

# Net-Zero America - washington state report

2021-03-15

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

E. Larson, C. Greig, J. Jenkins, E. Mayfield, A. Pascale, C. Zhang, J. Drossman, R. Williams, S. Pacala, R. Socolow, EJ Baik, R. Birdsey, R. Duke, R. Jones, B. Haley, E. Leslie, K. Paustian, and A. Swan, Net-Zero America: Potential Pathways, Infrastructure, and Impacts, interim report, Princeton University, Princeton, NJ, December 15, 2020. Report available at <a href="https://netzeroamerica.princeton.edu">https://netzeroamerica.princeton.edu</a>.

#### Notes

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

## 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	. 3
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	
23	E- scenario - PILLAR 6: Land sinks - Forests	
24	E- scenario - IMPACTS - Health	
25	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	. 14
26	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand .	
27	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview	
28	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential	
29	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	
30	E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity	. 15
31	E+RE+ scenario - PILLAR 2: Clean Electricity - Generation	
32	E+RE+ scenario - PILLAR 6: Land sinks - Agriculture	
33	E+RE+ scenario - PILLAR 6: Land sinks - Forests	
34	E+RE+ scenario - IMPACTS - Health	
35	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial	
36	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	
37	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview	
38	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential	
39	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation	
40	E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity	
41	E+RE- scenario - PILLAR 2: Clean Electricity - Generation	
42	E+RE- scenario - PILLAR 6: Land sinks - Agriculture	
43	E+RE- scenario - PILLAR 6: Land sinks - Forests	. 22

44	E+RE- scenario - IMPACTS - Health	24
45	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	25
46	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	25
47	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview	25
48	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential	25
49	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	26
50	E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity	26
51	E-B+ scenario - PILLAR 2: Clean Electricity - Generation	26
52	E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy	26
53	E-B+ scenario - PILLAR 4: CCUS - CO2 capture	27
54	E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines	27
55	E-B+ scenario - PILLAR 4: CCUS - CO2 storage	27
56	E-B+ scenario - PILLAR 6: Land sinks - Agriculture	27
57	E-B+ scenario - PILLAR 6: Land sinks - Forests	29
58	E-B+ scenario - IMPACTS - Health	31
59	REF scenario - PILLAR 1: Efficiency/Electrification - Commercial	31
60	REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	32
61	REF scenario - PILLAR 1: Efficiency/Electrification - Overview	32
62	REF scenario - PILLAR 1: Efficiency/Electrification - Residential	32
63	REF scenario - PILLAR 1: Efficiency/Electrification - Transportation	32
64	REF scenario - PILLAR 6: Land sinks - Forests	33
65	REF scenario - PILLAR 6: Land sinks - Forests - REF only	35
66	REF scenario - IMPACTS - Health	35

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		22,776	24,705				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Sales of space heating units - Electric	2.72	15.7	39.9	56.5	59	59.1	59.1
Heat Pump (%)							
Sales of space heating units - Electric	18.3	17.1	34.2	39.6	40.2	40.2	40.2
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	79	67.2	25.9	3.88	0.83	0.698	0.698
(%)							
Sales of water heating units - Electric	1.12	9.5	48.6	62.9	64.3	64.4	64.4
Heat Pump (%)							
Sales of water heating units - Electric	3.42	6.18	24.2	33.6	34.9	34.9	34.9
Resistance (%)							
Sales of water heating units - Gas Furnace	94.6	83.7	26.6	2.84	0.138	0	0
(%)							
Sales of water heating units - Other (%)	0.885	0.628	0.63	0.632	0.632	0.63	0.631

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.77	3.88	6.5	6.9	5.9	6.14
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)	160	162	160	153	146	145	146
Final energy use - Industry (PJ)	342	354	359	361	368	377	387
Final energy use - Residential (PJ)	246	227	199	170	144	128	117
Final energy use - Transportation (PJ)	656	650	592	519	454	412	391

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		4.12	4.1				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	70.6	76.8	96	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	29.4	23.2	3.96	0.2	0	0	0
Sales of space heating units - Electric	14	25.2	47.6	59.1	60.7	60.7	60.6
Heat Pump (%)							
Sales of space heating units - Electric	35.6	41	35.5	30.7	30	30.2	30.3
Resistance (%)							
Sales of space heating units - Fossil (%)	8.89	13.2	9.93	8.85	8.62	8.41	8.39
Sales of space heating units - Gas (%)	41.5	20.6	6.9	1.33	0.7	0.659	0.662
Sales of water heating units - Electric	0	6.87	37.5	47.6	48.6	48.6	48.6
Heat Pump (%)							
Sales of water heating units - Electric	45.5	59.1	48.2	46.1	46.1	46.1	46.1
Resistance (%)							
Sales of water heating units - Gas Furnace	47.5	28.5	9.06	0.967	0.047	0	0
(%)							
Sales of water heating units - Other (%)	6.95	5.52	5.27	5.27	5.28	5.27	5.28

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		1,331	3,547	5,529	8,462	9,115	8,742
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.551		2.62		9.97		15.8
units)							
Public EV charging plugs - L2 (1000 units)	2.37		63.1		240		381
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 (%)	1.51	1.78	1.24	0.397	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	4.05	15.6	47.1	82.1	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.7	77.5	48.1	16.3	3.26	0.589	0
Vehicle sales - Light-duty - hybrid (%)	4.56	4.64	3.26	1.21	0.294	0.065	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.337	0.2	0.062	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.1	0.096	0.062	0.022	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion \$2018)	0	0.003	0.249	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0.008	0.044
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0.02	0.172
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Solar PV - Constrained (billion \$2018)		0.2	0	0	0	0	0
Capital invested - Wind - Base (billion \$2018)		0	0.826	0.787	0.706	0.738	0.057
Capital invested - Wind - Constrained (billion \$2018)		0	2.11	3.35	11.6	9.51	1.16
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	1,788	2,755	3,680	4,796	6,121	7,666	9,495
Installed renewables - Solar - Base land use assumptions (MW)	721	721	721	721	721	721	721
Installed renewables - Solar - Constrained land use assumptions (MW)	696	696	696	696	696	696	696
Installed renewables - Wind - Base land use assumptions (MW)	3,388	3,388	3,866	4,354	4,813	5,320	5,361
Installed renewables - Wind - Constrained land use assumptions (MW)	3,421	3,421	4,686	6,666	14,261	20,324	21,419

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	6.64	495	495	495	495	495
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	7.51	51.1
Biomass w/ccu power plant (GWh)	0	0	0	0	0	22.3	216
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	1,419	1,419	1,419	1,419	1,419	1,419	1,419
Solar - Constrained land use assumptions	1,371	1,371	1,371	1,371	1,371	1,371	1,371
(GWh)							
Wind - Base land use assumptions (GWh)	11,561	11,561	13,217	14,787	16,215	17,781	17,905
Wind - Constrained land use assumptions	11,682	11,682	15,810	21,726	43,208	59,787	62,739
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)		49.2	148	149	149	200	644
Conversion capital investment -		3.83	277	22.3	0	927	8,114
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	1	2
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	1	8
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	2
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu	0	0	0	0	0	1	2
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu	0	0	0	0	0	1	3
(quantity)							
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	1	1

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	3.35	3.32	4.6	15
Annual - BECCS (MMT)		0	0	0	0	1.17	11.5
Annual - Cement and lime (MMT)		0	0	3.35	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	3.35	6.67	11.3	26.3
Cumulative - BECCS (MMT)		0	0	0	0	1.17	12.7
Cumulative - Cement and lime (MMT)		0	0	3.35	6.67	10.1	13.6
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	776	776	1,019	2,201
Cumulative investment - All (million \$2018)		0	0	1,802	1,801	1,948	2,738
Cumulative investment - Spur (million \$2018)		0	0	99.8	99.3	246	1,036
Cumulative investment - Trunk (million \$2018)		0	0	1,702	1,702	1,702	1,702
Spur (km)		0	0	101	101	344	1,526
Trunk (km)		0	0	675	675	675	675

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							(
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,98
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-14
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-2,129
deployment - Total (1000 tC02e/y)							2,12
Carbon sink potential - Moderate							(
							,
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							4.00
Carbon sink potential - Moderate							-1,02
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-73.
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,10
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink -							
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							2,798
Aggressive deployment - Cropland							_,. , ,
measures (1000 hectares)							
Land impacted for carbon sink -							23
Aggressive deployment - Permanent							200
conservation cover (1000 hectares)							0.00
Land impacted for carbon sink -							3,03
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							(
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,45
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							11
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,575
deployment - Total (1000 hectares)							.,010

