

Net-Zero America - Iouisiana 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.

Data by category and subcategory

1	E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	. 1
2	E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	. 1
3	E+ scenario - PILLAR 1: Efficiency/Electrification - Overview	. 1
4	E+ scenario - PILLAR 1: Efficiency/Electrification - Residential	. 1
5	E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	. 2
6	E+ scenario - PILLAR 2: Clean Electricity - Generating capacity	2
7	E+ scenario - PILLAR 2: Clean Electricity - Generation	. 2
8	E+ scenario - PILLAR 3: Clean fuels - Bioenergy	3
9	E+ scenario - PILLAR 4: CCUS - CO2 capture	3
10	E+ scenario - PILLAR 4: CCUS - CO2 pipelines	3
11	E+ scenario - PILLAR 4: CCUS - CO2 storage	4
12	E+ scenario - PILLAR 6: Land sinks - Agriculture	4
13	E+ scenario - PILLAR 6: Land sinks - Forests	5
14	E+ scenario - IMPACTS - Fossil fuel industries	. 7
15	E+ scenario - IMPACTS - Health	. 7
16	E+ scenario - IMPACTS - Jobs	. 7
17	E- scenario - PILLAR 1: Efficiency/Electrification - Commercial	9
18	E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	9
19	E- scenario - PILLAR 1: Efficiency/Electrification - Overview	9
20	E- scenario - PILLAR 1: Efficiency/Electrification - Residential	9
21	E- scenario - PILLAR 1: Efficiency/Electrification - Transportation	10
22	E- scenario - PILLAR 6: Land sinks - Agriculture	10
23	E- scenario - PILLAR 6: Land sinks - Forests	. 11
24	E- scenario - IMPACTS - Health	13
25	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	14
26	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand .	14
27	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview	14
28	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential	14
29	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	15
30	E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity	15
31	E+RE+ scenario - PILLAR 2: Clean Electricity - Generation	15
32	E+RE+ scenario - PILLAR 6: Land sinks - Agriculture	16
33	E+RE+ scenario - PILLAR 6: Land sinks - Forests	16
34	E+RE+ scenario - IMPACTS - Health	. 19
35	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial	. 19
36	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	. 19
37	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview	. 19
38	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential	20
39	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation	20
40	E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity	21
41	E+RE- scenario - PILLAR 2: Clean Electricity - Generation	21
42	E+RE- scenario - PILLAR 6: Land sinks - Agriculture	21
43	E+RE- scenario - PILLAR 6: Land sinks - Forests	22

E+RE- scenario - IMPACTS - Health	24
E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	24
E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	25
E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview	25
E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential	25
E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	25
E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity	26
E-B+ scenario - PILLAR 2: Clean Electricity - Generation	26
E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy	26
E-B+ scenario - PILLAR 4: CCUS - CO2 capture	27
E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines	27
E-B+ scenario - PILLAR 4: CCUS - CO2 storage	27
E-B+ scenario - PILLAR 6: Land sinks - Agriculture	27
E-B+ scenario - PILLAR 6: Land sinks - Forests	28
E-B+ scenario - IMPACTS - Health	31
REF scenario - PILLAR 1: Efficiency/Electrification - Commercial	31
REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	31
REF scenario - PILLAR 1: Efficiency/Electrification - Overview	31
REF scenario - PILLAR 1: Efficiency/Electrification - Residential	32
REF scenario - PILLAR 1: Efficiency/Electrification - Transportation	32
REF scenario - PILLAR 6: Land sinks - Forests	32
REF scenario - PILLAR 6: Land sinks - Forests - REF only	35
REF scenario - IMPACTS - Health	35
	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity E-B+ scenario - PILLAR 3: Clean Electricity - Generation E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy E-B+ scenario - PILLAR 4: CCUS - CO2 capture E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines E-B+ scenario - PILLAR 6: Land sinks - Agriculture E-B+ scenario - PILLAR 6: Land sinks - Forests E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand REF scenario - PILLAR 1: Efficiency/Electrification - Overview REF scenario - PILLAR 1: Efficiency/Electrification - Residential REF scenario - PILLAR 1: Efficiency/Electrification - Residential REF scenario - PILLAR 1: Efficiency/Electrification - Transportation REF scenario - PILLAR 6: Land sinks - Forests REF scenario - PILLAR 6: Land sinks - Forests

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	16,472	19,203	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric Heat Pump (%)	6.12	26.1	76.9	91.1	92.2	92.2	92.2
Sales of space heating units - Electric Resistance (%)	5.02	4.5	4.79	6.09	6.39	6.41	6.42
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	88.9	69.4	18.3	2.84	1.39	1.35	1.34
Sales of water heating units - Electric Heat Pump (%)	0.147	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	4.15	8.12	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	93.7	79.3	15	0.631	0	0	0
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		5.94	6.22	10.4	11.1	8.07	8.36
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)	127	128	123	117	112	111	112
Final energy use - Industry (PJ)	1,932	2,153	2,273	2,317	2,383	2,435	2,505
Final energy use - Residential (PJ)	142	136	128	117	108	103	102
Final energy use - Transportation (PJ)	598	567	515	454	397	363	350

