Net-Zero America - kentucky state report

Larson et al. 2020

February 2021

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 https://netzeroamerica.princeton.edu.)

Notes

- These data are a subset of all data from the study available at https://netzeroamerica.princeton.edu.
- The Net-Zero America study describes five pathways to reach net-zero emissions and one "no new policies" reference scenario. In this document, state-level results are grouped by scenario. For some scenarios, the study generated national, but not state-level 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.)
- Some results are not model outputs, but rather they are limits that apply across all scenarios (e.g., maximum carbon storage potential in agricultural soils).

List of Tables

1	E+ scenario - PILLAR 1: Efficiency/Electrification - Residential	4
2	E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	4
3	E+ scenario - PILLAR 1: Efficiency/Electrification - Overview	4
4	E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	4
5	E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	5
6	E+ scenario - PILLAR 2: Clean Electricity - Generating capacity	5
7	E+ scenario - PILLAR 2: Clean Electricity - Generation	5
8	E+ scenario - PILLAR 3: Clean fuels - Bioenergy	5
9	E+ scenario - PILLAR 4: CCUS - CO2 capture	5
10	E+ scenario - PILLAR 4: CCUS - CO2 storage	6
11	E+ scenario - PILLAR 4: CCUS - CO2 pipelines	6
12	E+ scenario - PILLAR 6: Land sinks - Agriculture	6
13	E+ scenario - PILLAR 6: Land sinks - Forests	7
14	E+ scenario - IMPACTS - Health	9
15	E+ scenario - IMPACTS - Jobs	9
16	E+ scenario - IMPACTS - Fossil fuel industries	10
17	E- scenario - PILLAR 1: Efficiency/Electrification - Residential	10

18	E- scenario - PILLAR 1: Efficiency/Electrification - Transportation	10
19	E- scenario - PILLAR 1: Efficiency/Electrification - Overview	11
20	E- scenario - PILLAR 1: Efficiency/Electrification - Commercial	11
21	E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	11
22	E- scenario - PILLAR 6: Land sinks - Agriculture	11
23	E- scenario - PILLAR 6: Land sinks - Forests	12
24	E- scenario - IMPACTS - Health	14
25	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential	14
26	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	15
27	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview	15
28	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	15
29	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	15
30	E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity	16
31	E+RE+ scenario - PILLAR 2: Clean Electricity - Generation	16
32	E+RE+ scenario - PILLAR 6: Land sinks - Agriculture	16
33	E+RE+ scenario - PILLAR 6: Land sinks - Forests	16
34	E+RE+ scenario - IMPACTS - Health	18
35	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential	19
36	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation	19
37	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview	19
38	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial	20
39	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	20
40	E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity	20
41	E+RE- scenario - PILLAR 2: Clean Electricity - Generation	20
42	E+RE- scenario - PILLAR 6: Land sinks - Agriculture	20
43	E+RE- scenario - PILLAR 6: Land sinks - Forests	21
44	E+RE- scenario - IMPACTS - Health	23
45	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential	23
46	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	23
47	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview	24
48	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	24
49	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	24
50	E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity	24
51	E-B+ scenario - PILLAR 2: Clean Electricity - Generation	25
52	E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy	25
53	E-B+ scenario - PILLAR 4: CCUS - CO2 capture	25
54	E-B+ scenario - PILLAR 4: CCUS - CO2 storage	25
55	E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines	25
56	E-B+ scenario - PILLAR 6: Land sinks - Agriculture	25
57	E-B+ scenario - PILLAR 6: Land sinks - Forests	26
58	REF scenario - PILLAR 1: Efficiency/Electrification - Residential	28

59	REF scenario - PILLAR 1: Efficiency/Electrification - Transportation	29
60	REF scenario - PILLAR 1: Efficiency/Electrification - Overview	29
61	REF scenario - PILLAR 1: Efficiency/Electrification - Commercial	29
62	REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	30
63	REF scenario - PILLAR 6: Land sinks - Forests	30
64	REF scenario - IMPACTS - Health	32

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF -	0	3.38	3.59	0	0	0	0
Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric Resistance (%)	76.9	81.8	96.9	99.8	100	100	100
Sales of cooking units - Gas (%)	23.1	18.2	3.11	0.157	0	0	0
Sales of space heating units - Electric Heat Pump	26.6	42.5	77.8	85.8	86.2	86.1	86.1
(%)							
Sales of space heating units - Electric Resistance	26.5	25.4	10.6	7.34	7.19	7.29	7.32
(%)							
Sales of space heating units - Fossil (%)	9.65	11.3	5.2	3.78	3.67	3.61	3.61
Sales of space heating units - Gas (%)	37.2	20.8	6.32	3.1	2.98	2.95	2.94
Sales of water heating units - Electric Heat Pump	0	8.47	44.9	53	53.3	53.4	53.4
(%)							
Sales of water heating units - Electric Resistance	62.5	70	49.2	44.5	44.3	44.3	44.3
(%)							
Sales of water heating units - Gas Furnace (%)	34.2	19.2	3.59	0.151	0	0	0
Sales of water heating units - Other (%)	3.3	2.39	2.36	2.36	2.36	2.37	2.38

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr	0	840	2,147	3,490	5,282	5,754	5,483
(million \$2018)							
Public EV charging plugs - DC Fast (1000 units)	0.06	0	1.72	0	7.66	0	12.4
Public EV charging plugs - L2 (1000 units)	0.251	0	41.4	0	184	0	298
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 (%)	1.56	1.82	1.26	0.403	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.9	15.1	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78.1	48.9	16.6	3.3	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.4	4.53	3.21	1.19	0.29	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	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 FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 3: E+ scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	119	118	113	105	99.3	96.6	97
Final energy use - Industry (PJ)	382	396	409	403	409	414	415
Final energy use - Residential (PJ)	184	171	156	137	121	111	106
Final energy use - Transportation (PJ)	426	391	344	288	236	205	193

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	12,650	14,338	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Sales of space heating units - Electric Heat Pump	5.4	31	77.5	91	92.2	92.3	92.3
(%)							
Sales of space heating units - Electric Resistance	3.11	4.17	4.51	5.9	6.19	6.19	6.21
(%)							
Sales of space heating units - Fossil (%)	15.1	4.35	0.819	0.034	0	0	0