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-2,170
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-71,521
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,904
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-9,494
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-4,080
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-29,790
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,078
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-14,981
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-2,477
pasture (1000 tC02e/y)							
Carbon sink potential - High - Restore							-5,545
productivity (1000 tC02e/y)							
Carbon sink potential - Low - Accelerate							-1,087
regeneration (1000 tC02e/y)							
Carbon sink potential - Low - All (not							-26,982
counting overlap) (1000 tCO2e/y)							047
Carbon sink potential - Low - Avoid							-317
deforestation (1000 tCO2e/y)							0.77
Carbon sink potential - Low - Extend							-3,647
rotation length (1000 tC02e/y)							0.07/
Carbon sink potential - Low - Improve							-2,076
plantations (1000 tCO2e/y)							0.000
Carbon sink potential - Low - Increase							-9,930
retention of HWP (1000 tC02e/y)							077
Carbon sink potential - Low - Increase							-377
trees outside forests (1000 tC02e/y)							7 / 01
Carbon sink potential - Low - Reforest							-7,491
cropland (1000 tC02e/y)							100
Carbon sink potential - Low - Reforest							-188
pasture (1000 tC02e/y)							10/0
Carbon sink potential - Low - Restore							-1,869
productivity (1000 tC02e/y)							1 / 00
Carbon sink potential - Mid - Accelerate							-1,629
regeneration (1000 tC02e/y)							/ 0 01/
Carbon sink potential - Mid - All (not							-49,216
counting overlap) (1000 tC02e/y)  Carbon sink potential - Mid - Avoid							-1,111
·							-1,111
deforestation (1000 tC02e/y)							/ 570
Carbon sink potential - Mid - Extend							-6,570
rotation length (1000 tC02e/y)  Carbon sink potential - Mid - Improve							-3,042
plantations (1000 tC02e/y)							-3,042
Carbon sink potential - Mid - Increase							-19,860
retention of HWP (1000 tC02e/y)							-19,860
							700
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-728
• • • • • • • • • • • • • • • • • • • •							11.007
Carbon sink potential - Mid - Reforest							-11,236
cropland (1000 tC02e/y)							1 000
Carbon sink potential - Mid - Reforest							-1,332
pasture (1000 tC02e/y)							0.707
Carbon sink potential - Mid - Restore							-3,707
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 -							355
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							258
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4,841
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,503
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 -							102
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							990
High - Reforest cropland (1000 hectares)							,,,
Land impacted for carbon sink potential -							70.4
High - Reforest pasture (1000 hectares)							10.4
Land impacted for carbon sink potential -							1,838
High - Restore productivity (1000							1,030
hectares)							
							9,959
Land impacted for carbon sink potential -							9,959
High - Total impacted (over 30 years)							
(1000 hectares)							170
Land impacted for carbon sink potential -							178
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							242
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,855
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							752
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 -							53.9
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							495
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							12.2
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -		+	+				1,112
Low - Restore productivity (1000							.,
hectares)							
Land impacted for carbon sink potential -		+				+	4,699
Low - Total impacted (over 30 years)							7,077
(1000 hectares)							
Land impacted for carbon sink potential -		+	-				266
Mid - Accelerate regeneration (1000							200
hectares)							
		1	<b>I</b>			1	

Table 13: E+	econario -	DTIIAP 6.	I and sinks -	Enrocte	(continued)
Table 15. E+	SCEHUITO -	PILLAR D.	LUHU SHIKS -	FULESTS	COMUNICEUR

2020	2025	2030	2035	2040	2045	2050
						250
						3,348
						1,131
						0
						78.2
						743
						88.2
						2,240
						8,144
	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)		238	201	161	121	76.3	52.9
Natural gas consumption - Cumulative							4,854
(tcf)							
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		135	119	96.2	74.7	57.8	41.8
Oil consumption - Cumulative (million							2,955
bbls)							
Oil production - Annual (million bbls)		0	0	0	0	0	0

#### Table 15: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		63.6	0.07	0.07	0.053	0.033	0
Monetary damages from air pollution - Natural Gas (million 2019\$)		59.3	35.2	31.1	30.1	25.2	20.2
Monetary damages from air pollution - Transportation (million 2019\$)		1,113	1,077	847	507	238	95
Premature deaths from air pollution - Coal (deaths)		7.18	0.008	0.008	0.006	0.004	0
Premature deaths from air pollution - Natural Gas (deaths)		6.69	3.97	3.51	3.4	2.84	2.28
Premature deaths from air pollution - Transportation (deaths)		125	121	95.3	57	26.7	10.7

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		125	364	389	329	334	783
By economic sector - Construction (jobs)		8,570	8,392	10,289	10,284	9,831	13,352
By economic sector - Manufacturing		4,850	7,540	9,472	8,742	7,531	8,676
(jobs)							
By economic sector - Mining (jobs)		2,249	1,645	1,105	712	448	269