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.78	4.86	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.6	73.7	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.4	26.3	4.49	0.226	0	0	0
Sales of space heating units - Electric	15	30.5	75.4	85.4	85.9	85.7	85.7
Heat Pump (%)							
Sales of space heating units - Electric	44.7	43.2	18.2	12.6	12.3	12.5	12.5
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.27	1.44	1.03	1.01	0.993	0.989
Sales of space heating units - Gas (%)	38	23	5.01	0.994	0.822	0.801	0.798
Sales of water heating units - Electric	0	12	63.6	75.1	75.6	75.6	75.6
Heat Pump (%)							
Sales of water heating units - Electric	56.5	60.4	29.9	23	22.7	22.7	22.7
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	25.8	4.84	0.202	0	0	0
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.71	1.71	1.72	1.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	747	1,909	3,103	4,697	5,116	4,875
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.067	0	1.34	0	5.93	0	9.61
units)							
Public EV charging plugs - L2 (1000 units)	0.204	0	32.1	0	143	0	231
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 (%)	1.7	1.95	1.32	0.424	0.077	0.013	0
Vehicle sales - Light-duty - EV (%)	3.4	13.6	44	80.8	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.8	79.8	51.3	17.5	3.42	0.594	0
Vehicle sales - Light-duty - hybrid (%)	3.92	4.18	3.04	1.15	0.276	0.059	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.348	0.215	0.068	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.109	0.105	0.07	0.025	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 6: E+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant	0	0	0	0	0	0	0
(billion \$2018)							
Capital invested - Biomass w/ccu allam	0	0	0	0	0	0	0
power plant (billion \$2018)							
Capital invested - Biomass w/ccu power	0	0	4.01	0	1.27	0	0
plant (billion \$2018)							
Capital invested - Offshore Wind - Base	0	0	0	0	0	0	0
(billion \$2018)							
Capital invested - Solar PV - Base (billion	0	0	0	0	0	0	0
\$2018)							
Capital invested - Solar PV - Constrained	0	12.5	1.23	0.476	0	0	0
(billion \$2018)							
Capital invested - Wind - Base (billion	0	0	0	0	0	0	0
\$2018)							
Capital invested - Wind - Constrained	0	0	0	0	0	0	0
(billion \$2018)							
Installed (cumulative) - OffshoreWind -	0	90	90	180	270	270	439
Base land use assumptions (MW)							
Installed (cumulative) - Rooftop PV (MW)	149	263	391	592	879	1,249	1,729
Installed (cumulative) - Solar - Base land	2,149	9,393	10,104	10,950	11,281	11,281	11,281
use assumptions (MW)							
Installed (cumulative) - Wind - Base land	0	0	0	0	0	410	682
use assumptions (MW)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	4,506	4,506	5,927	5,927	5,927

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	316	0	316	315	0	587
assumptions (GWh)							
OffshoreWind - Constrained land use	0	316	0	316	315	0	587
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	4,154	13,823	1,354	1,620	633	0	0
Solar - Constrained land use assumptions	4,549	15,294	1,525	1,232	461	0	696
(GWh)							
Wind - Base land use assumptions (GWh)	0	0	0	0	0	1,119	724
Wind - Constrained land use assumptions	0	0	0	0	23,852	0	0
(GWh)							

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

0000	חחחר	0000	0005	0070	00/5	0050
2020						2050
0	0	178	338	1,053	1,053	1,053
0	0	3,683	2,872	12,973	0	0
0	0	0	0	0	0	0
0	0	0	3	16	16	16
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	4	4	5	5	5
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	1	1	1	1	1
	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 178 0 0 3,683 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 178 338 0 0 3,683 2,872 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 178 338 1,053 0 0 3,683 2,872 12,973 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 178 338 1,053 1,053 0 0 3,683 2,872 12,973 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	4.5	8.25	24.6	24.7	25.1
Annual - BECCS (MMT)		0	4.46	8.14	24.5	24.6	24.6
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0.03	0.11	0.12	0.13	0.58
Cumulative - All (MMT)		0	4.5	12.8	37.4	62.1	87.2
Cumulative - BECCS (MMT)		0	4.46	12.6	37.1	61.7	86.2
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0.03	0.14	0.26	0.39	0.97

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

Table 10. L. Scenario Tillar 4. 0000 0	OZ pipciilic	U					
Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	1,158	2,112	2,735	2,824	3,406
Cumulative investment - All (million \$2018)		0	5,319	8,747	9,320	9,421	9,749
Cumulative investment - Spur (million \$2018)		0	211	512	1,085	1,187	1,515
Cumulative investment - Trunk (million \$2018)		0	5,108	8,234	8,234	8,234	8,234
Spur (km)		0	337	760	1,383	1,472	2,054
Trunk (km)		0	821	1,352	1,352	1,352	1,352

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	12.1	41.4	75	121	163
Injection wells (wells)		0	10	41	72	122	150
Resource characterization, appraisal, permitting costs (million \$2020)		47.3	1,162	1,837	1,837	1,837	1,837
Wells and facilities construction costs (million \$2020)		0	312	1,215	2,166	3,621	4,496

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

Table 12: E+ Scenario - PILLAR 6: Land Sink			0000	0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-181
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							F /1/
Carbon sink potential - Aggressive							-5,416
deployment - Cropland measures (1000							
tCO2e/y)							(7.0
Carbon sink potential - Aggressive							-67.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,665
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,814
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-33.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,029
deployment - Total (1000 tCO2e/y)							,
Land impacted for carbon sink -							73.3
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,563
Aggressive deployment - Cropland							.,
measures (1000 hectares)							
Land impacted for carbon sink -							123
Aggressive deployment - Permanent							120
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,760
Aggressive deployment - Total (1000							1,700
hectares)							
Land impacted for carbon sink - Moderate							73.3
deployment - Corn-ethanol to energy							13.3
grasses (1000 hectares)							010
Land impacted for carbon sink - Moderate							813
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							61.7
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							948
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-388
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tC02e/y)							7.00/
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							0.057
Carbon sink potential - High - Improve							-3,857
plantations (1000 tC02e/y)							10.001
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tC02e/y)							0//
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tC02e/y) Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							-1,331
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tC02e/y)							-5,511
Carbon sink potential - High - Restore						-	-3,779
productivity (1000 tC02e/y)							-5,117
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							-170
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tC02e/y)							-12,212
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tC02e/y)							201
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tC02e/y)							2,.00
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							, -
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							•
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-669
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-422
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-24,865
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tC02e/y)							2 2 2 2
Carbon sink potential - Mid - Reforest							-2,997
pasture (1000 tC02e/y)							2
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -	2020	2020	2000	2000	2040	2040	63.5
High - Accelerate regeneration (1000							00.0
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							100
(1000 hectares)							
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							0,000
hectares)							
Land impacted for carbon sink potential -							1,421
High - Improve plantations (1000							1,721
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							O
hectares)							
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							00.4
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							00.4
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							130
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							1,253
hectares)							
Land impacted for carbon sink potential -							6,840
							6,640
High - Total impacted (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							31.8
							31.0
Low - Accelerate regeneration (1000							
hectares)							176
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							1.075
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							
hectares)							711
Land impacted for carbon sink potential -							711
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 -							42.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							44.2
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							758
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,165
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							47.7
Mid - Accelerate regeneration (1000							
hectares)	1	1	1				