Table 4: E+ scenario	- PTI I AR 1: FHiciency	//Flertritiration -	Commercial	(Irontinued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	76.4	60.5	17.1	3.03	1.58	1.53	1.52
Sales of water heating units - Electric Heat Pump	0.117	10.6	55.7	65.7	66.2	66.2	66.2
(%)							
Sales of water heating units - Electric Resistance	4.29	9.87	28	32.1	32.3	32.2	32.3
(%)							
Sales of water heating units - Gas Furnace (%)	94.4	77.9	14.7	0.621	0	0	0
Sales of water heating units - Other (%)	1.17	1.57	1.57	1.57	1.57	1.56	1.55

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -	0	3.26	3.36	4.91	5.18	4.05	4.16
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion	0	0	0	0	0	0	0
\$2018)							
Capital invested - Biomass w/ccu allam power	0	0	0	0	0	0	0
plant (billion \$2018)							
Capital invested - Biomass w/ccu power plant	0	0	5.14	0	0	5.51	0
(billion \$2018)							
Capital invested - Solar PV - Base (billion \$2018)	0	0	0	0	0	0	0.071
Capital invested - Solar PV - Constrained (billion	0	0.091	0	0	0	0.132	0.08
\$2018)							
Capital invested - Wind - Constrained (billion	0	0	0.098	0.431	0.052	0	0
\$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	5,771	5,771	5,771	11,950	11,950
Solar - Base land use assumptions (GWh)	145	0	0	0	0	0	139
Solar - Constrained land use assumptions (GWh)	145	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	0	0	217	838	91	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)	0	0	227	552	552	902	902
Conversion capital investment - Cumulative 5-yr (million \$2018)	0	0	4,717	5,838	0	6,983	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	6	6	8	8
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	4	4	4	9	9
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)	0	0	5.71	20.1	22.8	35.3	34.1
Annual - BECCS (MMT)	0	0	5.71	13.2	13	21.4	21.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - Cement and lime (MMT)	0	0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)	0	0	0	6.95	6.44	10.4	9.12
Cumulative - All (MMT)	0	0	5.71	25.9	48.6	83.9	118
Cumulative - BECCS (MMT)	0	0	5.71	18.9	31.9	53.4	74.8
Cumulative - Cement and lime (MMT)	0	0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)	0	0	0	6.95	13.4	23.8	33

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)	0	0	1.1	1.76	3.61	5.16	6.52
Injection wells (wells)	0	0	1	4	7	12	15
Resource characterization, appraisal, permitting costs (million \$2020)	0	45.8	128	165	165	165	165
Wells and facilities construction costs (million \$2020)	0	0	30.5	119	212	354	439

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)	0	0	505	1,390	1,455	2,534	2,836
Cumulative investment - All (million \$2018)	0	0	1,724	2,883	2,920	3,762	4,000
Cumulative investment - Spur (million \$2018)	0	0	284	929	966	1,808	2,046
Cumulative investment - Trunk (million \$2018)	0	0	1,440	1,954	1,954	1,954	1,954
Spur (km)	0	0	230	1,031	1,097	2,176	2,477
Trunk (km)	0	0	275	359	359	359	359

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment -	0	0	-432
Corn-ethanol to energy grasses (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-4,963
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-136
Permanent conservation cover (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-5,532
Total (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-432
Corn-ethanol to energy grasses (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-2,618
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-67.9
Permanent conservation cover (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-3,118
Total (1000 tCO2e/y)			
Land impacted for carbon sink - Aggressive	0	0	188
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	2,250
deployment - Cropland measures (1000			
hectares)			
Land impacted for carbon sink - Aggressive	0	0	247
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	2,685
deployment - Total (1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	188
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,187
deployment - Cropland measures (1000			
hectares)			

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

Item	2020	2025	2050
Land impacted for carbon sink - Moderate	0	0	124
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,498
deployment - Total (1000 hectares)			

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

able 13: <i>E+ scenario - PILLAR 6: Land sinks - For</i> Item	2020	2025	2050
Carbon sink potential - High - Accelerate	0	0	96.7
regeneration (1000 tCO2e/y)			
Carbon sink potential - High - All (not counting	0	0	27,796
overlap) (1000 tC02e/y)			
Carbon sink potential - High - Avoid deforestation	0	0	1,537
(1000 tC02e/y)			
Carbon sink potential - High - Extend rotation	0	0	5,669
length (1000 tCO2e/y)			
Carbon sink potential - High - Improve	0	0	48.1
plantations (1000 tC02e/y)	0	0	/ / / 5
Carbon sink potential - High - Increase retention	0	0	4,665
of HWP (1000 tC02e/y)	0	0	0/5
Carbon sink potential - High - Increase trees	0	0	965
outside forests (1000 tC02e/y) Carbon sink potential - High - Reforest cropland	0	0	1,409
(1000 tC02e/y)	U	0	1,409
Carbon sink potential - High - Reforest pasture	0	0	10,207
(1000 tCO2e/y)	U	0	10,201
Carbon sink potential - High - Restore	0	0	3,200
productivity (1000 tC02e/y)	o	0	3,200
Carbon sink potential - Low - Accelerate	0	0	48.5
regeneration (1000 tCO2e/y)	0	0	40.0
Carbon sink potential - Low - All (not counting	0	0	6,956
overlap) (1000 tC02e/y)	0	0	0,700
Carbon sink potential - Low - Avoid deforestation	0	0	256
(1000 tC02e/y)			200
Carbon sink potential - Low - Extend rotation	0	0	2,177
length (1000 tC02e/y)		-	_,
Carbon sink potential - Low - Improve	0	0	24.5
plantations (1000 tCO2e/y)			
Carbon sink potential - Low - Increase retention	0	0	1,555
of HWP (1000 tCO2e/y)			•
Carbon sink potential - Low - Increase trees	0	0	338
outside forests (1000 tCO2e/y)			
Carbon sink potential - Low - Reforest cropland	0	0	704
(1000 tC02e/y)			
Carbon sink potential - Low - Reforest pasture	0	0	773
(1000 tC02e/y)			
Carbon sink potential - Low - Restore	0	0	1,079
productivity (1000 tCO2e/y)			
Carbon sink potential - Mid - Accelerate	0	0	72.6
regeneration (1000 tCO2e/y)			
Carbon sink potential - Mid - All (not counting	0	0	17,376
overlap) (1000 tCO2e/y)			
Carbon sink potential - Mid - Avoid deforestation	0	0	897
(1000 tC02e/y)			
Carbon sink potential - Mid - Extend rotation	0	0	3,923
length (1000 tC02e/y)			
Carbon sink potential - Mid - Improve plantations	0	0	35.9
(1000 tC02e/y)			
Carbon sink potential - Mid - Increase retention	0	0	3,110
of HWP (1000 tC02e/y)			,
Carbon sink potential - Mid - Increase trees	0	0	651
outside forests (1000 tC02e/y)			