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

Item  By economic sector - Other (jobs)  By economic sector - Professional (jobs)  By economic sector - Professional (jobs)  By economic sector - Trade (jobs)  By economic sector - Utilities (jobs)  By economic sector - Utilities (jobs)  By education level - All sectors - Associates degree or some college (jobs)  By education level - All sectors - Bachelors degree (jobs)  By education level - All sectors - Doctoral degree (jobs)  By education level - All sectors - High school diploma or less (jobs)  By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)  By resource sector - Oil (jobs)	2025 1,146 418 3,915 3,140 4,450 8,906 6,016 217 12,287 1,437 0 98.8 5,671 2,549 606 6,006 9,420	2030 1,192 361 4,130 2,993 5,095 9,838 6,502 223 13,619 1,531 1,003 0 0 7,561 2,064 596 4,868	2035 1,469 502 4,718 3,186 7,657 12,304 7,700 250 16,728 1,805 1,107 1,741 0 11,493 2,014 346	2040 1,726 229 5,032 3,344 7,723 12,151 7,523 252 16,401 1,794 989 53.5 0 14,009 1,796	2045 1,924 169 5,150 3,411 6,900 11,388 7,058 249 15,290 1,711 1,216 90 0 12,552	2050 3,451 210 7,796 5,119 7,084 14,823 9,267 361 19,982 2,305 3,342 814 0 11,879
By economic sector - Pipeline (jobs)  By economic sector - Professional (jobs)  By economic sector - Trade (jobs)  By economic sector - Utilities (jobs)  By education level - All sectors - Associates degree or some college (jobs)  By education level - All sectors - Bachelors degree (jobs)  By education level - All sectors - Doctoral degree (jobs)  By education level - All sectors - High school diploma or less (jobs)  By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Goid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	418 3,915 3,140 4,450 8,906 6,016 217 12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	361 4,130 2,993 5,095 9,838 6,502 223 13,619 1,531 1,003 0 0 7,561 2,064 596	502 4,718 3,186 7,657 12,304 7,700 250 16,728 1,805 1,107 1,741 0 11,493 2,014	229 5,032 3,344 7,723 12,151 7,523 252 16,401 1,794 989 53.5 0 14,009	169 5,150 3,411 6,900 11,388 7,058 249 15,290 1,711 1,216 90 0 12,552	210 7,796 5,119 7,084 14,823 9,267 361 19,982 2,305 3,342 814 0
By economic sector - Professional (jobs) By economic sector - Trade (jobs) By economic sector - Utilities (jobs) By education level - All sectors - Associates degree or some college (jobs) By education level - All sectors - Bachelors degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - High school diploma or less (jobs) By education level - All sectors - Masters or professional degree (jobs) By resource sector - Biomass (jobs) By resource sector - CO2 (jobs) By resource sector - Goal (jobs) By resource sector - Grid (jobs) By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	3,915 3,140 4,450 8,906 6,016 217 12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	4,130 2,993 5,095 9,838 6,502 223 13,619 1,531 1,003 0 0 7,561 2,064 596	4,718 3,186 7,657 12,304 7,700 250 16,728 1,805 1,107 1,741 0 11,493 2,014	5,032 3,344 7,723 12,151 7,523 252 16,401 1,794 989 53.5 0	5,150 3,411 6,900 11,388 7,058 249 15,290 1,711 1,216 90 0 12,552	7,796 5,119 7,084 14,823 9,267 361 19,982 2,305 3,342 814 0
By economic sector - Trade (jobs) By economic sector - Utilities (jobs) By education level - All sectors - Associates degree or some college (jobs) By education level - All sectors - Bachelors degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - High school diploma or less (jobs) By education level - All sectors - Masters or professional degree (jobs) By resource sector - Biomass (jobs) By resource sector - CO2 (jobs) By resource sector - Grid (jobs) By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	3,140 4,450 8,906 6,016 217 12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	2,993 5,095 9,838 6,502 223 13,619 1,531 1,003 0 0 7,561 2,064 596	3,186 7,657 12,304 7,700 250 16,728 1,805 1,107 1,741 0 11,493 2,014	3,344 7,723 12,151 7,523 252 16,401 1,794 989 53.5 0	3,411 6,900 11,388 7,058 249 15,290 1,711 1,216 90 0 12,552	5,119 7,084 14,823 9,267 361 19,982 2,305 3,342 814 0
By economic sector - Utilities (jobs) By education level - All sectors - Associates degree or some college (jobs) By education level - All sectors - Bachelors degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - High school diploma or less (jobs) By education level - All sectors - Masters or professional degree (jobs) By resource sector - Biomass (jobs) By resource sector - CO2 (jobs) By resource sector - Coal (jobs) By resource sector - Grid (jobs) By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	4,450 8,906 6,016 217 12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	5,095 9,838 6,502 223 13,619 1,531 1,003 0 0 7,561 2,064 596	7,657 12,304 7,700 250 16,728 1,805 1,107 1,741 0 11,493 2,014	7,723 12,151 7,523 252 16,401 1,794 989 53.5 0 14,009	6,900 11,388 7,058 249 15,290 1,711 1,216 90 0 12,552	7,084 14,823 9,267 361 19,982 2,305 3,342 814 0
By education level - All sectors - Associates degree or some college (jobs) By education level - All sectors - Bachelors degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - High school diploma or less (jobs) By education level - All sectors - Masters or professional degree (jobs) By resource sector - Biomass (jobs) By resource sector - CO2 (jobs) By resource sector - Coal (jobs) By resource sector - Grid (jobs) By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	8,906 6,016 217 12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	9,838 6,502 223 13,619 1,531 1,003 0 0 7,561 2,064 596	12,304 7,700 250 16,728 1,805 1,107 1,741 0 11,493 2,014	12,151 7,523 252 16,401 1,794 989 53.5 0 14,009	11,388 7,058 249 15,290 1,711 1,216 90 0 12,552	14,823 9,267 361 19,982 2,305 3,342 814 0
Associates degree or some college (jobs)  By education level - All sectors - Bachelors degree (jobs)  By education level - All sectors - Doctoral degree (jobs)  By education level - All sectors - High school diploma or less (jobs)  By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Coal (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	6,016 217 12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	6,502 223 13,619 1,531 1,003 0 0 7,561 2,064 596	7,700 250 16,728 1,805 1,107 1,741 0 11,493 2,014	7,523 252 16,401 1,794 989 53.5 0 14,009	7,058  249  15,290  1,711  1,216  90  0  12,552	9,267 361 19,982 2,305 3,342 814 0
By education level - All sectors - Bachelors degree (jobs)  By education level - All sectors - Doctoral degree (jobs)  By education level - All sectors - High school diploma or less (jobs)  By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Goal (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	217 12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	223 13,619 1,531 1,003 0 0 7,561 2,064 596	250 16,728 1,805 1,107 1,741 0 11,493 2,014	252 16,401 1,794 989 53.5 0 14,009	249 15,290 1,711 1,216 90 0 12,552	361 19,982 2,305 3,342 814 0
Bachelors degree (jobs)  By education level - All sectors - Doctoral degree (jobs)  By education level - All sectors - High school diploma or less (jobs)  By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Grid (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	217 12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	223 13,619 1,531 1,003 0 0 7,561 2,064 596	250 16,728 1,805 1,107 1,741 0 11,493 2,014	252 16,401 1,794 989 53.5 0 14,009	249 15,290 1,711 1,216 90 0 12,552	361 19,982 2,305 3,342 814 0
By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - High school diploma or less (jobs) By education level - All sectors - Masters or professional degree (jobs) By resource sector - Biomass (jobs) By resource sector - CO2 (jobs) By resource sector - Grid (jobs) By resource sector - Grid (jobs) By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	13,619 1,531 1,003 0 0 7,561 2,064 596	16,728 1,805 1,107 1,741 0 11,493 2,014	16,401 1,794 989 53.5 0 14,009	15,290 1,711 1,216 90 0 12,552	19,982 2,305 3,342 814 0
degree (jobs)  By education level - All sectors - High school diploma or less (jobs)  By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Coal (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	12,287 1,437 537 0 98.8 5,671 2,549 606 6,006	13,619 1,531 1,003 0 0 7,561 2,064 596	16,728 1,805 1,107 1,741 0 11,493 2,014	16,401 1,794 989 53.5 0 14,009	15,290 1,711 1,216 90 0 12,552	19,982 2,305 3,342 814 0
By education level - All sectors - High school diploma or less (jobs)  By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Coal (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	1,437 537 0 98.8 5,671 2,549 606 6,006	1,531 1,003 0 0 7,561 2,064 596	1,805 1,107 1,741 0 11,493 2,014	1,794 989 53.5 0 14,009	1,711 1,216 90 0 12,552	2,305 3,342 814 0
school diploma or less (jobs)  By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Coal (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	1,437 537 0 98.8 5,671 2,549 606 6,006	1,531 1,003 0 0 7,561 2,064 596	1,805 1,107 1,741 0 11,493 2,014	1,794 989 53.5 0 14,009	1,711 1,216 90 0 12,552	2,305 3,342 814 0
By education level - All sectors - Masters or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Coal (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	537 0 98.8 5,671 2,549 606 6,006	1,003 0 0 7,561 2,064 596	1,107 1,741 0 11,493 2,014	989 53.5 0 14,009	1,216 90 0 12,552	3,342 814 0
or professional degree (jobs)  By resource sector - Biomass (jobs)  By resource sector - CO2 (jobs)  By resource sector - Coal (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	537 0 98.8 5,671 2,549 606 6,006	1,003 0 0 7,561 2,064 596	1,107 1,741 0 11,493 2,014	989 53.5 0 14,009	1,216 90 0 12,552	3,342 814 0
By resource sector - Biomass (jobs) By resource sector - CO2 (jobs) By resource sector - Coal (jobs) By resource sector - Grid (jobs) By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	98.8 5,671 2,549 606 6,006	0 0 7,561 2,064 596	1,741 0 11,493 2,014	53.5 0 14,009	90 0 12,552	814 0
By resource sector - CO2 (jobs)  By resource sector - Coal (jobs)  By resource sector - Grid (jobs)  By resource sector - Natural Gas (jobs)  By resource sector - Nuclear (jobs)	98.8 5,671 2,549 606 6,006	0 0 7,561 2,064 596	1,741 0 11,493 2,014	53.5 0 14,009	90 0 12,552	814 0
By resource sector - Coal (jobs) By resource sector - Grid (jobs) By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	98.8 5,671 2,549 606 6,006	7,561 2,064 596	0 11,493 2,014	0 14,009	0 12,552	0
By resource sector - Grid (jobs) By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	5,671 2,549 606 6,006	7,561 2,064 596	11,493 2,014	14,009	12,552	_
By resource sector - Natural Gas (jobs) By resource sector - Nuclear (jobs)	2,549 606 6,006	2,064 596	2,014			11.879
By resource sector - Nuclear (jobs)	606 6,006	596		1,796		, ,
,	6,006		21.4		1,380	1,366
Dy negourne coston Oil (icho)		4.868	340	0.015	0.019	0.038
by resource sector - on (jobs)	9,420	.,000	3,624	2,612	1,888	1,284
By resource sector - Solar (jobs)		9,518	12,164	13,095	14,032	23,686
By resource sector - Wind (jobs)	3,976	6,104	6,298	5,567	4,538	4,367
Median wages - Annual - All (\$2019 per	68,136	68,415	69,492	70,588	71,567	71,977
iob)	, , , ,		,	-,	,	•
On-Site or In-Plant Training - Total jobs - 1	4,656	5,087	6,322	6,221	5,810	7,507
to 4 years (jobs)		.			, i	•
On-Site or In-Plant Training - Total jobs - 4	1,923	2,005	2,514	2,489	2,347	3,065
to 10 years (jobs)	, -	,	,-	, -	,-	.,
On-Site or In-Plant Training - Total jobs -	4,750	5,226	6,339	6,219	5,850	7,782
None (jobs)	,	, -	.,		-,	, -
On-Site or In-Plant Training - Total jobs -	235	259	331	329	309	398
Over 10 years (jobs)						
On-Site or In-Plant Training - Total jobs -	17,299	19,136	23,281	22,863	21,380	27,987
Up to 1 year (jobs)	,	,		,	,	, -
On-the-Job Training - All sectors - 1 to 4	5,969	6,503	8,110	7,982	7,458	9,623
years (jobs)	7, 31	5,555	,,,,,	.,=	.,	7,5=5
On-the-Job Training - All sectors - 4 to 10	1,871	1,950	2,470	2,458	2,326	3,050
years (jobs)	,,,,,,	.,	_,	_,	_,===	2,222
On-the-Job Training - All sectors - None	1,632	1,753	2,087	2,054	1,945	2,628
(jobs)	.,002	.,. 55	_,00.	_,00.	.,,	_,0_0
On-the-Job Training - All sectors - Over 10	300	331	401	386	358	469
years (jobs)		00.		000		107
On-the-Job Training - All sectors - Up to 1	19,093	21,176	25,719	25,241	23,610	30,969
year (jobs)	17,070	21,0	20,117	20,2	20,010	00,707
Related work experience - All sectors - 1	10,375	11,351	13,836	13,598	12,729	16,616
to 4 years (jobs)	10,010	11,001	10,000	10,070	12,127	10,010
Related work experience - All sectors - 4	6,683	7,277	8,931	8,767	8,201	10,645
to 10 years (jobs)	0,000	1,211	0,701	5,101	0,201	10,040
Related work experience - All sectors -	4,124	4,537	5,603	5,519	5,179	6,817
	7,124	4,551	3,003	5,519	5,117	0,011
	179/	1002	2 /.2/.	2 266	2 105	2,807
	1,104	1,700	2,424	2,300	۷,175	2,001
	5 907	4 545	7002	7 071	7 202	9,853
	5,071	0,000	1,773	1,011	1,373	7,003
Wage income - All (million \$2019)	1,967	2,170	2,696	2,691	2,555	3,365
vvage mounte - All (million \$2017)	1,701	۷,۱۲۰	۷,070	۷,071	۷,555	3,303
None (jobs)  Related work experience - All sectors - Over 10 years (jobs)  Related work experience - All sectors - Up to 1 year (jobs)	1,784 5,897	1,983 6,565	2,424 7,993	2,366 7,871	2,195 7,393	