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

2020	2025	2030	2035	2040	2045	2050
						182
						2,481
						1,069
						0
						61.4
						66.3
						198
						1,527
						5,633
	2020	2020 2025	2020 2025 2030	2020 2025 2030 2035	2020 2025 2030 2035 2040	2020 2025 2030 2035 2040 2045

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		1,342	1,131	907	683	430	298
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	27,326
Natural gas production - Annual (tcf)		3,393	3,208	2,794	2,362	1,873	1,455
Oil consumption - Annual (million bbls)		176	158	129	102	80	58.8
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	3,942
Oil production - Annual (million bbls)		87.4	87.7	87.6	69.4	56.4	37.5

Table 15: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		251	0.265	0.229	0.146	0.088	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		147	87.1	48.6	42.1	22.2	11.7
Monetary damages from air pollution - Transportation (million 2019\$)		716	671	513	298	138	57.1
Premature deaths from air pollution - Coal (deaths)		28.3	0.03	0.026	0.017	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		16.6	9.84	5.48	4.76	2.51	1.32
Premature deaths from air pollution - Transportation (deaths)		80.6	75.5	57.7	33.5	15.5	6.42

Table 16: E+ scenario - IMPACTS - Jobs

2020	2025	2030	2035	2040	2045	2050
	173	482	787	1,871	1,526	1,257
	18,631	15,168	15,055	13,369	11,175	10,662
	26,861	30,395	37,234	35,031	27,836	32,792
	25,601	19,924	14,818	9,645	6,203	3,458
	2020	173 18,631 26,861	173 482 18,631 15,168 26,861 30,395	173 482 787 18,631 15,168 15,055 26,861 30,395 37,234	173 482 787 1,871 18,631 15,168 15,055 13,369 26,861 30,395 37,234 35,031	173 482 787 1,871 1,526 18,631 15,168 15,055 13,369 11,175 26,861 30,395 37,234 35,031 27,836

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

Table 16: E+ scenario - IMPACTS - Jobs (co	ntinueaj						
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		1,833	950	1,134	1,222	1,186	1,381
By economic sector - Pipeline (jobs)		2,177	2,517	1,992	1,289	926	708
By economic sector - Professional (jobs)		11,016	8,780	8,765	9,077	7,722	6,909
By economic sector - Trade (jobs)		9,894	7,912	7,265	6,336	5,172	4,355
By economic sector - Utilities (jobs)		14,952	15,134	15,450	14,244	11,051	10,132
By education level - All sectors -		33,558	30,800	31,406	28,149	22,292	22,233
Associates degree or some college (jobs)							
By education level - All sectors -		25,587	22,892	22,506	19,790	15,480	14,799
Bachelors degree (jobs)							
By education level - All sectors - Doctoral		839	694	649	585	465	411
degree (jobs)							
By education level - All sectors - High		45,133	41,625	42,885	39,098	31,064	30,972
school diploma or less (jobs)							
By education level - All sectors - Masters		6,021	5,248	5,054	4,463	3,497	3,240
or professional degree (jobs)							
By resource sector - Biomass (jobs)		744	1,328	2,242	5,633	5,567	5,367
By resource sector - CO2 (jobs)		47.4	5,826	4,378	1,433	1,842	2,235
By resource sector - Coal (jobs)		641	105	8.25	7.08	6.3	5.52
By resource sector - Grid (jobs)		11,976	11,411	16,175	17,208	14,746	15,191
By resource sector - Natural Gas (jobs)		41,897	32,991	25,333	20,464	13,078	7,450
By resource sector - Nuclear (jobs)		1,128	1,110	1,093	634	0	0
By resource sector - Oil (jobs)		27,520	24,381	21,256	15,488	11,575	7,349
By resource sector - Solar (jobs)		19,783	13,691	18,105	18,417	16,667	22,253
By resource sector - Wind (jobs)		7,403	10,415	13,910	12,801	9,318	11,805
Median wages - Annual - All (\$2019 per		59,061	59,662	59,502	59,590	59,990	59,446
iob)		, , , , ,	, , , ,	, , , ,		,	, -
On-Site or In-Plant Training - Total jobs - 1		17,739	16,190	16,333	14,527	11,464	11,259
to 4 years (jobs)			.		,	,	•
On-Site or In-Plant Training - Total jobs - 4		6,827	6,059	5,873	5,149	4,077	3,790
to 10 years (jobs)		-,-	-,	-,	-,	, -	
On-Site or In-Plant Training - Total jobs -		18,076	16,377	16,611	14,993	11,849	11,759
None (jobs)		-,	-,-	-,-	, -	, -	, -
On-Site or In-Plant Training - Total jobs -		850	788	804	726	580	572
Over 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		67,646	61,847	62,880	56,689	44,828	44,274
Up to 1 year (jobs)		- ,	, -	. ,	,	,	•
On-the-Job Training - All sectors - 1 to 4		22,732	20,707	20,807	18,453	14,546	14,251
years (jobs)		, -	-, -	-,		,	, -
On-the-Job Training - All sectors - 4 to 10		6,317	5,586	5,433	4,790	3,808	3,557
years (jobs)		-,-	-,	-,	, -	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
On-the-Job Training - All sectors - None		6,137	5,435	5,419	4,832	3,824	3,753
(jobs)		7,53	5, 155	3,	,,,,,,	-,	0,
On-the-Job Training - All sectors - Over 10		1,143	1,052	1,086	962	758	782
years (jobs)		.,	,,,,,	,,,,,			
On-the-Job Training - All sectors - Up to 1		74,809	68,481	69,757	63,046	49,863	49,311
year (jobs)		,007	33, 13.	07,101	00,010	,000	.,,
Related work experience - All sectors - 1		40,840	37,108	37,279	33,304	26,247	25,533
to 4 years (jobs)		.0,0 .0	0.,.00	0.,,	33,33	20,2	20,000
Related work experience - All sectors - 4		26,179	23,770	23,804	21,123	16,642	16,237
to 10 years (jobs)		20,117	20,110	20,004	21,120	10,042	10,201
Related work experience - All sectors -		15,504	14,191	14,397	13,034	10,339	10,161
None (jobs)		10,004	17,171	14,071	10,004	10,007	10,101
Related work experience - All sectors -		7,464	6,847	6,927	6,124	4,803	4,773
Over 10 years (jobs)		1,404	0,041	0,721	0,124	4,003	- ,113
Related work experience - All sectors - Up		21,151	19,344	20,094	18,498	14,767	14,949
to 1 year (jobs)		21,101	17,044	20,074	10,470	14,101	17,/7/
Wage income - All (million \$2019)		6,564	6,042	6,099	5,487	4,367	4,260
vvage income - An (infillion \$2017)		0,004	0,042	0,077	5,401	4,301	4,200