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

Table 13: E+ scenario - PILLAR 6: Land sinks - Fo		ued)	
Item	2020	2025	2050
Carbon sink potential - Mid - Reforest cropland	0	0	1,057
(1000 tCO2e/y)			
Carbon sink potential - Mid - Reforest pasture	0	0	5,490
(1000 tC02e/y)			
Carbon sink potential - Mid - Restore	0	0	2,139
productivity (1000 tCO2e/y)		9	2,107
Land impacted for carbon sink potential - High -	0	0	15.8
	0	U	15.8
Accelerate regeneration (1000 hectares)			000
Land impacted for carbon sink potential - High -	0	0	208
Avoid deforestation (over 30 years) (1000			
hectares)			
Land impacted for carbon sink potential - High -	0	0	2,891
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	17.7
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	91.7
Increase trees outside forests (1000 hectares)		0	71.1
	0	0	00.0
Land impacted for carbon sink potential - High -	0	0	93.2
Reforest cropland (1000 hectares)		_	
Land impacted for carbon sink potential - High -	0	0	290
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	1,061
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	4,668
Total impacted (over 30 years) (1000 hectares)			,
Land impacted for carbon sink potential - Low -	0	0	7.91
Accelerate regeneration (1000 hectares)		9	1.71
Land impacted for carbon sink potential - Low -	0	0	195
	"	0	175
Avoid deforestation (over 30 years) (1000			
hectares)		_	
Land impacted for carbon sink potential - Low -	0	0	1,107
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	8.86
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	48.3
Increase trees outside forests (1000 hectares)			10.0
Land impacted for carbon sink potential - Low -	0	0	46.6
	"	0	40.0
Reforest cropland (1000 hectares)		-	50.0
Land impacted for carbon sink potential - Low -	0	0	50.3
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	642
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	2,107
Total impacted (over 30 years) (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	11.9
Accelerate regeneration (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	202
Avoid deforestation (over 30 years) (1000		0	202
hectares)			1000
Land impacted for carbon sink potential - Mid -	0	0	1,999
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	13.3
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	70
Increase trees outside forests (1000 hectares)		-	, ,
Land impacted for carbon sink potential - Mid -	0	0	69.9
Reforest cropland (1000 hectares)		0	07.7
norm cat or opiana (1000 neotal 63)			

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

Item	2020	2025	2050
Land impacted for carbon sink potential - Mid -	0	0	363
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	1,293
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	4,022
Total impacted (over 30 years) (1000 hectares)			

Table 14: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal	0	766	2.45	2.43	2.28	1.74	0.169
(million 2019\$)							
Monetary damages from air pollution - Natural	0	166	129	71.3	56.6	24.6	8.82
Gas (million 2019\$)							
Monetary damages from air pollution -	0	1,223	1,135	858	493	225	90.1
Transportation (million 2019\$)							
Premature deaths from air pollution - Coal	0	85.9	0.275	0.273	0.256	0.195	0.019
(deaths)							
Premature deaths from air pollution - Natural	0	18.7	14.5	8.05	6.39	2.78	0.997
Gas (deaths)							
Premature deaths from air pollution -	0	138	128	96.5	55.5	25.3	10.1
Transportation (deaths)							

Table 15: E+ scenario - IMPACTS - Jobs

982 3,984 10,457 1,026 252 317 2,559 1,364 5,536 8,212 5,290 144 11,654	1,266 3,689 8,644 741 245 312 2,950 1,319 4,636 7,226 4,789 10,535	1,043 3,953 10,810 535 305 353 2,893 1,276 4,648 7,950 5,164
10,457 1,026 252 317 2,559 1,364 5,536 8,212 5,290 144	8,644 741 245 312 2,950 1,319 4,636 7,226 4,789 149	10,810 535 305 353 2,893 1,276 4,648 7,950 5,164 151
1,026 252 317 2,559 1,364 5,536 8,212 5,290 144	741 245 312 2,950 1,319 4,636 7,226 4,789 149	535 305 353 2,893 1,276 4,648 7,950 5,164
252 317 2,559 1,364 5,536 8,212 5,290 144	245 312 2,950 1,319 4,636 7,226 4,789 149	305 353 2,893 1,276 4,648 7,950 5,164 151
317 2,559 1,364 5,536 8,212 5,290 144	312 2,950 1,319 4,636 7,226 4,789 149	353 2,893 1,276 4,648 7,950 5,164 151
2,559 1,364 5,536 8,212 5,290 144 11,654	2,950 1,319 4,636 7,226 4,789 149	2,893 1,276 4,648 7,950 5,164 151
1,364 5,536 8,212 5,290 144 11,654	1,319 4,636 7,226 4,789 149	1,276 4,648 7,950 5,164 151
5,536 8,212 5,290 144 11,654	4,636 7,226 4,789 149	4,648 7,950 5,164 151 11,394
8,212 5,290 144 11,654	7,226 4,789 149 10,535	7,950 5,164 151 11,394
5,290 144 11,654	4,789 149 10,535	5,164 151 11,394
144	149	151
144	149	151
11,654	10,535	11,394
11,654	10,535	11,394
·		
·		
1.177	1102	115/
1.177	1102	115/
.,	1,102	1,156
2,933	4,620	4,463
1,106	1,664	2,392
432	384	339
7,292	6,211	6,045
3,561	2,066	1,464
0	0	0
		933
4,869		6,347
4,273		3,833
55,539	56,203	56,450
4,177	3,679	4,012
1,462	1,306	1,382
4,311	3,904	4,248
	191	209
216	1	
	3,561 0 2,011 4,869 4,273 55,539	3,561 2,066 0 0 2,011 1,414 4,869 4,415 4,273 3,026 55,539 56,203 4,177 3,679 1,462 1,306 4,311 3,904

Table 15: E+ scenario - IMPAC	TS - Johs (cont	inued)
-------------------------------	-----------------	--------