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		22,723	24,348				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	27.5	31	36.1	49.7	68.6	80.2	84.3
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	69	63.9	50.3	31.4	19.8	15.7
Sales of space heating units - Electric	2.72	11.9	14.6	22.8	37.2	49.8	55.8
Heat Pump (%)							
Sales of space heating units - Electric	18.3	13.9	15.8	21.6	30.6	36.8	39.3
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	79	74.3	69.5	55.6	32.2	13.3	4.9
(%)							
Sales of water heating units - Electric	1.12	2.39	6.84	19.8	40.6	55.7	61.7
Heat Pump (%)							
Sales of water heating units - Electric	3.42	3.14	5.18	11.2	21.3	29.5	33.1
Resistance (%)							
Sales of water heating units - Gas Furnace	94.6	93.8	87.3	68.4	37.5	14.2	4.65
(%)							
Sales of water heating units - Other (%)	0.885	0.628	0.63	0.632	0.632	0.63	0.631

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.95	2.96	4.08	4.22	5.76	6.07
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)	160	163	165	166	164	162	160
Final energy use - Industry (PJ)	342	355	361	367	376	385	395
Final energy use - Residential (PJ)	246	227	207	188	169	150	133
Final energy use - Transportation (PJ)	657	654	611	573	544	510	470

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		4.1	4.04				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	70.4	71.2	73.9	81.1	91	97.1	99.2
Resistance (%)							
Sales of cooking units - Gas (%)	29.6	28.8	26.1	18.9	9.03	2.91	0.784
Sales of space heating units - Electric	14	21.3	23.9	31.4	44.1	54.1	58.4
Heat Pump (%)							
Sales of space heating units - Electric	35.6	41.8	41.1	39.2	35.8	32.7	31
Resistance (%)							
Sales of space heating units - Fossil (%)	8.89	13.8	13.5	12.4	10.6	9.24	8.81
Sales of space heating units - Gas (%)	41.5	23	21.5	17	9.58	4.03	1.76
Sales of water heating units - Electric	0	1.23	4.71	14.8	30.9	42.3	46.7
Heat Pump (%)							
Sales of water heating units - Electric	45.5	61.3	60	56.4	51	47.6	46.5
Resistance (%)							
Sales of water heating units - Gas Furnace	47.5	31.9	29.8	23.3	12.8	4.87	1.59
(%)							
Sales of water heating units - Other (%)	6.95	5.56	5.52	5.49	5.39	5.31	5.28

 ${\bf Table~21:}~{\it E-scenario-PILLAR~1:}~{\it Efficiency/Electrification-Transportation}$ 

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million \$2018)		0	239	450	1,569	4,778	7,016
Public EV charging plugs - DC Fast (1000 units)	0.551		1.02		3.86		10.1
Public EV charging plugs - L2 (1000 units)	2.37		24.5		92.8		244
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 (%)	1.52	1.94	2.05	1.63	1.04	0.532	0.228
Vehicle sales - Light-duty - EV (%)	1.94	4.79	12.1	26.2	48.8	72.3	87.7
Vehicle sales - Light-duty - gasoline (%)	91.6	87.3	79.3	66.2	45.8	24.6	10.9
Vehicle sales - Light-duty - hybrid (%)	4.73	5.52	6.19	5.61	4.19	2.46	1.19
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.379	0.324	0.246	0.174	0.096	0.045
Vehicle sales - Light-duty - other (%)	0.101	0.105	0.095	0.083	0.059	0.033	0.015
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,981
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-147
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-2,129
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-1,027
deployment - Cropland measures (1000							
tC02e/y)							
Carbon sink potential - Moderate							-73.6
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-1,101
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							2,798
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							235
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 -							3,033
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,458
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							117
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,575
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							-2,170
regeneration (1000 tC02e/y)							
Carbon sink potential - High - All (not							-71,521
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,904
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-9,494
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-4,080
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-29,790
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,078
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-14,981
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-2,477
pasture (1000 tC02e/y)							•
Carbon sink potential - High - Restore							-5,545
productivity (1000 tCO2e/y)							•
Carbon sink potential - Low - Accelerate							-1,087
regeneration (1000 tC02e/y)							•
Carbon sink potential - Low - All (not							-26,982
counting overlap) (1000 tCO2e/y)							,
Carbon sink potential - Low - Avoid							-317
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-3,647
rotation length (1000 tCO2e/y)							•
Carbon sink potential - Low - Improve							-2,076
plantations (1000 tCO2e/y)							,
Carbon sink potential - Low - Increase							-9,930
retention of HWP (1000 tCO2e/y)							•
Carbon sink potential - Low - Increase							-377
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							-7,491
cropland (1000 tCO2e/y)							.,
Carbon sink potential - Low - Reforest							-188
pasture (1000 tC02e/y)							.50
Carbon sink potential - Low - Restore							-1,869
productivity (1000 tC02e/y)							1,007
Carbon sink potential - Mid - Accelerate		+					-1,629
regeneration (1000 tC02e/y)							1,027

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

Item Carbon sink potential - Mid - All (not	2020	2025	2030	2035	2040	2045	2050 -49,216
counting overlap) (1000 tCO2e/y)							-49,216
Carbon sink potential - Mid - Avoid							-1,111
deforestation (1000 tC02e/y)							-1,111
Carbon sink potential - Mid - Extend							-6,570
rotation length (1000 tC02e/y)							-0,510
Carbon sink potential - Mid - Improve							-3,042
plantations (1000 tCO2e/y)							-3,042
Carbon sink potential - Mid - Increase							-19,860
retention of HWP (1000 tC02e/y)							-17,000
Carbon sink potential - Mid - Increase						+	-728
trees outside forests (1000 tC02e/y)							-120
Carbon sink potential - Mid - Reforest							-11,236
cropland (1000 tC02e/y)							-11,230
Carbon sink potential - Mid - Reforest							-1,332
pasture (1000 tC02e/y)							-1,332
Carbon sink potential - Mid - Restore							-3,707
productivity (1000 tC02e/y)							-3,101
Land impacted for carbon sink potential -							355
High - Accelerate regeneration (1000							300
hectares)							
,							050
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years)							258
(1000 hectares)							
Land impacted for carbon sink potential -							4,841
							4,041
High - Extend rotation length (1000							
hectares)							1,503
Land impacted for carbon sink potential -							1,503
High - Improve plantations (1000							
hectares)						+	0
Land impacted for carbon sink potential -							U
High - Increase retention of HWP (1000							
hectares)							100
Land impacted for carbon sink potential -							102
High - Increase trees outside forests							
(1000 hectares)							000
Land impacted for carbon sink potential -							990
High - Reforest cropland (1000 hectares)							70./
Land impacted for carbon sink potential -							70.4
High - Reforest pasture (1000 hectares)							4 000
Land impacted for carbon sink potential -							1,838
High - Restore productivity (1000							
hectares)							0.050
Land impacted for carbon sink potential -							9,959
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							178
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							242
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,855
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							752
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							53.9
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							495
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							12.2
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,112
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,699
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							266
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							250
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,348
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,131
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 -							78.2
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							743
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							88.2
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,240
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,144
Mid - Total impacted (over 30 years) (1000							
hectares)							

