNICEUM

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							38.7
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							40.3
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							86.2
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,105
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,876
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)		254	214	172	129	81.4	56.4
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	5,174
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		97	83.4	63.6	45.3	30.8	19.7
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	1,969
Oil production - Annual (million bbls)		0	0	0	0	0	0

Table 15: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		269	0.437	0.407	0.323	0.225	0.019
Coal (million 2019\$)							
Monetary damages from air pollution -		186	148	88.4	69.9	35	12.9
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		1,041	979	750	437	201	79.7
Transportation (million 2019\$)							
Premature deaths from air pollution -		30.4	0.049	0.046	0.036	0.025	0.002
Coal (deaths)							
Premature deaths from air pollution -		21	16.7	9.98	7.89	3.95	1.45
Natural Gas (deaths)							
Premature deaths from air pollution -		117	110	84.4	49.2	22.6	8.97
Transportation (deaths)							

Table 16: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		182	370	141	433	924	1,074
By economic sector - Construction (jobs)		5,030	30,329	22,797	26,148	29,404	31,012
By economic sector - Manufacturing		10,125	19,973	20,076	16,400	19,360	15,877
(jobs)							
By economic sector - Mining (jobs)		1,727	1,235	795	478	270	148
By economic sector - Other (jobs)		445	5,893	4,191	5,230	5,634	6,866
By economic sector - Pipeline (jobs)		367	312	360	238	227	224
By economic sector - Professional (jobs)		2,923	12,014	9,195	11,480	14,943	16,704
By economic sector - Trade (jobs)		2,036	8,034	6,165	7,568	9,281	10,722
By economic sector - Utilities (jobs)		7,557	14,745	16,841	19,130	23,760	22,906
By education level - All sectors -		9,440	29,656	25,934	28,119	33,445	33,958
Associates degree or some college (jobs)							

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

Table 10. E+ Scenario - IMPAGTS - Jubs (Cui		0005	0000	0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors -		6,532	17,905	15,600	16,777	20,227	20,632
Bachelors degree (jobs)		404	(01	101	,	700	
By education level - All sectors - Doctoral		191	631	496	574	709	770
degree (jobs)							
By education level - All sectors - High		12,743	40,456	34,878	37,574	44,457	44,997
school diploma or less (jobs)							
By education level - All sectors - Masters		1,486	4,255	3,653	4,062	4,965	5,175
or professional degree (jobs)							
By resource sector - Biomass (jobs)		782	1,020	403	1,304	3,370	4,585
By resource sector - CO2 (jobs)		1.58	3.49	961	497	937	1,235
By resource sector - Coal (jobs)		744	0	0	0	0	0
By resource sector - Grid (jobs)		7,712	22,626	27,709	34,046	44,991	44,340
By resource sector - Natural Gas (jobs)		3,626	3,404	2,868	2,985	2,134	1,133
By resource sector - Nuclear (jobs)		2,635	2,593	2,194	1,214	337	0.097
By resource sector - Oil (jobs)		4,311	3,403	2,397	1,583	1,006	605
By resource sector - Solar (jobs)		10,556	59,130	43,470	42,438	39,611	42,263
By resource sector - Wind (jobs)		26.2	724	559	3,039	11,417	11,371
Median wages - Annual - All (\$2019 per		55,437	53,264	54,500	55,316	56,410	57,209
job)							
On-Site or In-Plant Training - Total jobs - 1		4,840	15,219	13,252	14,384	17,066	17,302
to 4 years (jobs)							
On-Site or In-Plant Training - Total jobs - 4		1,751	6,178	5,244	5,909	7,005	7,237
to 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		4,995	15,411	13,194	14,222	16,920	17,258
None (jobs)							
On-Site or In-Plant Training - Total jobs -		241	788	694	765	918	934
Over 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		18,566	55,308	48,178	51,825	61,895	62,801
Up to 1 year (jobs)					-		•
On-the-Job Training - All sectors - 1 to 4		6,189	19,537	17,015	18,509	21,968	22,279
years (jobs)		,			,	.	•
On-the-Job Training - All sectors - 4 to 10		1,660	6,155	5,203	5,907	6,992	7,247
years (jobs)			,		•	,	,
On-the-Job Training - All sectors - None		1,643	5,190	4,371	4,740	5,598	5,779
(jobs)					,		,
On-the-Job Training - All sectors - Over 10		320	1,011	852	882	1,019	1,016
years (jobs)							
On-the-Job Training - All sectors - Up to 1		20,581	61,011	53,120	57,069	68,227	69,211
year (jobs)		-,	- ,-		,	,	- ,
Related work experience - All sectors - 1		10,930	32,856	28,580	30,978	36,987	37,633
to 4 years (jobs)		-,	- ,	.,	,		. ,
Related work experience - All sectors - 4		7,034	21,258	18,510	20,042	23,919	24,286
to 10 years (jobs)		.,	,	,			,
Related work experience - All sectors -		4,293	13,394	11,637	12,688	15,118	15,432
None (jobs)		,	-,	,	,	,,,,,	-,
Related work experience - All sectors -		2,015	5,710	5,048	5,333	6,357	6,361
Over 10 years (jobs)		_,	3,	-,0.0	-,000	-,	2,00.
Related work experience - All sectors - Up		6,121	19,686	16,785	18,065	21,422	21,820
to 1 year (jobs)		-,	,	- ,	-,	,	,
Wage income - All (million \$2019)		1,685	4,949	4,391	4,819	5,856	6,038
11232 111001110 7111 (111111011 42017)		.,000	.17 .17	.,0,.	.,0.,	5,000	5,000