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	16,461	19,126	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	30.1	34.2	39	52	70.1	81.2	85
Resistance (%)							
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Sales of space heating units - Electric	6.12	16.4	22.3	39	65.1	83.1	89.8
Heat Pump (%)							
Sales of space heating units - Electric	5.02	4.5	4.54	4.7	5.12	5.78	6.22
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	88.9	79.1	73.2	56.3	29.8	11.1	4.02
(%)							
Sales of water heating units - Electric	0.147	1.96	7.14	22.1	44.9	59.9	65.1
Heat Pump (%)							
Sales of water heating units - Electric	4.15	4.5	6.61	12.8	22.2	28.4	30.5
Resistance (%)							
Sales of water heating units - Gas Furnace	93.7	91.7	84.4	63.3	31	9.9	2.58
(%)							
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.71	4.85	6.22	6.5	9.04	9.59
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)	127	128	127	126	123	121	119
Final energy use - Industry (PJ)	1,932	2,153	2,275	2,325	2,395	2,445	2,512
Final energy use - Residential (PJ)	142	137	134	131	124	116	110
Final energy use - Transportation (PJ)	599	570	531	500	477	451	421

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	3.73	4.58	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.5	67.4	70.4	78.5	89.8	96.7	99.1
Resistance (%)							
Sales of cooking units - Gas (%)	33.5	32.6	29.6	21.5	10.2	3.31	0.889
Sales of space heating units - Electric	15	21.9	27	41.8	64.3	78.9	84
Heat Pump (%)							
Sales of space heating units - Electric	44.7	48	45.1	36.7	24.2	16.2	13.4
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.62	3.47	2.83	1.88	1.28	1.07
Sales of space heating units - Gas (%)	38	26.5	24.5	18.7	9.62	3.59	1.53
Sales of water heating units - Electric	0	2.06	7.93	24.8	50.7	67.6	73.5
Heat Pump (%)							
Sales of water heating units - Electric	56.5	66.3	63	52.9	37.5	27.4	23.9
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	29.9	27.3	20.5	10.1	3.2	0.831
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.73	1.74	1.73	1.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million \$2018)	0	0	120	254	856	2,700	3,931
Public EV charging plugs - DC Fast (1000 units)	0.067	0	0.404	0	2.19	0	6.15
Public EV charging plugs - L2 (1000 units)	0.204	0	9.71	0	52.7	0	148
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 (%)	1.71	2.1	2.09	1.67	1.08	0.557	0.238
Vehicle sales - Light-duty - EV (%)	1.71	4.29	11	24.5	46.9	71.1	87.2
Vehicle sales - Light-duty - gasoline (%)	92.3	88.2	80.9	68.3	47.8	25.9	11.4
Vehicle sales - Light-duty - hybrid (%)	4.05	4.89	5.54	5.12	3.91	2.35	1.15
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.385	0.335	0.259	0.186	0.104	0.048
Vehicle sales - Light-duty - other (%)	0.11	0.113	0.104	0.091	0.066	0.037	0.017
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

Table 22: E- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,416
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-67.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,665
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,814
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-33.9
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,029
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							73.3
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,563
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							123
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							1,760
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							73.3
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							813
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							61.7
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							948
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-388
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tC02e/y)							
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-3,857
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,779
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-669
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-422
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tCO2e/y)							

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

Item Carbon sink potential - Mid - All (not	2020	2025	2030	2035	2040	2045	2050 -24,865
counting overlap) (1000 tC02e/y)							-24,000
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							-2,876
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tCO2e/y)							3,72.
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							2.007
pasture (1000 tCO2e/y)							-2,997
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tCO2e/y)							2,02.
Land impacted for carbon sink potential -							63.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							0,000
hectares)							
Land impacted for carbon sink potential -							1,421
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential - High - Increase retention of HWP (1000							0
hectares)							
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares) Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							1,200
hectares)							
Land impacted for carbon sink potential -							6,840
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							
hectares) Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							110
(1000 hectares)							
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							711
Low - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							U
hectares)							

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

Low - Increase trees outside forests (1000 hectares) Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	2.3 4.2 7.4
[1000 hectares] Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) [1000 hectares] Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	7.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	7.4
Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	7.4
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	·58
Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	'58
hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Low - Total impacted (over 30 years) [1000 hectares] Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
(1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	165
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Mid - Accelerate regeneration (1000 hectares)	
hectares)	+7.7
Land imported for conton sink potential	
Land impacted for Garbon sink potential -	82
Mid - Avoid deforestation (over 30 years)	
(1000 hectares)	
Land impacted for carbon sink potential -	481
Mid - Extend rotation length (1000	
hectares)	
Land impacted for carbon sink potential -	169
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 -	1.4
Mid - Increase trees outside forests (1000	
hectares)	
Land impacted for carbon sink potential -	6.3
Mid - Reforest cropland (1000 hectares)	
Land impacted for carbon sink potential -	198
Mid - Reforest pasture (1000 hectares)	
Land impacted for carbon sink potential -	527
Mid - Restore productivity (1000	
hectares)	
Land impacted for carbon sink potential - 5,6	33
Mid - Total impacted (over 30 years) (1000	
hectares)	