Table 24: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)	2020	63.6	0.07	0.07	0.053	0.033	0
Monetary damages from air pollution - Natural Gas (million 2019\$)		62.4	33.3	23	17.6	14.2	14.7
Monetary damages from air pollution - Transportation (million 2019\$)		1,133	1,189	1,198	1,115	917	648
Premature deaths from air pollution - Coal (deaths)		7.18	0.008	0.008	0.006	0.004	0
Premature deaths from air pollution - Natural Gas (deaths)		7.04	3.76	2.59	1.98	1.6	1.65
Premature deaths from air pollution - Transportation (deaths)		127	134	135	125	103	72.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		22,776	24,705				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Sales of space heating units - Electric	2.72	15.7	39.9	56.5	59	59.1	59.1
Heat Pump (%)							
Sales of space heating units - Electric	18.3	17.1	34.2	39.6	40.2	40.2	40.2
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	79	67.2	25.9	3.88	0.83	0.698	0.698
(%)							
Sales of water heating units - Electric	1.12	9.5	48.6	62.9	64.3	64.4	64.4
Heat Pump (%)							
Sales of water heating units - Electric	3.42	6.18	24.2	33.6	34.9	34.9	34.9
Resistance (%)							
Sales of water heating units - Gas Furnace	94.6	83.7	26.6	2.84	0.138	0	0
(%)							
Sales of water heating units - Other (%)	0.885	0.628	0.63	0.632	0.632	0.63	0.631

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.77	3.88	6.5	6.9	5.9	6.14
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)	160	162	160	153	146	145	146
Final energy use - Industry (PJ)	342	354	359	361	368	377	387
Final energy use - Residential (PJ)	246	227	199	170	144	128	117
Final energy use - Transportation (PJ)	656	650	592	519	454	412	391

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		4.12	4.1				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	70.6	76.8	96	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	29.4	23.2	3.96	0.2	0	0	0
Sales of space heating units - Electric	14	25.2	47.6	59.1	60.7	60.7	60.6
Heat Pump (%)							
Sales of space heating units - Electric	35.6	41	35.5	30.7	30	30.2	30.3
Resistance (%)							
Sales of space heating units - Fossil (%)	8.89	13.2	9.93	8.85	8.62	8.41	8.39
Sales of space heating units - Gas (%)	41.5	20.6	6.9	1.33	0.7	0.659	0.662
Sales of water heating units - Electric	0	6.87	37.5	47.6	48.6	48.6	48.6
Heat Pump (%)							
Sales of water heating units - Electric	45.5	59.1	48.2	46.1	46.1	46.1	46.1
Resistance (%)							
Sales of water heating units - Gas Furnace	47.5	28.5	9.06	0.967	0.047	0	0
(%)							
Sales of water heating units - Other (%)	6.95	5.52	5.27	5.27	5.28	5.27	5.28

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		1,331	3,547	5,529	8,462	9,115	8,742
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.551		2.62		9.97		15.8
units)							
Public EV charging plugs - L2 (1000 units)	2.37		63.1		240		381
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 (%)	1.51	1.78	1.24	0.397	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	4.05	15.6	47.1	82.1	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.7	77.5	48.1	16.3	3.26	0.589	0
Vehicle sales - Light-duty - hybrid (%)	4.56	4.64	3.26	1.21	0.294	0.065	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.337	0.2	0.062	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.1	0.096	0.062	0.022	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion		0	0	0	0	0	6.65
\$2018)							
Capital invested - Wind - Base (billion		0	0.898	1.32	2.71	4.51	10.6
\$2018)							
Installed renewables - OffshoreWind -	0	0	0	0	0	0	0
Base land use assumptions (MW)							
Installed renewables - OffshoreWind -	0	0	0	0	0	0	0
Constrained land use assumptions (MW)							
Installed renewables - Solar - Base land	721	721	721	721	721	721	9,125
use assumptions (MW)							
Installed renewables - Solar -	1,442	1,442	1,442	1,442	1,442	1,442	28,690
Constrained land use assumptions (MW)							
Installed renewables - Wind - Base land	3,388	3,388	3,907	4,728	6,492	9,583	17,262
use assumptions (MW)							
Installed renewables - Wind - Constrained	6,917	6,917	9,456	25,814	58,410	116,720	193,532
land use assumptions (MW)							

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	1,419	1,419	1,419	1,419	1,419	1,419	15,515
Solar - Constrained land use assumptions	2,837	2,837	2,837	2,837	2,837	2,837	48,345
(GWh)							
Wind - Base land use assumptions (GWh)	11,561	11,561	13,355	15,953	21,315	30,373	52,064
Wind - Constrained land use assumptions	23,634	23,634	31,885	78,964	166,657	311,488	472,062
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,981
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-147
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-2,129
deployment - Total (1000 tC02e/y)							•
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							_
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-1,027
deployment - Cropland measures (1000							1,021
tCO2e/y)							
Carbon sink potential - Moderate							-73.6
deployment - Permanent conservation							-13.0
cover (1000 tC02e/y)							1 101
Carbon sink potential - Moderate							-1,101
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							2,798
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							235
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							3,033
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate	+						1,458
deployment - Cropland measures (1000							.,
hectares)							
Land impacted for carbon sink - Moderate	+						117
deployment - Permanent conservation							111
cover (1000 hectares)							
Land impacted for carbon sink - Moderate	+						1,575
							1,515
deployment - Total (1000 hectares)							

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

2020	2025	2030	2035	2040	2045	2050
						-2,170
						-71,521
						-1,904
						-9,494
						-4,080
						-29,790
	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							-1,078
trees outside forests (1000 tC02e/y)							1/ 00:
Carbon sink potential - High - Reforest cropland (1000 tC02e/y)							-14,98
Carbon sink potential - High - Reforest							-2,47
pasture (1000 tCO2e/y)							-2,47
Carbon sink potential - High - Restore							-5,545
productivity (1000 tC02e/y)							-0,040
Carbon sink potential - Low - Accelerate							-1,087
regeneration (1000 tCO2e/y)							.,00
Carbon sink potential - Low - All (not							-26,982
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - Low - Avoid							-317
deforestation (1000 tC02e/y)							
Carbon sink potential - Low - Extend							-3,64
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,076
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-9,930
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-37
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-7,49
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-188
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,86
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-1,62
regeneration (1000 tCO2e/y)							(0.01
Carbon sink potential - Mid - All (not							-49,216
counting overlap) (1000 tC02e/y)							1 11
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,11
Carbon sink potential - Mid - Extend							-6,570
rotation length (1000 tC02e/y)							-0,570
Carbon sink potential - Mid - Improve							-3,04
plantations (1000 tCO2e/y)							-3,04
Carbon sink potential - Mid - Increase							-19,860
retention of HWP (1000 tCO2e/y)							-17,000
Carbon sink potential - Mid - Increase							-72
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-11,23
cropland (1000 tCO2e/y)							,_0
Carbon sink potential - Mid - Reforest							-1,33
pasture (1000 tC02e/y)							,
Carbon sink potential - Mid - Restore							-3,70
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							35
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							25
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4,84
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,50
High - Improve plantations (1000							
hectares)							

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 -							102
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							990
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							70.4
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,838
High - Restore productivity (1000							
hectares)							0.050
Land impacted for carbon sink potential -							9,959
High - Total impacted (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							178
Low - Accelerate regeneration (1000							110
hectares)							
Land impacted for carbon sink potential -							242
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,85
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							75:
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							
hectares)							F0.
Land impacted for carbon sink potential -							53.9
Low - Increase trees outside forests (1000 hectares)							
Land impacted for carbon sink potential -							495
Low - Reforest cropland (1000 hectares)							470
Land impacted for carbon sink potential -							12.2
Low - Reforest pasture (1000 hectares)							12.2
Land impacted for carbon sink potential -							1,112
Low - Restore productivity (1000							.,
hectares)							
Land impacted for carbon sink potential -							4,699
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							266
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							250
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							0.077
Land impacted for carbon sink potential - Mid - Extend rotation length (1000							3,348
hectares)							
Land impacted for carbon sink potential -		+					1,13
Mid - Improve plantations (1000 hectares)							1,13
Land impacted for carbon sink potential -		+	+				
Mid - Increase retention of HWP (1000							,
hectares)							
Land impacted for carbon sink potential -		+					78.5
Mid - Increase trees outside forests (1000							
hectares)							