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	15,746	17,554	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	32	36.2	40.9	53.4	71	81.7	85.5
Resistance (%)							
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric Heat Pump (%)	10.1	19.3	24.3	38.5	60.9	76.8	82.9

Table 17: F- scenario -	DTI I AP 1. Efficiency	/Flectrification -	Commercial (continued)
Taule II. E- Scenurio -	· PILLAK I FIIII:IPIII:V	/ E18.CH 1111.CHHUH -	COMMERCIALICANIANAEAL

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.29	8.02	8.23	8.98	10.4	11.8	12.5
Resistance (%)							
Sales of space heating units - Fossil (%)	2.15	4.53	4.19	3.17	1.56	0.496	0.13
Sales of space heating units - Gas Furnace	78.5	68.1	63.3	49.4	27.1	10.9	4.44
(%)							
Sales of water heating units - Electric	0.316	2.04	7.05	21.5	43.6	58	63
Heat Pump (%)							
Sales of water heating units - Electric	7.81	7.62	9.51	15.3	24.1	29.8	31.8
Resistance (%)							
Sales of water heating units - Gas Furnace	88	86.1	79.2	59.5	29.1	9.29	2.42
(%)							
Sales of water heating units - Other (%)	3.86	4.23	4.21	3.8	3.27	2.9	2.77

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.92	2.93	3.93	4.05	5.12	5.35
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)	114	115	113	112	109	107	107
Final energy use - Industry (PJ)	358	374	381	391	402	403	407
Final energy use - Residential (PJ)	158	151	147	142	135	128	122
Final energy use - Transportation (PJ)	464	441	404	373	350	323	290

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.78	4.05	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	82.6	83.1	84.7	88.9	94.7	98.3	99.5
Resistance (%)							
Sales of cooking units - Gas (%)	17.4	16.9	15.3	11.1	5.31	1.72	0.462
Sales of space heating units - Electric	37.5	46.3	49.6	59.1	73.7	83	86.3
Heat Pump (%)							
Sales of space heating units - Electric	25.8	28.1	26.5	21.5	14	9.4	7.8
Resistance (%)							
Sales of space heating units - Fossil (%)	6.1	8.46	8.09	7	5.31	4.17	3.78
Sales of space heating units - Gas (%)	30.5	17.1	15.8	12.4	7.01	3.39	2.12
Sales of water heating units - Electric	0	2.08	8	25	51.1	68.2	74.1
Heat Pump (%)							
Sales of water heating units - Electric	67.7	78.2	73.7	60.5	40.4	27.4	22.9
Resistance (%)							
Sales of water heating units - Gas Furnace	28.2	17	15.7	11.9	5.84	1.86	0.487
(%)							
Sales of water heating units - Other (%)	4.1	2.66	2.65	2.64	2.62	2.58	2.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	0	138	291	982	3,094	4,506
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.1	0	0.496	0	2.66	0	7.45
units)							
Public EV charging plugs - L2 (1000 units)	0.476	0	11.9	0	63.9	0	179
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	1.48	1.91	2.04	1.62	1.03	0.528	0.226
Vehicle sales - Light-duty - EV (%)	1.98	4.89	12.3	26.5	49.1	72.5	87.8
Vehicle sales - Light-duty - gasoline (%)	91.5	87.1	79	65.8	45.4	24.4	10.8
Vehicle sales - Light-duty - hybrid (%)	4.86	5.65	6.32	5.71	4.24	2.48	1.19
Vehicle sales - Light-duty - hydrogen FC	0.112	0.378	0.321	0.244	0.172	0.095	0.044
(%)							
Vehicle sales - Light-duty - other (%)	0.1	0.103	0.093	0.081	0.058	0.032	0.015
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen	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							-81.8
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,291
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-38.7
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,411
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-81.8
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-677
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-19.4
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-778
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							46.8
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							707
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							70.4
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							824
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							46.8
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							453