Table 24: E- scenario - IMPACTS - Health

Table 24. L Scenario Initratto riculti							
Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		251	0.265	0.229	0.146	0.088	0.003
Coal (million 2019\$)							
Monetary damages from air pollution -		142	73.6	33.7	14.6	7.17	6.75
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		727	735	719	651	521	360
Transportation (million 2019\$)							
Premature deaths from air pollution -		28.3	0.03	0.026	0.017	0.01	0
Coal (deaths)							
Premature deaths from air pollution -		16	8.3	3.8	1.65	0.809	0.762
Natural Gas (deaths)							
Premature deaths from air pollution -		81.8	82.7	80.9	73.2	58.6	40.5
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	16,472	19,203	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric Heat Pump (%)	6.12	26.1	76.9	91.1	92.2	92.2	92.2
Sales of space heating units - Electric Resistance (%)	5.02	4.5	4.79	6.09	6.39	6.41	6.42
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	88.9	69.4	18.3	2.84	1.39	1.35	1.34
Sales of water heating units - Electric Heat Pump (%)	0.147	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	4.15	8.12	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	93.7	79.3	15	0.631	0	0	0
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		5.94	6.22	10.4	11.1	8.07	8.36
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)	127	128	123	117	112	111	112
Final energy use - Industry (PJ)	1,932	2,153	2,273	2,317	2,383	2,435	2,505
Final energy use - Residential (PJ)	142	136	128	117	108	103	102
Final energy use - Transportation (PJ)	598	567	515	454	397	363	350

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	3.78	4.86	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.6	73.7	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.4	26.3	4.49	0.226	0	0	0
Sales of space heating units - Electric	15	30.5	75.4	85.4	85.9	85.7	85.7
Heat Pump (%)							
Sales of space heating units - Electric	44.7	43.2	18.2	12.6	12.3	12.5	12.5
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.27	1.44	1.03	1.01	0.993	0.989
Sales of space heating units - Gas (%)	38	23	5.01	0.994	0.822	0.801	0.798
Sales of water heating units - Electric	0	12	63.6	75.1	75.6	75.6	75.6
Heat Pump (%)							
Sales of water heating units - Electric	56.5	60.4	29.9	23	22.7	22.7	22.7
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	25.8	4.84	0.202	0	0	0
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.71	1.71	1.72	1.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	747	1,909	3,103	4,697	5,116	4,875
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.067	0	1.34	0	5.93	0	9.61
_units)							
Public EV charging plugs - L2 (1000 units)	0.204	0	32.1	0	143	0	231
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 (%)	1.7	1.95	1.32	0.424	0.077	0.013	0
Vehicle sales - Light-duty - EV (%)	3.4	13.6	44	80.8	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.8	79.8	51.3	17.5	3.42	0.594	0
Vehicle sales - Light-duty - hybrid (%)	3.92	4.18	3.04	1.15	0.276	0.059	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.348	0.215	0.068	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.109	0.105	0.07	0.025	0.005	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	0	0.255	0.217	0	0.31	0	3.13
(billion \$2018)							
Capital invested - Solar PV - Base (billion	0	5	0.207	0.17	0.14	0.476	0
\$2018)							
Capital invested - Wind - Base (billion	0	0	0	0	0.397	0.388	26.1
\$2018)							
Installed (cumulative) - OffshoreWind -	0	90	180	180	359	359	2,859
Base land use assumptions (MW)							
Installed (cumulative) - Solar - Base land	3,369	7,103	7,276	7,430	7,565	8,050	8,050
use assumptions (MW)							
Installed (cumulative) - Wind - Base land	0	0	0	0	336	682	25,361
use assumptions (MW)							

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	316	316	0	620	0	8,759
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	1,534
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	6,488	7,147	331	295	258	928	0
Solar - Constrained land use assumptions	4,130	7,335	1,711	258	0	0	2,106
(GWh)							
Wind - Base land use assumptions (GWh)	0	0	0	0	917	926	62,588
Wind - Constrained land use assumptions	0	0	0	2,842	21,011	0	5,093
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,416
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-67.8
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-5,665
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,814
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-33.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,029
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							73.3
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,563
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							123
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,760
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							73.3
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							813
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							61.7
deployment - Permanent conservation							J
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							948
							7-10
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							

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

2020	2025	2030	2035	2040	2045	2050
						-388
						-37,585
						-1,388
						-7,036
						-3,857
						-13,381
	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 (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tC02e/y)							1.00
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,33 ⁻
Carbon sink potential - High - Reforest pasture (1000 tC02e/y)							-5,57
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,779
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-195
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,21
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)							-23
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,70
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,96
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-4,46
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-290
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-66
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-42
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,27
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-29
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,86
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-81
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,86
Carbon sink potential - Mid - Improve olantations (1000 tCO2e/y)							-2,87
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-8,92
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-5
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,00
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,99
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,52
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							63
and impacted for carbon sink potential - High - Avoid deforestation (over 30 years)							18
(1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000							3,58
hectares) Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,42

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

Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050
High - Increase retention of HWP (1000							(
hectares)							
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,25
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,840
High - Total impacted (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							31.0
hectares)							
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							110
(1000 hectares)							
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							,-
hectares)							
Land impacted for carbon sink potential -							71
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							42.3
Low - Increase trees outside forests							
(1000 hectares)							,,,
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							44.2
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							21.4
Land impacted for carbon sink potential -							758
Low - Restore productivity (1000							100
hectares)							
Land impacted for carbon sink potential -							3,165
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							47.
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							18:
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,48
Mid - Extend rotation length (1000							
hectares)							100
Land impacted for carbon sink potential -							1,06
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000 hectares)							
Land impacted for carbon sink potential -		+					61.4
Mid - Increase trees outside forests (1000							01.4
hectares)							