Table 33: <i>E+RE+</i>	scenario -	DTII AR 6.	I and sinks -	Forests	(continued)
I ADIC JJ. LTNLT	acenui iu -	· FILLAN O.	LUHU ƏHINƏ "	ายเกลาเลา	COHILINGER

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							743
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							88.2
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,240
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,144
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 -		63.6	0.07	0.07	0.053	0.033	0
Coal (million 2019\$)							
Monetary damages from air pollution -		55.2	26.2	16.9	15.4	13	4.18
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		1,113	1,077	847	507	238	95
Transportation (million 2019\$)							
Premature deaths from air pollution -		7.18	0.008	0.008	0.006	0.004	0
Coal (deaths)							
Premature deaths from air pollution -		6.23	2.96	1.9	1.73	1.47	0.472
Natural Gas (deaths)							
Premature deaths from air pollution -		125	121	95.3	57	26.7	10.7
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 -		22,776	24,705				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Sales of space heating units - Electric	2.72	15.7	39.9	56.5	59	59.1	59.1
Heat Pump (%)							
Sales of space heating units - Electric	18.3	17.1	34.2	39.6	40.2	40.2	40.2
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	79	67.2	25.9	3.88	0.83	0.698	0.698
(%)							
Sales of water heating units - Electric	1.12	9.5	48.6	62.9	64.3	64.4	64.4
Heat Pump (%)							
Sales of water heating units - Electric	3.42	6.18	24.2	33.6	34.9	34.9	34.9
Resistance (%)							
Sales of water heating units - Gas Furnace	94.6	83.7	26.6	2.84	0.138	0	0
(%)							
Sales of water heating units - Other (%)	0.885	0.628	0.63	0.632	0.632	0.63	0.631

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.77	3.88	6.5	6.9	5.9	6.14
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)	160	162	160	153	146	145	146

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	342	354	359	361	368	377	387
Final energy use - Residential (PJ)	246	227	199	170	144	128	117
Final energy use - Transportation (PJ)	656	650	592	519	454	412	391

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		4.12	4.1				
Sales of cooking units - Electric Resistance (%)	70.6	76.8	96	99.8	100	100	100
Sales of cooking units - Gas (%)	29.4	23.2	3.96	0.2	0	0	0
Sales of space heating units - Electric Heat Pump (%)	14	25.2	47.6	59.1	60.7	60.7	60.6
Sales of space heating units - Electric Resistance (%)	35.6	41	35.5	30.7	30	30.2	30.3
Sales of space heating units - Fossil (%)	8.89	13.2	9.93	8.85	8.62	8.41	8.39
Sales of space heating units - Gas (%)	41.5	20.6	6.9	1.33	0.7	0.659	0.662
Sales of water heating units - Electric Heat Pump (%)	0	6.87	37.5	47.6	48.6	48.6	48.6
Sales of water heating units - Electric Resistance (%)	45.5	59.1	48.2	46.1	46.1	46.1	46.1
Sales of water heating units - Gas Furnace (%)	47.5	28.5	9.06	0.967	0.047	0	0
Sales of water heating units - Other (%)	6.95	5.52	5.27	5.27	5.28	5.27	5.28

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		1,331	3,547	5,529	8,462	9,115	8,742
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.551		2.62		9.97		15.8
units)							
Public EV charging plugs - L2 (1000 units)	2.37		63.1		240		381
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 (%)	1.51	1.78	1.24	0.397	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	4.05	15.6	47.1	82.1	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.7	77.5	48.1	16.3	3.26	0.589	0
Vehicle sales - Light-duty - hybrid (%)	4.56	4.64	3.26	1.21	0.294	0.065	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.337	0.2	0.062	0.012	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.1	0.096	0.062	0.022	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0.377	0
Capital invested - Solar PV - Constrained (billion \$2018)		0.437	0	0	1.54	0.688	0
Capital invested - Wind - Base (billion \$2018)		0.134	0.485	0.205	0.75	0.37	0
Capital invested - Wind - Constrained (billion \$2018)		0.094	1.29	0.695	3.43	5.19	0
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	721	721	721	721	721	1,171	1,171
Installed renewables - Solar - Constrained land use assumptions (MW)	1,351	1,734	1,734	1,734	3,466	4,287	4,287
Installed renewables - Wind - Base land use assumptions (MW)	3,388	3,459	3,739	3,866	4,354	4,607	4,607
Installed renewables - Wind - Constrained land use assumptions (MW)	3,459	3,508	4,255	4,686	6,919	10,482	10,482

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	1,419	1,419	1,419	1,419	1,419	2,177	2,177
Solar - Constrained land use assumptions	2,487	3,131	3,131	3,131	6,048	7,413	7,413
(GWh)							
Wind - Base land use assumptions (GWh)	11,561	11,817	12,794	13,217	14,787	15,576	15,576
Wind - Constrained land use assumptions	11,817	11,993	14,463	15,810	22,465	32,717	32,717
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,981
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-147
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-2,129
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,027
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-73.6
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,101
deployment - Total (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							2,798
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							235
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							3,033
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,458
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							117
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,575
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-2,170
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-71,521
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,904
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-9,494
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-4,080
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-29,790
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,078
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-14,981
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-2,477
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-5,545
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-1,087
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-26,982
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-317
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-3,647
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,076
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-9,930
retention of HWP (1000 tCO2e/y)							•
Carbon sink potential - Low - Increase							-377
trees outside forests (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	205
Carbon sink potential - Low - Reforest							-7,49
cropland (1000 tCO2e/y)							10
Carbon sink potential - Low - Reforest							-18
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,86
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-1,62
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-49,21
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,1
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-6,57
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,04
plantations (1000 tCO2e/y)							-,-
Carbon sink potential - Mid - Increase							-19,86
retention of HWP (1000 tCO2e/y)							17,00
Carbon sink potential - Mid - Increase							-72
rees outside forests (1000 tC02e/y)							-12
Carbon sink potential - Mid - Reforest							-11,23
•							-11,23
cropland (1000 tC02e/y)							1.00
Carbon sink potential - Mid - Reforest							-1,33
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-3,70
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							35
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							25
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4,8
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,50
High - Improve plantations (1000							•
nectares)							
Land impacted for carbon sink potential -							
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							10
High - Increase trees outside forests							IC
(1000 hectares)							
							00
Land impacted for carbon sink potential -							99
High - Reforest cropland (1000 hectares)							70
Land impacted for carbon sink potential -							70
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,83
High - Restore productivity (1000							
nectares)							
and impacted for carbon sink potential -							9,95
High - Total impacted (over 30 years)							
1000 hectares)							
and impacted for carbon sink potential -							17
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							24
Low - Avoid deforestation (over 30 years)							
(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 -							1,855
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							752
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 -							53.9
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							495
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							12.2
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,112
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,699
Low - Total impacted (over 30 years)							·
(1000 hectares)							
Land impacted for carbon sink potential -							266
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							250
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,348
Mid - Extend rotation length (1000							-,-
hectares)							
Land impacted for carbon sink potential -							1,131
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 -							78.2
Mid - Increase trees outside forests (1000							10.2
hectares)							
Land impacted for carbon sink potential -							743
Mid - Reforest cropland (1000 hectares)							1 10
Land impacted for carbon sink potential -							88.2
Mid - Reforest pasture (1000 hectares)							00.2
Land impacted for carbon sink potential -			-				2,240
Mid - Restore productivity (1000							2,240
hectares)							
Land impacted for carbon sink potential -			-				8,144
Mid - Total impacted (over 30 years) (1000							0,144
hectares)							
HEULAI ESJ							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		63.6	0.07	0.07	0.053	0.033	0
Coal (million 2019\$)							
Monetary damages from air pollution -		57.8	27.7	32.8	38.7	24.2	11.4
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		1,113	1,077	847	507	238	95
Transportation (million 2019\$)							
Premature deaths from air pollution -		7.18	0.008	0.008	0.006	0.004	0
Coal (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		6.53	3.13	3.7	4.37	2.73	1.29
Natural Gas (deaths)							
Premature deaths from air pollution -		125	121	95.3	57	26.7	10.7
Transportation (deaths)							