Table 23: E- scenario - PILLAR 6: Land sink	ks - Forests						
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-315
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-36,273
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,646
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,310
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-2,791
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-17,707
retention of HWP (1000 tCO2e/y)							·
Carbon sink potential - High - Increase							-534
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-813
cropland (1000 tCO2e/y)							0.0
Carbon sink potential - High - Reforest							-2,422
pasture (1000 tC02e/y)							2,422
Carbon sink potential - High - Restore							-2,736
productivity (1000 tCO2e/y)							2,100
Carbon sink potential - Low - Accelerate							-158
regeneration (1000 tCO2e/y)							-130
Carbon sink potential - Low - All (not							-12,261
counting overlap) (1000 tC02e/y)							-12,201
Carbon sink potential - Low - Avoid							-274
deforestation (1000 tC02e/y)							-214
Carbon sink potential - Low - Extend							-2,808
rotation length (1000 tCO2e/y)							-2,000
Carbon sink potential - Low - Improve							-1,420
							-1,420
plantations (1000 tC02e/y) Carbon sink potential - Low - Increase							E 000
·							-5,902
retention of HWP (1000 tC02e/y)							107
Carbon sink potential - Low - Increase							-187
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							-407
cropland (1000 tC02e/y)							100
Carbon sink potential - Low - Reforest							-183
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-922
productivity (1000 tC02e/y)							
Carbon sink potential - Mid - Accelerate							-236
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-24,243
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-960
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,059
rotation length (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase							-11,805
retention of HWP (1000 tC02e/y)							-11,000
Carbon sink potential - Mid - Increase							-360
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-610
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,303
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-1,829
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							51.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							223
High - Avoid deforestation (over 30 years)							
(1000 hectares)							0.707
Land impacted for carbon sink potential -							3,727
High - Extend rotation length (1000							
hectares) Land impacted for carbon sink potential -							1,028
High - Improve plantations (1000							1,020
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							50.7
High - Increase trees outside forests							00.1
(1000 hectares)							
Land impacted for carbon sink potential -							53.8
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							68.8
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							907
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,110
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							25.7
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							209
Low - Avoid deforestation (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							1 / 00
Low - Extend rotation length (1000							1,428
hectares)							
Land impacted for carbon sink potential -							514
Low - Improve plantations (1000							314
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							26.7
Low - Increase trees outside forests							20.1
(1000 hectares)							
Land impacted for carbon sink potential -							26.9
,		1	I	1			,

Tahla 22. F.	econario -	DTII AD A.	Land sinks -	Enrecte	(continued)
1 auit 25. <i>E</i> -	SCEHUITO -	PILLAK O.	Luliu Siliks -	FULLS IS	COHUHUEUL

Item	2020	20	025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -								11.9
Low - Reforest pasture (1000 hectares)								
Land impacted for carbon sink potential -								549
Low - Restore productivity (1000								
hectares)								
Land impacted for carbon sink potential -								2,791
Low - Total impacted (over 30 years)								
(1000 hectares)								
Land impacted for carbon sink potential -								38.6
Mid - Accelerate regeneration (1000								
hectares)								
Land impacted for carbon sink potential -								216
Mid - Avoid deforestation (over 30 years)								
(1000 hectares)								
Land impacted for carbon sink potential -								2,578
Mid - Extend rotation length (1000								
hectares)								
Land impacted for carbon sink potential -								774
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 -								38.7
Mid - Increase trees outside forests (1000								
hectares)								
Land impacted for carbon sink potential -								40.3
Mid - Reforest cropland (1000 hectares)								
Land impacted for carbon sink potential -								86.2
Mid - Reforest pasture (1000 hectares)								
Land impacted for carbon sink potential -								1,105
Mid - Restore productivity (1000								
hectares)								
Land impacted for carbon sink potential -								4,876
Mid - Total impacted (over 30 years) (1000								
hectares)								

Table 24: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Natural Gas (million 2019\$)		176	116	46.3	17.4	5.7	3.02
Monetary damages from air pollution - Transportation (million 2019\$)		1,058	1,078	1,057	961	772	534
Premature deaths from air pollution - Coal (deaths)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Natural Gas (deaths)		19.9	13.1	5.23	1.96	0.644	0.341
Premature deaths from air pollution - Transportation (deaths)		119	121	119	108	86.8	60.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	15,755	17,550	0	0	0	0
Cumulative 5-yr (million \$2018) Sales of cooking units - Electric	32	46	79.9	86.5	86.9	86.9	86.9
Resistance (%)	32	40	1 7.7	00.5	00.7	00.7	00.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1

Table 25: E+RE+	acanania	DTIIAD 1.	Efficiency/	Electrification	Commonaid	(continued)
TABLE ZO. E+KE+	· SCEHUITO -	PILLAR I.	EIIICIEIICV/E	=186111116011011 -	· Guillillercial i	COMUNICEUM

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Heat Pump (%)							
Sales of space heating units - Electric	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Resistance (%)							
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of space heating units - Gas Furnace	78.5	60.3	18.3	3.66	1.98	1.94	1.94
(%)							
Sales of water heating units - Electric	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Heat Pump (%)							
Sales of water heating units - Electric	7.81	11	28.4	32.3	32.5	32.5	32.5
Resistance (%)							
Sales of water heating units - Gas Furnace	88	74.5	14.1	0.593	0	0	0
(%)							
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.55	3.63	5.67	5.98	4.97	5.12
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.83	4.21	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	82.7	86.4	97.7	99.9	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	0	0	0
Sales of space heating units - Electric	37.5	51.9	80.7	87.2	87.5	87.4	87.4
Heat Pump (%)							
Sales of space heating units - Electric	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Resistance (%)							
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of water heating units - Electric	0	12.1	64.1	75.7	76.2	76.2	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Resistance (%)							
Sales of water heating units - Gas Furnace	28.2	14.7	2.78	0.118	0	0	0
(%)							
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	856	2,191	3,557	5,385	5,864	5,589
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000 units)	0.1	0	1.63	0	7.19	0	11.6
Public EV charging plugs - L2 (1000 units)	0.476	0	39.1	n	173	n	280
		- 0	_	0		0	200
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0