Table 33: E+RE+	. cronaria ₋	DTII AD A.	I and cinke -	Forests	(continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							66.3
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							198
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,527
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,633
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 -		251	0.265	0.229	0.146	0.088	0.003
Coal (million 2019\$)							
Monetary damages from air pollution -		141	83.8	38.3	26.8	8.47	4.42
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		716	671	513	298	138	57.1
Transportation (million 2019\$)							
Premature deaths from air pollution -		28.3	0.03	0.026	0.017	0.01	0
Coal (deaths)							
Premature deaths from air pollution -		15.9	9.46	4.32	3.03	0.956	0.499
Natural Gas (deaths)							
Premature deaths from air pollution -		80.6	75.5	57.7	33.5	15.5	6.42
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	16,472	19,203	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric Heat Pump (%)	6.12	26.1	76.9	91.1	92.2	92.2	92.2
Sales of space heating units - Electric Resistance (%)	5.02	4.5	4.79	6.09	6.39	6.41	6.42
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	88.9	69.4	18.3	2.84	1.39	1.35	1.34
Sales of water heating units - Electric Heat Pump (%)	0.147	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	4.15	8.12	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	93.7	79.3	15	0.631	0	0	0
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		5.94	6.22	10.4	11.1	8.07	8.36
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)	127	128	123	117	112	111	112

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	1,932	2,153	2,273	2,317	2,383	2,435	2,505
Final energy use - Residential (PJ)	142	136	128	117	108	103	102
Final energy use - Transportation (PJ)	598	567	515	454	397	363	350

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	3.78	4.86	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.6	73.7	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.4	26.3	4.49	0.226	0	0	0
Sales of space heating units - Electric	15	30.5	75.4	85.4	85.9	85.7	85.7
Heat Pump (%)							
Sales of space heating units - Electric	44.7	43.2	18.2	12.6	12.3	12.5	12.5
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.27	1.44	1.03	1.01	0.993	0.989
Sales of space heating units - Gas (%)	38	23	5.01	0.994	0.822	0.801	0.798
Sales of water heating units - Electric	0	12	63.6	75.1	75.6	75.6	75.6
Heat Pump (%)							
Sales of water heating units - Electric	56.5	60.4	29.9	23	22.7	22.7	22.7
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	25.8	4.84	0.202	0	0	0
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.71	1.71	1.72	1.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	747	1,909	3,103	4,697	5,116	4,875
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.067	0	1.34	0	5.93	0	9.61
units)							
Public EV charging plugs - L2 (1000 units)	0.204	0	32.1	0	143	0	231
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 (%)	1.7	1.95	1.32	0.424	0.077	0.013	0
Vehicle sales - Light-duty - EV (%)	3.4	13.6	44	80.8	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.8	79.8	51.3	17.5	3.42	0.594	0
Vehicle sales - Light-duty - hybrid (%)	3.92	4.18	3.04	1.15	0.276	0.059	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.348	0.215	0.068	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.109	0.105	0.07	0.025	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 40: E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion \$2018)		0.255	0	0	0.156	0	0
Capital invested - Solar PV - Base (billion \$2018)		6.52	0.356	0.17	0	0	0
Capital invested - Solar PV - Constrained (billion \$2018)		5.33	0.495	0.403	0	0.151	0
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	1.07

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	316	0	0	316	0	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	11,065	9,298	567	295	0	0	0
Solar - Constrained land use assumptions (GWh)	4,300	7,617	794	701	0	293	0
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	2,390

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-18
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,416
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-67.8
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-5,665
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,814
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-33.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,029
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							73.3
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,563
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							123
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,760
Aggressive deployment - Total (1000							,
hectares)							
Land impacted for carbon sink - Moderate							73.3
deployment - Corn-ethanol to energy							. 5.0
grasses (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							813
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.7
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							948

Table 43: E+RE- scenario - PILLAR 6: Land	l sinks - Fore	ests					
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-388
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-3,857
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,779
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tCO2e/y)							•
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							,
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-669
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-422
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							.,
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tCO2e/y)							_,_
Carbon sink potential - Mid - All (not							-24,865
counting overlap) (1000 tCO2e/y)							= :,000
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tC02e/y)							0.0
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tC02e/y)							.,007
. 5.5							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tC02e/y)							0.001
Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)							-8,921
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tC02e/y)							-311
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tC02e/y)							-1,000
Carbon sink potential - Mid - Reforest							-2,997
pasture (1000 tCO2e/y)							_,,,,
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tCO2e/y)							_,
Land impacted for carbon sink potential -							63.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,421
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 -							80.4
High - Increase trees outside forests							
(1000 hectares)							00.7
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							150
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							1.050
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000 hectares)							
Land impacted for carbon sink potential -							6,840
High - Total impacted (over 30 years)							0,040
(1000 hectares)							
Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							01.0
hectares)							
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							•
hectares)							
Land impacted for carbon sink potential -							711
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 -							42.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							44.2
Low - Reforest cropland (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							758
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,165
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							47.7
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							182
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,481
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,069
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 -							61.4
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							66.3
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							198
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,527
Mid - Restore productivity (1000							•
hectares)							
Land impacted for carbon sink potential -							5,633
Mid - Total impacted (over 30 years) (1000							,
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		251	0.265	0.229	0.146	0.088	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		157	95.2	107	88.8	37.3	9.73
Monetary damages from air pollution - Transportation (million 2019\$)		716	671	513	298	138	57.1
Premature deaths from air pollution - Coal (deaths)		28.3	0.03	0.026	0.017	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		17.7	10.7	12.1	10	4.21	1.1
Premature deaths from air pollution - Transportation (deaths)		80.6	75.5	57.7	33.5	15.5	6.42

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

Item	2020	2025	2030	2035	2040	2045	2050		
Commercial HVAC investment in 2020s -	0	16,461	19,126	0	0	0	0		
Cumulative 5-yr (million \$2018)									
Sales of cooking units - Electric	30.1	34.2	39	52	70.1	81.2	85		
Resistance (%)									
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15		