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

0000	2005					
2020	2025	2030	2035	2040	2045	2050
	22,723	24,348				
27.5	31	36.1	49.7	68.6	80.2	84.3
72.5	69	63.9	50.3	31.4	19.8	15.7
2.72	11.9	14.6	22.8	37.2	49.8	55.8
18.3	13.9	15.8	21.6	30.6	36.8	39.3
0	0	0	0	0	0	0
79	74.3	69.5	55.6	32.2	13.3	4.9
1.12	2.39	6.84	19.8	40.6	55.7	61.7
3.42	3.14	5.18	11.2	21.3	29.5	33.1
94.6	93.8	87.3	68.4	37.5	14.2	4.65
0.885	0.628	0.63	0.632	0.632	0.63	0.631
	27.5 72.5 2.72 18.3 0 79 1.12 3.42 94.6	22,723  27.5 31  72.5 69  2.72 11.9  18.3 13.9  0 0  79 74.3  1.12 2.39  3.42 3.14  94.6 93.8	22,723     24,348       27.5     31     36.1       72.5     69     63.9       2.72     11.9     14.6       18.3     13.9     15.8       0     0     0       79     74.3     69.5       1.12     2.39     6.84       3.42     3.14     5.18       94.6     93.8     87.3	22,723     24,348       27.5     31     36.1     49.7       72.5     69     63.9     50.3       2.72     11.9     14.6     22.8       18.3     13.9     15.8     21.6       0     0     0     0       79     74.3     69.5     55.6       1.12     2.39     6.84     19.8       3.42     3.14     5.18     11.2       94.6     93.8     87.3     68.4	22,723       24,348         27.5       31       36.1       49.7       68.6         72.5       69       63.9       50.3       31.4         2.72       11.9       14.6       22.8       37.2         18.3       13.9       15.8       21.6       30.6         0       0       0       0       0         79       74.3       69.5       55.6       32.2         1.12       2.39       6.84       19.8       40.6         3.42       3.14       5.18       11.2       21.3         94.6       93.8       87.3       68.4       37.5	22,723       24,348         27.5       31       36.1       49.7       68.6       80.2         72.5       69       63.9       50.3       31.4       19.8         2.72       11.9       14.6       22.8       37.2       49.8         18.3       13.9       15.8       21.6       30.6       36.8         0       0       0       0       0       0         79       74.3       69.5       55.6       32.2       13.3         1.12       2.39       6.84       19.8       40.6       55.7         3.42       3.14       5.18       11.2       21.3       29.5         94.6       93.8       87.3       68.4       37.5       14.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.95	2.96	4.08	4.22	5.76	6.07
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)	160	163	165	166	164	162	160
Final energy use - Industry (PJ)	342	355	361	367	376	385	395
Final energy use - Residential (PJ)	246	227	207	188	169	150	133
Final energy use - Transportation (PJ)	657	654	611	573	544	510	470

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		4.1	4.04				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	70.4	71.2	73.9	81.1	91	97.1	99.2
Resistance (%)							
Sales of cooking units - Gas (%)	29.6	28.8	26.1	18.9	9.03	2.91	0.784
Sales of space heating units - Electric	14	21.3	23.9	31.4	44.1	54.1	58.4
Heat Pump (%)							
Sales of space heating units - Electric	35.6	41.8	41.1	39.2	35.8	32.7	31
Resistance (%)							
Sales of space heating units - Fossil (%)	8.89	13.8	13.5	12.4	10.6	9.24	8.81
Sales of space heating units - Gas (%)	41.5	23	21.5	17	9.58	4.03	1.76
Sales of water heating units - Electric	0	1.23	4.71	14.8	30.9	42.3	46.7
Heat Pump (%)							
Sales of water heating units - Electric	45.5	61.3	60	56.4	51	47.6	46.5
Resistance (%)							

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

	-	-	•	-			
Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	47.5	31.9	29.8	23.3	12.8	4.87	1.59
Sales of water heating units - Other (%)	6.95	5.56	5.52	5.49	5.39	5.31	5.28

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		0	239	450	1,569	4,778	7,016
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.551		1.02		3.86		10.1
units)							
Public EV charging plugs - L2 (1000 units)	2.37		24.5		92.8		244
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 (%)	1.52	1.94	2.05	1.63	1.04	0.532	0.228
Vehicle sales - Light-duty - EV (%)	1.94	4.79	12.1	26.2	48.8	72.3	87.7
Vehicle sales - Light-duty - gasoline (%)	91.6	87.3	79.3	66.2	45.8	24.6	10.9
Vehicle sales - Light-duty - hybrid (%)	4.73	5.52	6.19	5.61	4.19	2.46	1.19
Vehicle sales - Light-duty - hydrogen FC	0.113	0.379	0.324	0.246	0.174	0.096	0.045
(%)							
Vehicle sales - Light-duty - other (%)	0.101	0.105	0.095	0.083	0.059	0.033	0.015
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen	0.166	0.485	1.37	3.58	7.86	13.2	17
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant	0	0.004	0.227	0	0	0	0
(billion \$2018)							
Capital invested - Biomass w/ccu allam	0	0	0	0	0.008	0	0
power plant (billion \$2018)							
Capital invested - Biomass w/ccu power	0	0	0	0	0.063	0	0
plant (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	7.38	452	452	452	452	452
Biomass w/ccu allam power plant (GWh)	0	0	0	0	8.4	8.4	8.4
Biomass w/ccu power plant (GWh)	0	0	0	0	70.4	70.4	70.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)		63.7	192	194	290	684	729
Conversion capital investment -		4.26	253	26.4	1,350	5,424	624
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	1	1	1
(quantity)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Beccs hydrogen	0	0	0	0	1	6	7
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu	0	0	0	0	1	1	1
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu	0	0	0	0	1	1	1
(quantity)							
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
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	3.35	5.03	12.1	13
Annual - BECCS (MMT)		0	0	0	1.71	8.69	9.49
Annual - Cement and lime (MMT)		0	0	3.35	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	3.35	8.38	20.5	33.5
Cumulative - BECCS (MMT)		0	0	0	1.71	10.4	19.9
Cumulative - Cement and lime (MMT)		0	0	3.35	6.67	10.1	13.6
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	776	984	1,486	1,688
Cumulative investment - All (million \$2018)		0	0	1,800	1,935	2,313	2,443
Cumulative investment - Spur (million \$2018)		0	0	98.6	233	611	741
Cumulative investment - Trunk (million \$2018)		0	0	1,702	1,702	1,702	1,702
Spur (km)		0	0	101	309	811	1,013
Trunk (km)		0	0	675	675	675	675

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tC02e/y)							-0.035
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,981
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0

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

2020	2025	2030	2035	2040	2045	2050
				- 1-		0
						-147
						-2,129
						-0.035
						-1,027
						0
						0
						-73.6
						-1,101
						0.040
						0.062
						( 000
						6,909
						0.017
						0.016
						2.81
						2.01
						235
						233
+						7,146
						1,140
					+	0.062
						0.002
		+		+		1,458
						1,430
				-		0.016
						0.010
	-			+		2.81
						2.01
+				+		117
						117
				-		1,578
						1,010
		<u> </u>	, ,	NRS - Agriculture (continued)  2020 2025 2030 2035	• • • • • • • • • • • • • • • • • • • •	· ,

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

Table 57: E-B+ scenario - PILLAR 6: Land							
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-2,170
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-71,521
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,904
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-9,494
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-4,080
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-29,790
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,078
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-14,981
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-2,477
pasture (1000 tC02e/y)							•
Carbon sink potential - High - Restore							-5,545
productivity (1000 tCO2e/y)							-,
Carbon sink potential - Low - Accelerate							-1,087
regeneration (1000 tCO2e/y)							.,00.
Carbon sink potential - Low - All (not						+	-26,982
counting overlap) (1000 tCO2e/y)							20,702
Carbon sink potential - Low - Avoid							-317
deforestation (1000 tC02e/y)							011
Carbon sink potential - Low - Extend							-3,647
rotation length (1000 tCO2e/y)							-3,041
Carbon sink potential - Low - Improve							-2,076
plantations (1000 tCO2e/y)							-2,010
Carbon sink potential - Low - Increase						-	-9,930
retention of HWP (1000 tCO2e/y)							-9,930
							-377
Carbon sink potential - Low - Increase							-377
trees outside forests (1000 tC02e/y)							7 / 01
Carbon sink potential - Low - Reforest							-7,491
cropland (1000 tCO2e/y)							100
Carbon sink potential - Low - Reforest							-188
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,869
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-1,629
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-49,216
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,111
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-6,570
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,042
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-19,860
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-728
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-11,236
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,332
pasture (1000 tC02e/y)							•
Carbon sink potential - Mid - Restore							-3,707
productivity (1000 tCO2e/y)							