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

Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	1.47	1.74	1.23	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.18	16	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.1	47.5	16	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.68	4.73	3.3	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.335	0.197	0.061	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.061	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 - Offshore Wind - Base (billion \$2018)	0	0	0	15	12.7	8.1	8.19
Capital invested - Solar PV - Base (billion \$2018)	0	20.3	23.4	24	11.3	11.7	2.77
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	7,318	14,654	14,654	14,654
Installed (cumulative) - Solar - Base land use assumptions (MW)	1,484	16,616	36,177	57,900	68,776	80,708	83,696
Installed (cumulative) - Wind - Base land use assumptions (MW)	0	0	0	0	0	0	0

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	26,149	26,467	20,830	25,432
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	29,418	29,497	0	46,263
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	3,487	30,050	38,713	42,841	21,461	23,549	5,869
Solar - Constrained land use assumptions	3,487	27,429	40,379	42,211	19,199	17,703	7,418
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-81.8
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,291
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-38.7
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,411
deployment - Total (1000 tC02e/y)							

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

2020	2025	2030	2035	2040	2045	2050
						-81.8
						-677
						-19.4
						-778
						46.8
						707
						70.4
						824
						46.8
						371
						35.2
						453
						.50
	2020	2020 2025	2020 2025 2030	2020 2025 2030 2035	2020 2025 2030 2035 2040	2020 2025 2030 2035 2040 2045

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-315
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-36,273
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,646
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,310
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-2,791
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-17,707
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-534
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-813
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-2,422
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,736
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-158
regeneration (1000 tCO2e/y)							

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

Item Conhon sink notantial Low All (not	2020	2025	2030	2035	2040	2045	205
Carbon sink potential - Low - All (not							-12,26
counting overlap) (1000 tC02e/y)							07
Carbon sink potential - Low - Avoid							-27
deforestation (1000 tC02e/y)							0.00
Carbon sink potential - Low - Extend							-2,80
rotation length (1000 tC02e/y)							1 / 0
Carbon sink potential - Low - Improve							-1,42
plantations (1000 tC02e/y)							F 00
Carbon sink potential - Low - Increase							-5,90
retention of HWP (1000 tCO2e/y)							10
Carbon sink potential - Low - Increase							-18
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							-40
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-18
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-92
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-23
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-24,24
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-96
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,05
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-2,08
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-11,80
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-36
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-61
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,30
pasture (1000 tCO2e/y)							.,
Carbon sink potential - Mid - Restore							-1,82
productivity (1000 tCO2e/y)							.,
Land impacted for carbon sink potential -							51.
High - Accelerate regeneration (1000							01.
hectares)							
Land impacted for carbon sink potential -							22
High - Avoid deforestation (over 30 years)							22
(1000 hectares)							
Land impacted for carbon sink potential -							3,72
High - Extend rotation length (1000							3,12
hectares)							
Land impacted for carbon sink potential -							1,02
High - Improve plantations (1000							1,02
= ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '							
nectares)							
Land impacted for carbon sink potential -							
High - Increase retention of HWP (1000							
nectares)							
Land impacted for carbon sink potential -							50
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -						Ţ	53.
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							68.
High - Reforest pasture (1000 hectares)							