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	6.12	16.4	22.3	39	65.1	83.1	89.8
Sales of space heating units - Electric Resistance (%)	5.02	4.5	4.54	4.7	5.12	5.78	6.22
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	88.9	79.1	73.2	56.3	29.8	11.1	4.02
Sales of water heating units - Electric Heat Pump (%)	0.147	1.96	7.14	22.1	44.9	59.9	65.1
Sales of water heating units - Electric Resistance (%)	4.15	4.5	6.61	12.8	22.2	28.4	30.5
Sales of water heating units - Gas Furnace (%)	93.7	91.7	84.4	63.3	31	9.9	2.58
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.71	4.85	6.22	6.5	9.04	9.59
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)	127	128	127	126	123	121	119
Final energy use - Industry (PJ)	1,932	2,153	2,275	2,325	2,395	2,445	2,512
Final energy use - Residential (PJ)	142	137	134	131	124	116	110
Final energy use - Transportation (PJ)	599	570	531	500	477	451	421

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	3.73	4.58	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.5	67.4	70.4	78.5	89.8	96.7	99.1
Resistance (%)							
Sales of cooking units - Gas (%)	33.5	32.6	29.6	21.5	10.2	3.31	0.889
Sales of space heating units - Electric	15	21.9	27	41.8	64.3	78.9	84
Heat Pump (%)							
Sales of space heating units - Electric	44.7	48	45.1	36.7	24.2	16.2	13.4
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.62	3.47	2.83	1.88	1.28	1.07
Sales of space heating units - Gas (%)	38	26.5	24.5	18.7	9.62	3.59	1.53
Sales of water heating units - Electric	0	2.06	7.93	24.8	50.7	67.6	73.5
Heat Pump (%)							
Sales of water heating units - Electric	56.5	66.3	63	52.9	37.5	27.4	23.9
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	29.9	27.3	20.5	10.1	3.2	0.831
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.73	1.74	1.73	1.72

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	120	254	856	2,700	3,931
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.067	0	0.404	0	2.19	0	6.15
units)							
Public EV charging plugs - L2 (1000 units)	0.204	0	9.71	0	52.7	0	148
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7

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

Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	1.71	2.1	2.09	1.67	1.08	0.557	0.238
Vehicle sales - Light-duty - EV (%)	1.71	4.29	11	24.5	46.9	71.1	87.2
Vehicle sales - Light-duty - gasoline (%)	92.3	88.2	80.9	68.3	47.8	25.9	11.4
Vehicle sales - Light-duty - hybrid (%)	4.05	4.89	5.54	5.12	3.91	2.35	1.15
Vehicle sales - Light-duty - hydrogen FC	0.113	0.385	0.335	0.259	0.186	0.104	0.048
(%)							
Vehicle sales - Light-duty - other (%)	0.11	0.113	0.104	0.091	0.066	0.037	0.017
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen	0.166	0.485	1.37	3.58	7.86	13.2	17
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	10.5	12.5	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	11,774	25,838	25,838	25,838

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	799	2,743	2,743	2,743
Conversion capital investment -	0	0	0	10,894	24,876	0	0
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	1	16	16	16
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	9	20	20	20
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	1	1	1	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	13.4	44.5	44.5	44.5
Annual - BECCS (MMT)		0	0	13.3	44.4	44.4	44.3
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0.14	0.11	0.09	0.17
Cumulative - All (MMT)		0	0	13.4	57.9	102	147
Cumulative - BECCS (MMT)		0	0	13.3	57.6	102	146
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0.14	0.25	0.34	0.51

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	845	2,391	3,748	3,748	4,168
Cumulative investment - All (million \$2018)		0	5,578	10,341	14,944	14,944	15,240
Cumulative investment - Spur (million \$2018)		0	12.7	714	1,786	1,786	2,082
Cumulative investment - Trunk (million \$2018)		0	5,565	9,626	13,158	13,158	13,158
Spur (km)		0	23.9	934	1,822	1,822	2,242
Trunk (km)		0	821	1,456	1,926	1,926	1,926

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

		-					
Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	19.4	87.8	173	240	252
Injection wells (wells)		0	16	65	116	194	240
Resource characterization, appraisal, permitting costs (million \$2020)		47.3	1,958	3,115	3,115	3,115	3,115
Wells and facilities construction costs (million \$2020)		0	499	1,946	3,468	5,799	7,199

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy							-527
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-4,958
deployment - Cropland measures (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Aggressive							-59.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-5,545
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-527
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,572
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops (1000 tCO2e/y)							
Carbon sink potential - Moderate							-29.9
deployment - Permanent conservation							-27.7
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,129
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							217
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							3,538
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							56.5
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							240
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							109
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							4,161
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							217
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							744
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							56.5
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							240
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							54.5
deployment - Permanent conservation							00
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,312
deployment - Total (1000 hectares)							.,512
uepioyinent - rotai (1000 nectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-388
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-3,857
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest						T	-1,337
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tC02e/y)							
Carbon sink potential - High - Restore							-3,779
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tCO2e/y)							•
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							.,, 02
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							4,400
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tC02e/y)							-270
Carbon sink potential - Low - Reforest							-669
							-009
cropland (1000 tCO2e/y)							/ 00
Carbon sink potential - Low - Reforest							-422
pasture (1000 tC02e/y)							4.07/
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tC02e/y)							
Carbon sink potential - Mid - All (not							-24,865
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tCO2e/y)							•
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tCO2e/y)							• • •
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tCO2e/y)							1,000
Carbon sink potential - Mid - Reforest							-2,997
pasture (1000 tC02e/y)							-2,771
Carbon sink potential - Mid - Restore							-2,527
·							-2,521
productivity (1000 tCO2e/y) Land impacted for carbon sink potential -							/0.5
							63.5
High - Accelerate regeneration (1000							
hectares)							400
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,421
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)			I .				