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)	18,333	14,645	14,798	18,012	16,312	14,721	15,965
On-the-Job Training - All sectors - 1 to 4 years (jobs)	6,004	4,882	4,989	5,848	5,304	4,658	5,080
On-the-Job Training - All sectors - 4 to 10 years (jobs)	1,760	1,345	1,370	1,552	1,397	1,246	1,317
On-the-Job Training - All sectors - None (jobs)	1,529	1,241	1,246	1,496	1,352	1,237	1,345
On-the-Job Training - All sectors - Over 10 years (jobs)	247	233	247	296	271	236	270
On-the-Job Training - All sectors - Up to 1 year (jobs)	20,064	16,154	16,366	20,038	18,153	16,423	17,804
Related work experience - All sectors - 1 to 4 years (jobs)	10,963	8,676	8,710	10,438	9,429	8,449	9,108
Related work experience - All sectors - 4 to 10 years (jobs)	6,688	5,489	5,568	6,575	5,960	5,299	5,768
Related work experience - All sectors - None (jobs)	4,150	3,382	3,477	4,217	3,821	3,452	3,720
Related work experience - All sectors - Over 10 years (jobs)	1,789	1,540	1,575	1,873	1,704	1,497	1,660
Related work experience - All sectors - Up to 1 year (jobs)	6,013	4,768	4,887	6,126	5,562	5,103	5,559
Wage income - All (million \$2019)	1,613	1,312	1,336	1,608	1,471	1,338	1,457

Table 16: E+ scenario - IMPACTS - Fossil fuel industries

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)	259	263	222	178	134	84.2	58.4
Natural gas consumption - Cumulative (tcf)	0	0	0	0	0	0	5,358
Natural gas production - Annual (tcf)	86.8	96.2	91	79.2	67	53.1	41.3
Oil consumption - Annual (million bbls)	93.4	88.2	77.2	61.2	46.1	34.1	24.3
Oil consumption - Cumulative (million bbls)	0	0	0	0	0	0	1,887
Oil production - Annual (million bbls)	2.71	2.93	2.94	2.94	2.33	1.89	1.26

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF -	0	3.35	3.47	0	0	0	0
Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric Resistance (%)	76.8	77.4	79.5	85.1	92.9	97.7	99.4
Sales of cooking units - Gas (%)	23.2	22.6	20.5	14.9	7.09	2.29	0.616
Sales of space heating units - Electric Heat Pump	26.6	35.6	39.7	51.4	69.2	80.7	84.7
(%)							
Sales of space heating units - Electric Resistance	26.5	28.2	26.4	21.5	14.1	9.46	7.83
(%)							
Sales of space heating units - Fossil (%)	9.65	12.5	11.9	9.77	6.6	4.55	3.88
Sales of space heating units - Gas (%)	37.2	23.6	22	17.4	10.1	5.25	3.56
Sales of water heating units - Electric Heat Pump	0	1.46	5.6	17.5	35.8	47.8	51.9
(%)							
Sales of water heating units - Electric Resistance	62.5	74	71.8	64.8	54.3	47.5	45.1
(%)							
Sales of water heating units - Gas Furnace (%)	34.2	22.2	20.3	15.3	7.52	2.39	0.624
Sales of water heating units - Other (%)	3.3	2.39	2.37	2.38	2.39	2.38	2.38

Table 18: E-scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr	0	0	135	286	962	3,037	4,422
(million \$2018)							
Public EV charging plugs - DC Fast (1000 units)	0.06	0	0.518	0	2.83	0	7.94
Public EV charging plugs - L2 (1000 units)	0.251	0	12.5	0	68	0	191
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051

Table 18: E- scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.57	1.98	2.06	1.64	1.05	0.538	0.231
Vehicle sales - Light-duty - EV (%)	1.88	4.66	11.8	25.8	48.3	72	87.5
Vehicle sales - Light-duty - gasoline (%)	91.8	87.5	79.7	66.7	46.3	24.9	11
Vehicle sales - Light-duty - hybrid (%)	4.56	5.37	6.03	5.49	4.12	2.44	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.38	0.326	0.249	0.177	0.098	0.046
Vehicle sales - Light-duty - other (%)	0.103	0.107	0.097	0.085	0.061	0.034	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 19: E- scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	119	119	117	114	110	106	103
Final energy use - Industry (PJ)	382	396	410	408	416	420	420
Final energy use - Residential (PJ)	184	172	163	153	142	129	118
Final energy use - Transportation (PJ)	427	394	360	333	312	287	259

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	12,642	14,325	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric Resistance (%)	43.5	47.1	51.3	61.6	76.1	85	88
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Sales of space heating units - Electric Heat Pump	5.4	22.1	27.3	42.8	66.9	83.6	89.9
(%)							
Sales of space heating units - Electric Resistance	3.11	4.17	4.24	4.4	4.84	5.52	5.99
(%)							
Sales of space heating units - Fossil (%)	15.1	5.03	4.61	3.36	1.65	0.539	0.139
Sales of space heating units - Gas Furnace (%)	76.4	68.7	63.8	49.5	26.6	10.3	3.94
Sales of water heating units - Electric Heat Pump	0.117	1.95	7.08	21.8	44.5	59.3	64.4
(%)							
Sales of water heating units - Electric Resistance	4.29	6.36	8.3	14.3	23.5	29.4	31.5
(%)							
Sales of water heating units - Gas Furnace (%)	94.4	90.1	83.1	62.2	30.5	9.74	2.54
Sales of water heating units - Other (%)	1.17	1.57	1.57	1.57	1.57	1.56	1.55

Table 21: E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -	0	2.71	2.75	3.26	3.36	4.25	4.44
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment -	0	0	-432
Corn-ethanol to energy grasses (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-4,963
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-136
Permanent conservation cover (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-5,532
Total (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-432
Corn-ethanol to energy grasses (1000 tCO2e/y)			

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

Item	2020	2025	2050
Carbon sink potential - Moderate deployment -	0	0	-2,618
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-67.9
Permanent conservation cover (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-3,118
Total (1000 tCO2e/y)			
Land impacted for carbon sink - Aggressive	0	0	188
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	2,250
deployment - Cropland measures (1000			
hectares)			
Land impacted for carbon sink - Aggressive	0	0	247
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	2,685
deployment - Total (1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	188
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,187
deployment - Cropland measures (1000			
hectares)			
Land impacted for carbon sink - Moderate	0	0	124
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,498
deployment - Total (1000 hectares)			