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

Item Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050 907
High - Restore productivity (1000							907
hectares)							(110
Land impacted for carbon sink potential - High - Total impacted (over 30 years)							6,110
(1000 hectares)							05.7
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000							25.7
hectares)							000
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years)							209
(1000 hectares)							4 / 00
Land impacted for carbon sink potential - Low - Extend rotation length (1000							1,428
hectares)							F1/
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
The state of the s							
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
							26.7
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000							549
hectares)							
Land impacted for carbon sink potential -							2,791
Low - Total impacted (over 30 years) (1000 hectares)							•
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000							38.6
hectares)							
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential -							2,578
Mid - Extend rotation length (1000 hectares)							2,510
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000							0
hectares) Land impacted for carbon sink potential -							38.7
Mid - Increase trees outside forests (1000 hectares)							33
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000							1,105
hectares) Land impacted for carbon sink potential -							4,876
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 -		269	0.437	0.407	0.323	0.225	0.019
Coal (million 2019\$)							
Monetary damages from air pollution -		181	141	80.5	48.4	12.3	3.77
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		1,041	979	750	437	201	79.7
Transportation (million 2019\$)							
Premature deaths from air pollution -		30.4	0.049	0.046	0.036	0.025	0.002
Coal (deaths)							
Premature deaths from air pollution -		20.4	16	9.08	5.46	1.39	0.425
Natural Gas (deaths)							
Premature deaths from air pollution -		117	110	84.4	49.2	22.6	8.97
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 -	0	15,755	17,550	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	32	46	79.9	86.5	86.9	86.9	86.9
Resistance (%)							
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Heat Pump (%)							
Sales of space heating units - Electric	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Resistance (%)							
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of space heating units - Gas Furnace	78.5	60.3	18.3	3.66	1.98	1.94	1.94
(%)							
Sales of water heating units - Electric	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Heat Pump (%)							
Sales of water heating units - Electric	7.81	11	28.4	32.3	32.5	32.5	32.5
Resistance (%)							
Sales of water heating units - Gas Furnace	88	74.5	14.1	0.593	0	0	0
(%)							
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.55	3.63	5.67	5.98	4.97	5.12
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)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.83	4.21	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	82.7	86.4	97.7	99.9	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	0	0	0
Sales of space heating units - Electric	37.5	51.9	80.7	87.2	87.5	87.4	87.4
Heat Pump (%)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Resistance (%)							
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of water heating units - Electric	0	12.1	64.1	75.7	76.2	76.2	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Resistance (%)							
Sales of water heating units - Gas Furnace	28.2	14.7	2.78	0.118	0	0	0
(%)							
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	856	2,191	3,557	5,385	5,864	5,589
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.1	0	1.63	0	7.19	0	11.6
units)							
Public EV charging plugs - L2 (1000 units)	0.476	0	39.1	0	173	0	280
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 (%)	1.47	1.74	1.23	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.18	16	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.1	47.5	16	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.68	4.73	3.3	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.335	0.197	0.061	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.061	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		8.07	8.33	13.7	6.01	7.66	0.596
\$2018)							
Capital invested - Solar PV - Constrained (billion \$2018)		11.2	6.78	16.9	6.15	7.66	0.498

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	3,487	11,974	13,798	24,602	11,460	15,398	1,271
Solar - Constrained land use assumptions	3,487	16,602	11,209	30,264	11,684	15,402	1,059
(GWh)							

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

Table 42: E+RE- scenario - PILLAR 6: Land						· - ·	
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-81.8
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,291
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-38.7
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,411
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-81.8
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-677
deployment - Cropland measures (1000							
tC02e/y)							
Carbon sink potential - Moderate							-19.4
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-778
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink -							46.8
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							707
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							70.4
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							824
Aggressive deployment - Total (1000							024
hectares)							
Land impacted for carbon sink - Moderate		+					46.8
deployment - Corn-ethanol to energy							40.0
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							371
deployment - Cropland measures (1000							311
hectares)							35.2
Land impacted for carbon sink - Moderate							35.2
deployment - Permanent conservation							
cover (1000 hectares)							, = 0
Land impacted for carbon sink - Moderate							453
deployment - Total (1000 hectares)							

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

2020	2025	2030	2035	2040	2045	2050
						-315
						-36,273
						-1,646
						-7,310
						-2,791
						-17,707
	2020	2020 2025	2020 2025 2030	2020 2025 2030 2035	2020 2025 2030 2035 2040	2020 2025 2030 2035 2040 2045

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

Item Conhon sink notantial High Increase	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-534
,							010
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tC02e/y)							-2,422
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y)							-158
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-12,26
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tC02e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tC02e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)							-24,243
Carbon sink potential - Mid - Avoid deforestation (1000 tC02e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,08
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,80
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,30
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,82
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years)							223
(1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,72
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,02

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

Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050
High - Increase retention of HWP (1000							(
hectares)							
Land impacted for carbon sink potential -							50.7
High - Increase trees outside forests							
(1000 hectares)							F0.6
Land impacted for carbon sink potential -							53.8
High - Reforest cropland (1000 hectares)							/0.0
Land impacted for carbon sink potential -							68.8
High - Reforest pasture (1000 hectares)							00
Land impacted for carbon sink potential - High - Restore productivity (1000							90
hectares)							
Land impacted for carbon sink potential -							6,110
High - Total impacted (over 30 years)							0,110
(1000 hectares)							
Land impacted for carbon sink potential -							25.
Low - Accelerate regeneration (1000							20.1
hectares)							
Land impacted for carbon sink potential -	+						209
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,428
Low - Extend rotation length (1000							•
hectares)							
Land impacted for carbon sink potential -							514
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							26.
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							26.9
Low - Reforest cropland (1000 hectares)							44.6
Land impacted for carbon sink potential -							11.9
Low - Reforest pasture (1000 hectares)							F./.C
Land impacted for carbon sink potential -							549
Low - Restore productivity (1000							
hectares) Land impacted for carbon sink potential -							2,79
Low - Total impacted (over 30 years)							۷,۱۶
(1000 hectares)							
Land impacted for carbon sink potential -							38.6
Mid - Accelerate regeneration (1000							00.0
hectares)							
Land impacted for carbon sink potential -							216
Mid - Avoid deforestation (over 30 years)							,
(1000 hectares)							
Land impacted for carbon sink potential -							2,578
Mid - Extend rotation length (1000							, -
hectares)							
Land impacted for carbon sink potential -							774
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							38.
Mid - Increase trees outside forests (1000							
hectares)							