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

355
056
258
4,84
4,04
1,503
C
102
990
70.4
70.4
1,000
1,838
9,959
7,737
178
242
1,855
752
53.9
00.7
495
12.2
1,112
4,699
266

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							250
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,348
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,131
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 -							78.2
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							743
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							88.2
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,240
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,144
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		63.6	0.07	0.07	0.053	0.033	0
Coal (million 2019\$)							
Monetary damages from air pollution -		60.3	31.8	24.2	23.1	19.6	17.4
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		1,133	1,189	1,198	1,115	917	648
Transportation (million 2019\$)							
Premature deaths from air pollution -		7.18	0.008	0.008	0.006	0.004	0
Coal (deaths)							
Premature deaths from air pollution -		6.81	3.58	2.73	2.6	2.21	1.96
Natural Gas (deaths)							
Premature deaths from air pollution -		127	134	135	125	103	72.9
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		22,575	23,159				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	27.5	29	29	29	29	28.9	28.9
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	71	71	71	71	71.1	71.1
Sales of space heating units - Electric	2.72	21.4	53.8	64.1	65.2	65.3	65.3
Heat Pump (%)							
Sales of space heating units - Electric	18.3	16.1	25.2	30.3	33.5	33.9	34
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	79	62.5	21	5.54	1.3	0.744	0.697
(%)							
Sales of water heating units - Electric	1.12	0.821	0.82	0.824	0.831	0.834	0.834
Heat Pump (%)							
Sales of water heating units - Electric	3.42	2.42	2.42	2.44	2.44	2.44	2.44
Resistance (%)							

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

	,.		•	,			
Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	94.6	96.1	96.1	96.1	96.1	96.1	96.1
Sales of water heating units - Other (%)	0.885	0.628	0.63	0.632	0.632	0.63	0.631

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.38	3.44	3.99	4.11	3.95	4.04
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	160	165	169	173	178	188	201
Final energy use - Industry (PJ)	342	367	387	404	428	457	490
Final energy use - Residential (PJ)	246	227	210	196	186	179	172
Final energy use - Transportation (PJ)	656	659	625	605	608	624	642

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		4.1	3.83				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	70.2	70.2	70.2	70.2	70.2	70.2	70.2
Resistance (%)							
Sales of cooking units - Gas (%)	29.8	29.8	29.8	29.8	29.8	29.8	29.8
Sales of space heating units - Electric	12.4	29.8	30.5	31.7	33.2	35.3	38.5
Heat Pump (%)							
Sales of space heating units - Electric	36.2	36.9	36.4	35.6	34.5	32.5	29.2
Resistance (%)							
Sales of space heating units - Fossil (%)	9.05	12.7	11.5	10.8	10.6	10.5	10.6
Sales of space heating units - Gas (%)	42.3	20.7	21.6	21.9	21.7	21.7	21.7
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	45.5	61.7	61.7	61.6	61.6	61.6	61.6
Resistance (%)							
Sales of water heating units - Gas Furnace	47.5	32.7	32.8	32.8	32.8	32.8	32.8
(%)							
Sales of water heating units - Other (%)	6.95	5.57	5.55	5.6	5.61	5.61	5.61

## Table 63: REF scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - diesel (%)	98.1	98.2	97.9	97	95.6	93.5	91.6
Vehicle sales - Heavy-duty - EV (%)	0	0	0	0	0	0	0
Vehicle sales - Heavy-duty - gasoline (%)	0.229	0.242	0.257	0.274	0.294	0.317	0.343
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.096	0.112	0.13	0.15	0.174	0.202
Vehicle sales - Heavy-duty - hydrogen FC	0.119	0.138	0.16	0.186	0.216	0.25	0.29
(%)							
Vehicle sales - Heavy-duty - other (%)	1.51	1.31	1.57	2.37	3.69	5.71	7.57
Vehicle sales - Light-duty - diesel (%)	1.51	1.93	2.18	2.03	1.82	1.7	1.62
Vehicle sales - Light-duty - EV (%)	3.7	5.77	6.57	8.08	9.83	11.3	12.5
Vehicle sales - Light-duty - gasoline (%)	90	86.4	84.2	82.3	80.2	78.3	76.7
Vehicle sales - Light-duty - hybrid (%)	4.57	5.41	6.62	7.18	7.74	8.3	8.72
Vehicle sales - Light-duty - hydrogen FC	0.111	0.375	0.343	0.304	0.301	0.301	0.312
(%)							
Vehicle sales - Light-duty - other (%)	0.1	0.104	0.1	0.101	0.1	0.099	0.101
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7

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

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

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

Table 64: REF Scenario - PILLAR 6: Land Sil			0000	0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-2,170
regeneration (1000 tCO2e/y)							71 501
Carbon sink potential - High - All (not							-71,521
counting overlap) (1000 tC02e/y)							400/
Carbon sink potential - High - Avoid							-1,904
deforestation (1000 tC02e/y)							
Carbon sink potential - High - Extend							-9,494
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-4,080
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-29,790
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,078
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-14,981
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-2,477
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-5,545
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-1,087
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-26,982
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - Low - Avoid							-317
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-3,647
rotation length (1000 tCO2e/y)							-,-
Carbon sink potential - Low - Improve							-2,076
plantations (1000 tCO2e/y)							_,-,-
Carbon sink potential - Low - Increase							-9,930
retention of HWP (1000 tCO2e/y)							.,
Carbon sink potential - Low - Increase							-377
trees outside forests (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest							-7,491
cropland (1000 tCO2e/y)							., ., .
Carbon sink potential - Low - Reforest							-188
pasture (1000 tC02e/y)							100
Carbon sink potential - Low - Restore							-1,869
productivity (1000 tCO2e/y)							1,007
Carbon sink potential - Mid - Accelerate							-1,629
regeneration (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - All (not							-49,216
counting overlap) (1000 tCO2e/y)							-47,210
Carbon sink potential - Mid - Avoid							-1,111
deforestation (1000 tC02e/y)							-1,111
Carbon sink potential - Mid - Extend							-6,570
•							-0,570
rotation length (1000 tC02e/y)							0.070
Carbon sink potential - Mid - Improve							-3,042
plantations (1000 tC02e/y)							10.07.0
Carbon sink potential - Mid - Increase							-19,860
retention of HWP (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-728
Carbon sink potential - Mid - Reforest							-11,236
cropland (1000 tCO2e/y)							11,200
Carbon sink potential - Mid - Reforest							-1,332
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-3,707
productivity (1000 tC02e/y)							055
Land impacted for carbon sink potential - High - Accelerate regeneration (1000							355
hectares)							
Land impacted for carbon sink potential -							258
High - Avoid deforestation (over 30 years)							200
(1000 hectares)							
Land impacted for carbon sink potential -							4,841
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,503
High - Improve plantations (1000							
hectares)							0
Land impacted for carbon sink potential - High - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							102
High - Increase trees outside forests							102
(1000 hectares)							
Land impacted for carbon sink potential -							990
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							70.4
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,838
High - Restore productivity (1000							
hectares)  Land impacted for carbon sink potential -							9,959
High - Total impacted (over 30 years)							7,707
(1000 hectares)							
Land impacted for carbon sink potential -							178
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							242
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,855
Low - Extend rotation length (1000							
hectares)  Land impacted for carbon sink potential -							752
Low - Improve plantations (1000							132
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							53.9
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							495
Low - Reforest cropland (1000 hectares)							10.0
Land impacted for carbon sink potential -							12.2
Low - Reforest pasture (1000 hectares)  Land impacted for carbon sink potential -			-			-	1,112
Land Impacted for carbon sink potential - Low - Restore productivity (1000							1,112
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,699
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							266
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							250
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,348
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,131
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							78.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							743
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							88.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,240
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							8,144

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

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	-27.2		-5.37				-4.47
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-8.11		-13.6				-14.3
Business-as-usual carbon sink - Total (Mt CO2e/y)	-35.3		-19				-18.8

## Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		271	195	35.8	28.1	25.7	24.2
Coal (million 2019\$)							
Monetary damages from air pollution -		72.7	72	75.4	61	55.4	57.5
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		1,130	1,203	1,275	1,353	1,434	1,517
Transportation (million 2019\$)							
Premature deaths from air pollution -		30.6	22	4.05	3.18	2.91	2.73
Coal (deaths)							
Premature deaths from air pollution -		8.21	8.13	8.52	6.89	6.26	6.49
Natural Gas (deaths)							
Premature deaths from air pollution -		127	135	143	152	161	171
Transportation (deaths)							