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

Table 25. L- Scenario - FILLAN O. Luna Sinks - 1 o			
Item	2020	2025	2050
Carbon sink potential - High - Accelerate	0	0	96.7
regeneration (1000 tCO2e/y)			
Carbon sink potential - High - All (not counting	0	0	27,796
overlap) (1000 tCO2e/y)			
Carbon sink potential - High - Avoid deforestation	0	0	1,537
(1000 tC02e/y)			
Carbon sink potential - High - Extend rotation	0	0	5,669
length (1000 tCO2e/y)			
Carbon sink potential - High - Improve	0	0	48.1
plantations (1000 tCO2e/y)			
Carbon sink potential - High - Increase retention	0	0	4,665
of HWP (1000 tCO2e/y)			
Carbon sink potential - High - Increase trees	0	0	965
outside forests (1000 tCO2e/y)			
Carbon sink potential - High - Reforest cropland	0	0	1,409
(1000 tC02e/y)			
Carbon sink potential - High - Reforest pasture	0	0	10,207
(1000 tCO2e/y)			
Carbon sink potential - High - Restore	0	0	3,200
productivity (1000 tCO2e/y)			
Carbon sink potential - Low - Accelerate	0	0	48.5
regeneration (1000 tCO2e/y)			
Carbon sink potential - Low - All (not counting	0	0	6,956
overlap) (1000 tC02e/y)			
Carbon sink potential - Low - Avoid deforestation	0	0	256
(1000 tC02e/y)			
Carbon sink potential - Low - Extend rotation	0	0	2,177
length (1000 tC02e/y)			
Carbon sink potential - Low - Improve	0	0	24.5
plantations (1000 tC02e/y)			
Carbon sink potential - Low - Increase retention	0	0	1,555
of HWP (1000 tC02e/y)			,

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

Table 23: E- scenario - PILLAR 6: Land sinks - Fo		иеиј	
Item	2020	2025	2050
Carbon sink potential - Low - Increase trees	0	0	338
outside forests (1000 tCO2e/y)			
Carbon sink potential - Low - Reforest cropland	0	0	704
(1000 tC02e/y)			
Carbon sink potential - Low - Reforest pasture	0	0	773
(1000 tCO2e/y)			
Carbon sink potential - Low - Restore	0	0	1,079
productivity (1000 tCO2e/y)			
Carbon sink potential - Mid - Accelerate	0	0	72.6
regeneration (1000 tCO2e/y)			
Carbon sink potential - Mid - All (not counting	0	0	17,376
overlap) (1000 tCO2e/y)			
Carbon sink potential - Mid - Avoid deforestation	0	0	897
(1000 tC02e/y)			
Carbon sink potential - Mid - Extend rotation	0	0	3,923
length (1000 tC02e/y)			
Carbon sink potential - Mid - Improve plantations	0	0	35.9
(1000 tC02e/y)			
Carbon sink potential - Mid - Increase retention	0	0	3,110
of HWP (1000 tCO2e/y)			-, -
Carbon sink potential - Mid - Increase trees	0	0	651
outside forests (1000 tC02e/y)			001
Carbon sink potential - Mid - Reforest cropland	0	0	1,057
(1000 tC02e/y)			1,001
Carbon sink potential - Mid - Reforest pasture	0	0	5,490
(1000 tCO2e/y)		0	0,470
Carbon sink potential - Mid - Restore	0	0	2,139
productivity (1000 tCO2e/y)		0	2,107
Land impacted for carbon sink potential - High -	0	0	15.8
Accelerate regeneration (1000 hectares)		0	15.6
Land impacted for carbon sink potential - High -	0	0	208
Avoid deforestation (over 30 years) (1000		0	200
hectares)			
Land impacted for carbon sink potential - High -	0	0	2,891
Extend rotation length (1000 hectares)		0	2,071
Land impacted for carbon sink potential - High -	0	0	17.7
Improve plantations (1000 hectares)		0	17.7
	0	0	0
Land impacted for carbon sink potential - High -	0	0	0
Increase retention of HWP (1000 hectares)	0	0	01.7
Land impacted for carbon sink potential - High -	0	0	91.7
Increase trees outside forests (1000 hectares)			00.0
Land impacted for carbon sink potential - High -	0	0	93.2
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	290
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	1,061
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	4,668
Total impacted (over 30 years) (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	7.91
Accelerate regeneration (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	195
Avoid deforestation (over 30 years) (1000			
hectares)			
Land impacted for carbon sink potential - Low -	0	0	1,107
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	8.86
Improve plantations (1000 hectares)			
	0	0	0
		- 1	_
Land impacted for carbon sink potential - Low -			
	0	0	48.3

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

Item	2020	2025	2050
Land impacted for carbon sink potential - Low -	0	0	46.6
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	50.3
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	642
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	2,107
Total impacted (over 30 years) (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	11.9
Accelerate regeneration (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	202
Avoid deforestation (over 30 years) (1000			
hectares)			
Land impacted for carbon sink potential - Mid -	0	0	1,999
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	13.3
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	70
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	69.9
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	363
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	1,293
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	4,022
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	0	766	2.45	2.43	2.28	1.74	0.169
(million 2019\$)							
Monetary damages from air pollution - Natural	0	142	85.6	32.8	14	4.84	2.76
Gas (million 2019\$)							
Monetary damages from air pollution -	0	1,243	1,249	1,211	1,086	860	589
Transportation (million 2019\$)							
Premature deaths from air pollution - Coal	0	85.9	0.275	0.273	0.256	0.195	0.019
(deaths)							
Premature deaths from air pollution - Natural	0	16.1	9.67	3.71	1.59	0.547	0.312
Gas (deaths)							
Premature deaths from air pollution -	0	140	141	136	122	96.8	66.2
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF -	0	3.38	3.59	0	0	0	0
Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric Resistance (%)	76.9	81.8	96.9	99.8	100	100	100
Sales of cooking units - Gas (%)	23.1	18.2	3.11	0.157	0	0	0
Sales of space heating units - Electric Heat Pump	26.6	42.5	77.8	85.8	86.2	86.1	86.1
(%)							
Sales of space heating units - Electric Resistance	26.5	25.4	10.6	7.34	7.19	7.29	7.32
(%)							
Sales of space heating units - Fossil (%)	9.65	11.3	5.2	3.78	3.67	3.61	3.61
Sales of space heating units - Gas (%)	37.2	20.8	6.32	3.1	2.98	2.95	2.94
Sales of water heating units - Electric Heat Pump	0	8.47	44.9	53	53.3	53.4	53.4
(%)							
Sales of water heating units - Electric Resistance	62.5	70	49.2	44.5	44.3	44.3	44.3
(%)							

Table 25: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	34.2	19.2	3.59	0.151	0	0	0
Sales of water heating units - Other (%)	3.3	2.39	2.36	2.36	2.36	2.37	2.38

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr	0	840	2,147	3,490	5,282	5,754	5,483
(million \$2018)							
Public EV charging plugs - DC Fast (1000 units)	0.06	0	1.72	0	7.66	0	12.4
Public EV charging plugs - L2 (1000 units)	0.251	0	41.4	0	184	0	298
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 (%)	1.56	1.82	1.26	0.403	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.9	15.1	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78.1	48.9	16.6	3.3	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.4	4.53	3.21	1.19	0.29	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	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 FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	119	118	113	105	99.3	96.6	97
Final energy use - Industry (PJ)	382	396	409	403	409	414	415
Final energy use - Residential (PJ)	184	171	156	137	121	111	106
Final energy use - Transportation (PJ)	426	391	344	288	236	205	193