Table 43: E+RE-	cconario	DTIIAD	6. Land sinks	Enrocte	(continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							40.3
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							86.2
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,105
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,876
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 -		269	0.437	0.407	0.323	0.225	0.019
Coal (million 2019\$)							
Monetary damages from air pollution -		202	168	161	123	39.9	12.9
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		1,041	979	750	437	201	79.7
Transportation (million 2019\$)							
Premature deaths from air pollution -		30.4	0.049	0.046	0.036	0.025	0.002
Coal (deaths)							
Premature deaths from air pollution -		22.8	18.9	18.1	13.9	4.5	1.45
Natural Gas (deaths)							
Premature deaths from air pollution -		117	110	84.4	49.2	22.6	8.97
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	15,746	17,554	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	32	36.2	40.9	53.4	71	81.7	85.5
Resistance (%)							
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric	10.1	19.3	24.3	38.5	60.9	76.8	82.9
Heat Pump (%)							
Sales of space heating units - Electric	9.29	8.02	8.23	8.98	10.4	11.8	12.5
Resistance (%)							
Sales of space heating units - Fossil (%)	2.15	4.53	4.19	3.17	1.56	0.496	0.13
Sales of space heating units - Gas Furnace	78.5	68.1	63.3	49.4	27.1	10.9	4.44
(%)							
Sales of water heating units - Electric	0.316	2.04	7.05	21.5	43.6	58	63
Heat Pump (%)							
Sales of water heating units - Electric	7.81	7.62	9.51	15.3	24.1	29.8	31.8
Resistance (%)							
Sales of water heating units - Gas Furnace	88	86.1	79.2	59.5	29.1	9.29	2.42
(%)							
Sales of water heating units - Other (%)	3.86	4.23	4.21	3.8	3.27	2.9	2.77

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.92	2.93	3.93	4.05	5.12	5.35
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)	114	115	113	112	109	107	107

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

• •	-	-	•	-			
Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	358	374	381	391	402	403	407
Final energy use - Residential (PJ)	158	151	147	142	135	128	122
Final energy use - Transportation (PJ)	464	441	404	373	350	323	290

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.78	4.05	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	82.6	83.1	84.7	88.9	94.7	98.3	99.5
Resistance (%)							
Sales of cooking units - Gas (%)	17.4	16.9	15.3	11.1	5.31	1.72	0.462
Sales of space heating units - Electric	37.5	46.3	49.6	59.1	73.7	83	86.3
Heat Pump (%)							
Sales of space heating units - Electric	25.8	28.1	26.5	21.5	14	9.4	7.8
Resistance (%)							
Sales of space heating units - Fossil (%)	6.1	8.46	8.09	7	5.31	4.17	3.78
Sales of space heating units - Gas (%)	30.5	17.1	15.8	12.4	7.01	3.39	2.12
Sales of water heating units - Electric	0	2.08	8	25	51.1	68.2	74.1
Heat Pump (%)							
Sales of water heating units - Electric	67.7	78.2	73.7	60.5	40.4	27.4	22.9
Resistance (%)							
Sales of water heating units - Gas Furnace	28.2	17	15.7	11.9	5.84	1.86	0.487
(%)							
Sales of water heating units - Other (%)	4.1	2.66	2.65	2.64	2.62	2.58	2.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	0	138	291	982	3,094	4,506
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.1	0	0.496	0	2.66	0	7.45
units)							
Public EV charging plugs - L2 (1000 units)	0.476	0	11.9	0	63.9	0	179
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 (%)	1.48	1.91	2.04	1.62	1.03	0.528	0.226
Vehicle sales - Light-duty - EV (%)	1.98	4.89	12.3	26.5	49.1	72.5	87.8
Vehicle sales - Light-duty - gasoline (%)	91.5	87.1	79	65.8	45.4	24.4	10.8
Vehicle sales - Light-duty - hybrid (%)	4.86	5.65	6.32	5.71	4.24	2.48	1.19
Vehicle sales - Light-duty - hydrogen FC	0.112	0.378	0.321	0.244	0.172	0.095	0.044
(%)							
Vehicle sales - Light-duty - other (%)	0.1	0.103	0.093	0.081	0.058	0.032	0.015
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen	0.166	0.485	1.37	3.58	7.86	13.2	17
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

Table 50: E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0.008	0	0.047
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	7.26	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	7.93	7.93	55.2
Biomass w/ccu power plant (GWh)	0	0	0	0	8,149	8,149	8,149

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	463	822	1,376
Conversion capital investment -	0	0	0	0	6,674	4,475	6,984
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	1	1	2
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	5	12
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	2
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	7	7	7
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	1
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	11.4	17.2	27
Annual - BECCS (MMT)		0	0	0	8.07	13.8	23.5
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	11.4	28.6	55.6
Cumulative - BECCS (MMT)		0	0	0	8.07	21.9	45.4
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	159	932	1,177	1,649
Cumulative investment - All (million \$2018)		0	0	951	1,943	2,149	2,706
Cumulative investment - Spur (million \$2018)		0	0	0	993	1,199	1,755
Cumulative investment - Trunk (million \$2018)		0	0	951	951	951	951
Spur (km)		0	0	0	773	1,018	1,489
Trunk (km)		0	0	159	159	159	159