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

Iable 57: E-B+ scenario - PILLAR 6: Land s Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,840
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							711
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 -							42.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							44.2
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							758
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,165
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							47.7
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							182
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,481
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,069
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 -							61.4
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							66.3
Mid - Reforest cropland (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							198
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,527
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,633

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		251	0.265	0.229	0.146	0.088	0.003
Coal (million 2019\$)							
Monetary damages from air pollution -		146	74.1	41.8	28.8	17.1	10.8
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		727	735	719	651	521	360
Transportation (million 2019\$)							
Premature deaths from air pollution -		28.3	0.03	0.026	0.017	0.01	0
Coal (deaths)							
Premature deaths from air pollution -		16.5	8.37	4.72	3.25	1.93	1.22
Natural Gas (deaths)							
Premature deaths from air pollution -		81.8	82.7	80.9	73.2	58.6	40.5
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	16,112	16,910	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	32.3	32.3	32.3	32.3	32.3	32.3
Sales of cooking units - Gas (%)	69.9	67.7	67.7	67.7	67.7	67.7	67.7
Sales of space heating units - Electric Heat Pump (%)	6.12	28.9	70.9	79.1	79.5	79.5	79.5
Sales of space heating units - Electric Resistance (%)	5.02	6.38	12.2	15.9	18.7	19.1	19.1
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	88.9	64.7	17	5	1.82	1.39	1.34
Sales of water heating units - Electric Heat Pump (%)	0.147	0.132	0.129	0.132	0.131	0.129	0.129
Sales of water heating units - Electric Resistance (%)	4.15	3.75	3.71	3.72	3.75	3.73	3.74
Sales of water heating units - Gas Furnace (%)	93.7	94.3	94.3	94.3	94.3	94.3	94.3
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		6.34	6.66	9.85	10.5	8.17	8.47
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)	127	130	131	133	135	141	150
Final energy use - Industry (PJ)	1,933	2,162	2,297	2,357	2,441	2,510	2,595
Final energy use - Residential (PJ)	142	137	138	141	145	151	156
Final energy use - Transportation (PJ)	599	570	535	514	514	526	543

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	3.65	3.76	0	0	0	0
Sales of cooking units - Electric Resistance (%)	66.2	66.2	66.2	66.2	66.2	66.2	66.2
Sales of cooking units - Gas (%)	33.8	33.8	33.8	33.8	33.8	33.8	33.8
Sales of space heating units - Electric Heat Pump (%)	12.3	40.8	42	44	45.9	48.4	52.1
Sales of space heating units - Electric Resistance (%)	46.3	37.2	36.6	35.6	34.3	32	28.2
Sales of space heating units - Fossil (%)	2.33	2.13	2.16	2.14	2.1	2.11	2.11
Sales of space heating units - Gas (%)	39.1	19.9	19.2	18.2	17.7	17.5	17.6
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	56.5	67.6	67.7	67.7	67.5	67.5	67.5
Sales of water heating units - Gas Furnace (%)	41.3	30.7	30.5	30.6	30.8	30.7	30.8
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.74	1.75	1.75	1.76

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 (%)	1.71	2.1	2.21	2.06	1.86	1.73	1.65
Vehicle sales - Light-duty - EV (%)	3.05	4.94	5.66	6.92	8.47	9.91	11.1
Vehicle sales - Light-duty - gasoline (%)	91.1	87.7	85.8	84.1	82.2	80.2	78.6
Vehicle sales - Light-duty - hybrid (%)	3.94	4.81	5.91	6.48	7.09	7.74	8.29
Vehicle sales - Light-duty - hydrogen FC	0.112	0.382	0.355	0.318	0.316	0.318	0.329
(%)							
Vehicle sales - Light-duty - other (%)	0.109	0.113	0.11	0.11	0.11	0.109	0.112
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							-388
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-3,857
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase		•					-846
trees outside forests (1000 tCO2e/y)							

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

Item Contagnish notantial High Defendet	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,57 ⁻
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,779
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - Low - Avoid							-23
deforestation (1000 tCO2e/y)							0
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tC02e/y)							-2,100
							10/0
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-29
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-669
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-422
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							-1,212
							000
Carbon sink potential - Mid - Accelerate							-29:
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-24,86
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							2,010
Carbon sink potential - Mid - Increase							-8,92
retention of HWP (1000 tCO2e/y)							-0,72
• //							
Carbon sink potential - Mid - Increase							-57
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-1,00
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-2,99
pasture (1000 tC02e/y)							•
Carbon sink potential - Mid - Restore							-2,52
productivity (1000 tCO2e/y)							2,02
Land impacted for carbon sink potential -							63.
High - Accelerate regeneration (1000							03.8
• • • • • • • • • • • • • • • • • • • •							
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,58
High - Extend rotation length (1000							•
hectares)							
Land impacted for carbon sink potential -				+			1,42
							1,42
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
High - Increase retention of HWP (1000							
hectares)	1	1	[

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

		s (continue					
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							
(1000 hectares)							00.7
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							450
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,840
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							711
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 -							42.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							44.2
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							758
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,165
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							47.7
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							182
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,481
Mid - Extend rotation length (1000							•
hectares)							
Land impacted for carbon sink potential -							1,069
Mid - Improve plantations (1000 hectares)							.,
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							0
hectares)							
Land impacted for carbon sink potential -				+		+	61.4
Mid - Increase trees outside forests (1000							01.4
hectares)							
Land impacted for carbon sink potential -							66.3
Mid - Reforest cropland (1000 hectares)							00.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							198
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,527
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,633
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural	-31.8		-11.5				-9.34
uptake (Mt CO2e/y)							
Business-as-usual carbon sink - Retained	-3.64		-6.07				-6.39
in Hardwood Products (Mt CO2e/y)							
Business-as-usual carbon sink - Total (Mt	-35.4		-17.6				-15.7
CO2e/y)							

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		1,342	802	417	333	300	298
Monetary damages from air pollution - Natural Gas (million 2019\$)		161	168	189	148	144	125
Monetary damages from air pollution - Transportation (million 2019\$)		727	747	767	791	816	841
Premature deaths from air pollution - Coal (deaths)		152	90.6	47	37.6	33.9	33.7
Premature deaths from air pollution - Natural Gas (deaths)		18.2	19	21.4	16.7	16.3	14.1
Premature deaths from air pollution - Transportation (deaths)		81.8	84	86.3	89	91.8	94.6