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	12,650	14,338	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Sales of space heating units - Electric Heat Pump	5.4	31	77.5	91	92.2	92.3	92.3
(%)							
Sales of space heating units - Electric Resistance	3.11	4.17	4.51	5.9	6.19	6.19	6.21
_ (%)							
Sales of space heating units - Fossil (%)	15.1	4.35	0.819	0.034	0	0	0
Sales of space heating units - Gas Furnace (%)	76.4	60.5	17.1	3.03	1.58	1.53	1.52
Sales of water heating units - Electric Heat Pump	0.117	10.6	55.7	65.7	66.2	66.2	66.2
(%)							
Sales of water heating units - Electric Resistance	4.29	9.87	28	32.1	32.3	32.2	32.3
(%)							
Sales of water heating units - Gas Furnace (%)	94.4	77.9	14.7	0.621	0	0	0
Sales of water heating units - Other (%)	1.17	1.57	1.57	1.57	1.57	1.56	1.55

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

" "	•		,				
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -	0	3.26	3.36	4.91	5.18	4.05	4.16
Cumulative 5-yr (billion \$2018)							

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 \$2018)	0	0	0	0	0	0.519	5.27
Capital invested - Wind - Base (billion \$2018)	0	0	0	0	0.302	0.116	0.175

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	145	0	0	0	0	930	10,365
Solar - Constrained land use assumptions (GWh)	145	0	0	0	0	1,294	10,440
Wind - Base land use assumptions (GWh)	0	0	0	0	623	237	450
Wind - Constrained land use assumptions (GWh)	0	0	217	929	0	0	0

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment -	0	0	-432
Corn-ethanol to energy grasses (1000 tC02e/y)			702
Carbon sink potential - Aggressive deployment -	0	0	-4,963
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-136
Permanent conservation cover (1000 tC02e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-5,532
Total (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-432
Corn-ethanol to energy grasses (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-2,618
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-67.9
Permanent conservation cover (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-3,118
Total (1000 tC02e/y)			
Land impacted for carbon sink - Aggressive	0	0	188
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	2,250
deployment - Cropland measures (1000			
hectares)			
Land impacted for carbon sink - Aggressive	0	0	247
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	2,685
deployment - Total (1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	188
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,187
deployment - Cropland measures (1000			
hectares)			
Land impacted for carbon sink - Moderate	0	0	124
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,498
deployment - Total (1000 hectares)			

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

Item	2020	2025	2050
Carbon sink potential - High - Accelerate	0	0	96.7
regeneration (1000 tCO2e/y)			
Carbon sink potential - High - All (not counting	0	0	27,796
overlap) (1000 tCO2e/y)			
Carbon sink potential - High - Avoid deforestation	0	0	1,537
(1000 tCO2e/y)			