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	2	2
Resource characterization, appraisal, permitting costs (million \$2020)		3.29	7.9	10.5	10.5	10.5	10.5
Wells and facilities construction costs (million \$2020)		0	4.11	16	28.5	47.7	59.2

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

Table 56: E-B+ scenario - PILLAR 6: Land	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive	2020	2020	2000	2000	2040	2040	-218
deployment - Corn-ethanol to energy							210
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-1,143
deployment - Cropland measures (1000							.,0
tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							_
crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Aggressive							-33.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,395
deployment - Total (1000 tCO2e/y)							,
Carbon sink potential - Moderate							-218
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-600
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Moderate							-16.9
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-834
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							132
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,546
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							45.9
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							85.4
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							61.4
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,871
Aggressive deployment - Total (1000							•
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							132
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							328
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							45.9
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							85.4
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							30.7
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							623
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-31
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-36,273
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,646
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,310
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-2,79
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-17,707
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-534
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-813
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-2,422
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,736
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-158
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,26
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-274
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,808
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-1,420
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-5,902
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-187
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-407
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-183
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-922
productivity (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate							-236
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-24,243
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-960
deforestation (1000 tC02e/y)							
Carbon sink potential - Mid - Extend							-5,059
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-2,081
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-11,805
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-360
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-610
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,303
pasture (1000 tC02e/y)							•
Carbon sink potential - Mid - Restore							-1,829
productivity (1000 tCO2e/y)							, -
Land impacted for carbon sink potential -							51.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							223
High - Avoid deforestation (over 30 years)							220
(1000 hectares)							
Land impacted for carbon sink potential -							3,727
High - Extend rotation length (1000							3,121
hectares)							
-							1 000
Land impacted for carbon sink potential -							1,028
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 -							50.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							53.8
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							68.8
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							907
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,110
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							25.7
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							209
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,428
Low - Extend rotation length (1000							.,0
hectares)							
Land impacted for carbon sink potential -		+		+			514
Low - Improve plantations (1000							0.4
IIIPI 010 Pidi (di 0110 (1000		1	1		[I	

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 -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							26.7
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							26.9
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							11.9
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							549
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,791
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							38.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							216
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,578
Mid - Extend rotation length (1000							•
hectares)							
Land impacted for carbon sink potential -							774
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 -							38.7
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							40.3
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							86.2
Mid - Reforest pasture (1000 hectares)							00.2
Land impacted for carbon sink potential -							1,105
Mid - Restore productivity (1000							.,
hectares)							
Land impacted for carbon sink potential -							4,876
Mid - Total impacted (over 30 years) (1000							7,010
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		269	0.437	0.407	0.323	0.225	0.019
Coal (million 2019\$)							
Monetary damages from air pollution -		193	127	61.5	37.8	19.9	8.22
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		1,058	1,078	1,057	961	772	534
Transportation (million 2019\$)							
Premature deaths from air pollution -		30.4	0.049	0.046	0.036	0.025	0.002
Coal (deaths)							
Premature deaths from air pollution -		21.8	14.4	6.94	4.27	2.24	0.928
Natural Gas (deaths)							
Premature deaths from air pollution -		119	121	119	108	86.8	60.1
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	15,522	16,121	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	34.3	34.3	34.3	34.4	34.3	34.3
Sales of cooking units - Gas (%)	68	65.7	65.7	65.7	65.6	65.7	65.7
Sales of space heating units - Electric Heat Pump (%)	10.1	29.8	65.1	72	72.3	72.3	72.4
Sales of space heating units - Electric Resistance (%)	9.29	9.59	14.9	20.3	25	25.7	25.7
Sales of space heating units - Fossil (%)	2.15	4.14	2.51	1.22	0.185	0.016	0
Sales of space heating units - Gas Furnace (%)	78.5	56.5	17.5	6.45	2.54	1.99	1.94
Sales of water heating units - Electric Heat Pump (%)	0.316	0.281	0.275	0.277	0.278	0.276	0.277
Sales of water heating units - Electric Resistance (%)	7.81	6.92	6.81	6.83	6.85	6.81	6.81
Sales of water heating units - Gas Furnace (%)	88	88.5	88.5	88.6	88.5	88.5	88.5
Sales of water heating units - Other (%)	3.86	4.28	4.39	4.33	4.38	4.4	4.38

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.94	4.06	5.79	6.1	5.26	5.44
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)	114	116	117	119	121	125	132
Final energy use - Industry (PJ)	358	383	402	413	428	438	452
Final energy use - Residential (PJ)	158	152	151	152	156	160	165
Final energy use - Transportation (PJ)	463	441	406	385	385	396	410

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.77	3.56	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	82.5	82.5	82.5	82.5	82.5	82.5	82.5
Resistance (%)							
Sales of cooking units - Gas (%)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Sales of space heating units - Electric	36.1	57.9	58.6	59.8	60.9	62.4	64.6
Heat Pump (%)							
Sales of space heating units - Electric	26.4	22.4	22.2	21.4	20.5	19.2	16.9
Resistance (%)							
Sales of space heating units - Fossil (%)	6.23	6.42	5.5	5.15	5.08	5.05	5.09
Sales of space heating units - Gas (%)	31.3	13.3	13.7	13.6	13.5	13.4	13.4
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	67.7	79.8	79.8	79.6	79.5	79.5	79.4
Resistance (%)							
Sales of water heating units - Gas Furnace	28.2	17.5	17.5	17.7	17.8	17.8	17.9
(%)							
Sales of water heating units - Other (%)	4.1	2.67	2.66	2.69	2.72	2.72	2.73

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 (%)	1.47	1.9	2.17	2.02	1.82	1.69	1.61
Vehicle sales - Light-duty - EV (%)	3.82	5.94	6.74	8.31	10.1	11.6	12.8
Vehicle sales - Light-duty - gasoline (%)	89.8	86.2	83.9	82	79.8	77.9	76.4
Vehicle sales - Light-duty - hybrid (%)	4.7	5.53	6.75	7.31	7.86	8.4	8.8
Vehicle sales - Light-duty - hydrogen FC	0.11	0.374	0.341	0.302	0.298	0.298	0.309
(%)							
Vehicle sales - Light-duty - other (%)	0.098	0.102	0.099	0.099	0.098	0.097	0.099
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7
Vehicle sales - Medium-duty - hybrid (%)	0.365	0.427	0.496	0.577	0.674	0.793	0.929
Vehicle sales - Medium-duty - hydrogen	0.175	0.208	0.242	0.285	0.339	0.409	0.487
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.255	0.271	0.298	0.345	0.42	0.528	0.671

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-315
Carbon sink potential - High - All (not counting overlap) (1000 tC02e/y)							-36,273
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tC02e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tC02e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y)							-158
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-12,261
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tC02e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tC02e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407

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

Item Corbon sink notantial Law Referent	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest							-183
pasture (1000 tC02e/y)							000
Carbon sink potential - Low - Restore							-922
productivity (1000 tC02e/y)							00/
Carbon sink potential - Mid - Accelerate							-236
regeneration (1000 tC02e/y)							01.010
Carbon sink potential - Mid - All (not							-24,243
counting overlap) (1000 tC02e/y)							0/0
Carbon sink potential - Mid - Avoid							-960
deforestation (1000 tC02e/y)							
Carbon sink potential - Mid - Extend							-5,059
rotation length (1000 tCO2e/y)							0.004
Carbon sink potential - Mid - Improve							-2,081
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-11,805
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-360
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-610
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,303
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-1,829
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							51.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							223
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,727
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,028
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 -							50.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							53.8
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							68.8
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							907
High - Restore productivity (1000							, 51
hectares)							
Land impacted for carbon sink potential -							6,110
High - Total impacted (over 30 years)							-7
(1000 hectares)							
Land impacted for carbon sink potential -		-			+		25.7
Low - Accelerate regeneration (1000							25.1
hectares)							
Land impacted for carbon sink potential -							209
Low - Avoid deforestation (over 30 years)							207
(1000 hectares)							
Land impacted for carbon sink potential -					+		1,428
Low - Extend rotation length (1000							1,420
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 -							514
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							0/7
Land impacted for carbon sink potential -							26.7
Low - Increase trees outside forests							
(1000 hectares) Land impacted for carbon sink potential -							26.9
Low - Reforest cropland (1000 hectares)							20.9
Land impacted for carbon sink potential -							11.9
Low - Reforest pasture (1000 hectares)							11.7
Land impacted for carbon sink potential -							549
Low - Restore productivity (1000							047
hectares)							
Land impacted for carbon sink potential -							2,791
Low - Total impacted (over 30 years)							2,171
(1000 hectares)							
Land impacted for carbon sink potential -							38.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							216
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,578
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							774
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 -							38.7
Mid - Increase trees outside forests (1000							
hectares)							/ 0.0
Land impacted for carbon sink potential -							40.3
Mid - Reforest cropland (1000 hectares)							07.0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential -							1,105
Mid - Restore productivity (1000							1,105
hectares)							
Land impacted for carbon sink potential -						-	4,876
Mid - Total impacted (over 30 years) (1000							4,010
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	-9.71		-9.95				-8.06
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-4.82		-8.04				-8.46
Business-as-usual carbon sink - Total (Mt CO2e/y)	-14.5		-18				-16.5

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		1,013	671	563	512	492	480
Monetary damages from air pollution - Natural Gas (million 2019\$)		173	185	202	202	233	244
Monetary damages from air pollution - Transportation (million 2019\$)		1,057	1,092	1,127	1,167	1,208	1,251
Premature deaths from air pollution - Coal (deaths)		114	75.8	63.5	57.8	55.6	54.2
Premature deaths from air pollution - Natural Gas (deaths)		19.6	20.9	22.8	22.8	26.3	27.6
Premature deaths from air pollution - Transportation (deaths)		119	123	127	131	136	141