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

Carbon sink potential - High - Extend rotation O	Table 33: E+RE+ scenario - PILLAR 6: Land sinks	- Forests (c		
		2020	2025	2050
Carbon sink potential - High - Improve Danish sink potential - High - Increase retention of HWP (1000 tC02e/v) Danish potential - High - Increase trees of Carbon sink potential - High - Increase trees outside forests (1000 tC02e/v) Danish spotential - High - Reforest cropland or (1000 tC02e/v) Danish spotential - High - Reforest cropland or (1000 tC02e/v) Danish spotential - High - Reforest pasture or (1000 tC02e/v) Danish spotential - High - Restore productivity (1000 tC02e/v) Danish spotential - Low - Accelerate or productivity (1000 tC02e/v) Danish spotential - Low - Accelerate or presentation (1000 tC02e/v) Danish spotential - Low - Accelerate or presentation (1000 tC02e/v) Danish spotential - Low - All (not counting or carbon sink potential - Low - All (not counting or carbon sink potential - Low - All (not counting overlap) (1000 tC02e/v) Danish spotential - Low - Avoid deforestation or (1000 tC02e/v) Danish spotential - Low - Extend rotation length (1000 tC02e/v) Danish spotential - Low - Improve or (1000 tC02e/v) Danish spotential - Low - Increase retention or (1000 tC02e/v) Danish spotential - Low - Increase trees or (1000 tC02e/v) Danish spotential - Low - Reforest cropland (1000 tC02e/v) Danish spotential - Low - Reforest cropland (1000 tC02e/v) Danish spotential - Low - Reforest cropland (1000 tC02e/v) Danish spotential - Low - Reforest cropland (1000 tC02e/v) Danish spotential - Low - Reforest cropland (1000 tC02e/v) Danish spotential - Low - Reforest cropland (1000 tC02e/v) Danish spotential - Low - Reforest cropland (1000 tC02e/v) Danish spotential - Low - Reforest cropland (1000 tC02e/v) Danish spotential - Hid - All (not counting overlap) (1000 tC02e/v) Danish spotential - Hid - All (not counting overlap) (1000 tC02e/v) Danish spotential - Hid - All (not counting overlap) (1000 tC02e/v) Danish spotential - Hid - Reforest cropland (1000 tC02e/v) Danish spotential - Hid - Reforest cropland (1000 tC02e/v) Danish spotential - Hid - Refores		0	0	5,669
Plantations (1000 tcO2e/v)				
Carbon sink potential - High - Increase retention of HWP (1000 tC02e/y)		0	0	48.1
Gribon sink potential - High - Increase trees				
Carbon sink potential - High - Increase trees		0	0	4,665
outside forests (1000 tCO2e/y) 0 1,409 Carbon sink potential - High - Reforest cropland (1000 tCO2e/y) 0 1,409 Carbon sink potential - High - Reforest pasture (1000 tCO2e/y) 0 10,207 Carbon sink potential - High - Restore productivity (1000 tCO2e/y) 0 0 3,200 Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y) 0 0 48.5 Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) 0 0 6,956 Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) 0 0 256 Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) 0 0 2,177 Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y) 0 0 2,177 Carbon sink potential - Low - Improve plantations (1000 tCO2e/y) 0 0 24.5 Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y) 0 0 1,555 Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) 0 0 704 Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) 0 0 77.6 <tr< td=""><td></td><td></td><td></td><td></td></tr<>				
Carbon sink potential - High - Reforest cropland 0 0 1,409 1000 tCO2e/y Carbon sink potential - High - Reforest pasture 0 0 10,207 1000 tCO2e/y Carbon sink potential - High - Restore 0 0 3,200 Carbon sink potential - Low - Accelerate 0 0 48.5 Carbon sink potential - Low - Accelerate 0 0 48.5 Carbon sink potential - Low - All (not counting 0 0 6,956 Overlap) (1000 tCO2e/y) Carbon sink potential - Low - All (not counting 0 0 6,956 Overlap) (1000 tCO2e/y) Carbon sink potential - Low - Avoid deforestation 0 0 2,177 Carbon sink potential - Low - Extend rotation 0 0 2,177 Carbon sink potential - Low - Extend rotation 0 0 2,177 Carbon sink potential - Low - Improve 0 0 24.5 Dantations (1000 tCO2e/y) Carbon sink potential - Low - Increase retention 0 0 1,555 Of HWP (1000 tCO2e/y) Carbon sink potential - Low - Increase retention 0 0 338 Outside forests (1000 tCO2e/y) Carbon sink potential - Low - Reforest cropland 0 0 704 (1000 tCO2e/y) Carbon sink potential - Low - Reforest pasture 0 0 773 (1000 tCO2e/y) Carbon sink potential - Low - Reforest pasture 0 0 773 (1000 tCO2e/y) Carbon sink potential - Low - Restore 0 0 1,079 productivity (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate 0 72.6 Carbon sink potential - Mid - Accelerate 0 72.6 Carbon sink potential - Mid - Accelerate 0 72.6 Carbon sink potential - Mid - Accelerate 0 72.6 Carbon sink potential - Mid - Accelerate 0 73.76 Overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Aroid deforestation 0 3,923 length (1000 tCO2e/y) Carbon sink potential - Mid - Aroid deforestation 0 0 3,923 length (1000 tCO2e/y) Carbon sink potential - Mid - Restore Carbon sink potential - Mid - Restore 0 0 3,490 Carbon sink potential - Mid - Restore Carbon sink potential - Mid - Restore 0 0 1,057 (1000 tCO2e/y) Carbon sink potential - Mid - Restore	Carbon sink potential - High - Increase trees	0	0	965
Carbon sink potential - High - Reforest pasture 0	outside forests (1000 tCO2e/y)			
Carbon sink potential - High - Reforest pasture	Carbon sink potential - High - Reforest cropland	0	0	1,409
Carbon sink potential - High - Restore	(1000 tC02e/y)			
Carbon sink potential - High - Restore		0	0	10,207
Carbon sink potential - High - Restore productivity (1000 tC02e/y) Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y) Carbon sink potential - Low - All (not counting vorelap) (1000 tC02e/y) Carbon sink potential - Low - All (not counting vorelap) (1000 tC02e/y) Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y) Carbon sink potential - Low - Extend rotation O				
Droductivity (1000 tC02e/y) Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y) Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y) Carbon sink potential - Low - Avoid deforestation O C256 (1000 tC02e/y) Carbon sink potential - Low - Avoid deforestation O C2,177 (arght) (1000 tC02e/y) Carbon sink potential - Low - Extend rotation O C2,177 (arght) (1000 tC02e/y) Carbon sink potential - Low - Improve O O C24.5 (arbon sink potential - Low - Improve O O C24.5 (arbon sink potential - Low - Improve O O C24.5 (arbon sink potential - Low - Imcrease retention O O 1,555 (arbon sink potential - Low - Imcrease trees O O 338 (austide forests (1000 tC02e/y) Carbon sink potential - Low - Increase trees O O 338 (austide forests (1000 tC02e/y) Carbon sink potential - Low - Reforest cropland O O 704 (1000 tC02e/y) Carbon sink potential - Low - Reforest pasture O O 773 (1000 tC02e/y) Carbon sink potential - Low - Restore O O 1,079 productivity (1000 tC02e/y) Carbon sink potential - Mid - Accelerate O O 72.6 regeneration (1000 tC02e/y) Carbon sink potential - Mid - All (not counting O O 17,376 overlap) (1000 tC02e/y) Carbon sink potential - Mid - All (not counting O O 3,997 (1000 tC02e/y) Carbon sink potential - Mid - Improve plantations O O 3,997 (1000 tC02e/y) Carbon sink potential - Mid - Increase trees O O 3,310 of HWP (1000 tC02e/y) Carbon sink potential - Mid - Increase trees O O 5,490 (1000 tC02e/y) Carbon sink potential - Mid - Reforest cropland O O 1,057 (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture O O 5,490 (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture O O 2,399 (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture O O 2,399 (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture O O 2,399 (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture O O 2,3		0	0	3,200
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y) Carbon sink potential - Low - All (not counting of the potential - Low - All (not counting of the potential - Low - All (not counting of the potential - Low - Avoid deforestation of the potential - Low - Extend rotation of the potential - Low - Extend rotation of the potential - Low - Improve of the plantations (1000 tCO2e/y) Carbon sink potential - Low - Improve of the plantations (1000 tCO2e/y) Carbon sink potential - Low - Increase retention of the plantations (1000 tCO2e/y) Carbon sink potential - Low - Increase trees of the plantations (1000 tCO2e/y) Carbon sink potential - Low - Reforest cropland of the plantation sink potential - Low - Reforest cropland of the productivity (1000 tCO2e/y) Carbon sink potential - Low - Reforest pasture of the productivity (1000 tCO2e/y) Carbon sink potential - Low - Restore of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Avoid deforestation of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Restore of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Restore of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Restore of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Restore of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Restore of the productivity (1000 tCO2e/y) Carbon sink potential - Mid - Restore of the productivity (1000 tCO2e/y) Ca				•
Regeneration (1000 tC02e/y)		0	0	48.5
Carbon sink potential - Low - All (not counting or carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)				
Overlap (1000 tCO2e/y)		0	0	6 9 5 6
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)		<u> </u>		0,700
(1000 tCO2e/y) Carbon sink potential - Low - Extend rotation Carbon sink potential - Low - Improve Carbon sink potential - Low - Improve Carbon sink potential - Low - Improve Carbon sink potential - Low - Increase retention Carbon sink potential - Low - Increase retention Carbon sink potential - Low - Increase trees Carbon sink potential - Low - Increase trees Carbon sink potential - Low - Reforest cropland Carbon sink potential - Low - Reforest cropland Carbon sink potential - Low - Reforest cropland Carbon sink potential - Low - Reforest pasture Carbon sink potential - Low - Restore Carbon sink potential - Low - Restore Carbon sink potential - Low - Restore Carbon sink potential - Mid - Accelerate Carbon sink potential - Mid - All (not counting Carbon sink potential - Mid - Avoid deforestation Carbon sink potential - Mid - Avoid deforestation Carbon sink potential - Mid - Avoid deforestation Carbon sink potential - Mid - Improve plantations Carbon sink potential - Mid - Increase trees Carbon sink potential - Mid - Increase trees Carbon sink potential - Mid - Increase trees Carbon sink potential - Mid - Reforest cropland Carbon sink potential - Mid - Reforest cropland Carbon sink potential - Mid - Reforest pasture Carbon sink potential - Mid - Restore Carbon sink potential - Mid - Reforest pasture Carbon sink potential - Mid - Reforest pasture Carbon sink potential - Mid - Reforest pasture Carbon sink potential - High - Car		0	n	256
Carbon sink potential - Low - Extend rotation Carbon sink potential - Low - Improve Danish (1000 tCO2e/y) Carbon sink potential - Low - Increase retention Carbon sink potential - Low - Increase retention Carbon sink potential - Low - Increase retention Carbon sink potential - Low - Increase trees Carbon sink potential - Low - Reforest cropland Carbon sink potential - Low - Reforest cropland Carbon sink potential - Low - Reforest cropland Carbon sink potential - Low - Reforest pasture Carbon sink potential - Low - Reforest pasture Carbon sink potential - Low - Restore Carbon sink potential - Low - Restore Carbon sink potential - Low - Restore Carbon sink potential - Mid - Accelerate Carbon sink potential - Mid - Avoid deforestation Carbon sink potential - Mid - Avoid deforestation Carbon sink potential - Mid - Avoid deforestation Carbon sink potential - Mid - Extend rotation Carbon sink potential - Mid - Improve plantations Carbon sink potential - Mid - Improve plantations Carbon sink potential - Mid - Improve plantations Carbon sink potential - Mid - Increase retention Carbon sink potential - Mid - Increase retention Carbon sink potential - Mid - Increase trees Carbon sink potential - Mid - Reforest cropland Carbon sink potential - Mid - Reforest cropland Carbon sink potential - Mid - Reforest pasture Carbon sink potential - High - Carbon sink poten		0	0	200
Length (1000 tCO2e/y)		0	0	9 177
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)		o	0	2,111
Description		0	0	2/. 5
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y) carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y) carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) carbon sink potential - Low - Restore of carbon sink potential - Low - Restore of carbon sink potential - Mid - Accelerate of carbon sink potential - Mid - Accelerate of carbon sink potential - Mid - All (not counting of carbon sink potential - Mid - All (not counting of carbon sink potential - Mid - Avoid deforestation of core (1000 tCO2e/y) carbon sink potential - Mid - Avoid deforestation of core (1000 tCO2e/y) carbon sink potential - Mid - Extend rotation of core (1000 tCO2e/y) carbon sink potential - Mid - Improve plantations of core (1000 tCO2e/y) carbon sink potential - Mid - Improve plantations of core (1000 tCO2e/y) carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) carbon sink potential - Mid - Increase trees of core (1000 tCO2e/y) carbon sink potential - Mid - Reforest cropland of corests (1000 tCO2e/y) carbon sink potential - Mid - Reforest cropland of core (1000 tCO2e/y) carbon sink potential - Mid - Reforest cropland of core (1000 tCO2e/y) carbon sink potential - Mid - Reforest cropland of core (1000 tCO2e/y) carbon sink potential - Mid - Reforest cropland of core (1000 tCO2e/y) carbon sink potential - Mid - Reforest cropland of core (1000 tCO2e/y) carbon sink potential - Mid - Reforest cropland of core (1000 tCO2e/y) carbon sink potential - Mid - Reforest cropland of core core core core core core core core		U	0	24.5
of HWP (1000 tC02e/y) Carbon sink potential - Low - Increase trees 0 0 338 outside forests (1000 tC02e/y) Carbon sink potential - Low - Reforest cropland 0 0 704 (1000 tC02e/y) Carbon sink potential - Low - Reforest pasture 0 0 773 (1000 tC02e/y) Carbon sink potential - Low - Restore 0 0 1,079 productivity (1000 tC02e/y) Carbon sink potential - Mid - Accelerate 0 0 72.6 regeneration (1000 tC02e/y) Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y) 0 17,376 carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y) 0 0 897 (1000 tC02e/y) Carbon sink potential - Mid - Extend rotation overlap (1000 tc02e/y) 0 3,923 length (1000 tc02e/y) Carbon sink potential - Mid - Improve plantations overlap (1000 tc02e/y) 0 35.9 (1000 tc02e/y) Carbon sink potential - Mid - Increase retention overlap (1000 tc02e/y) 0 651 carbon sink potential - Mid - Increase trees overlap (1000 tc02e/y) 0 651 carbon sink potential - Mid - Reforest cropland (1000 tc02e/y)		0	0	1 555
Carbon sink potential - Low - Increase trees		U	U	1,555
outside forests (1000 tCO2e/y) Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) 0 704 (1000 tCO2e/y) Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) 0 0 773 (1000 tCO2e/y) Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) 0 0 1,079 (1,079 productivity (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) 0 0 72.6 (1,079 productivity (1000 tCO2e/y) Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) 0 0 17,376 (1000 tCO2e/y) Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) 0 0 897 (1000 tCO2e/y) Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) 0 0 3,923 (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) 0 0 3,923 (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) 0 0 3,110 of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) 0 0 651 outside forests (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) 0 0 5,490 outside for carbon sink potentia				
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)		U	0	338
Carbon sink potential - Low - Reforest pasture O O 773				
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate		0	0	704
Carbon sink potential - Low - Restore				
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Avoid deforestation (2000 tCO2e/y) Carbon sink potential - Mid - Extend rotation overlap (1000 tCO2e/y) Carbon sink potential - Mid - Extend rotation overlap (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations overlap (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture overlap (1000 tCO2e/y) Carbon sink potential - Mid - Restore overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y)		0	0	773
productivity (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate				
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) Carbon sink potential - Mid - Avoid deforestation overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture overlap (1000 tCO2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (10		0	0	1,079
regeneration (1000 tCO2e/y) Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations overlap (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture overlap (1000 tCO2e/y) Carbon sink potential - Mid - Restore overlap (1000 tCO2e/y) Carbon sink potential - Mid - Restore overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y)				
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) Carbon sink potential - Mid - Extend rotation overlap (1000 tCO2e/y) Carbon sink potential - Mid - Extend rotation overlap (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention overlap (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture overlap (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture overlap (1000 tCO2e/y) Carbon sink potential - Mid - Restore overlap (1000 tCO2e/y) Carbon sink potential - Mid - Restore overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y) Land impacted for carbon sink potential - High - overlap (1000 tCO2e/y)		0	0	72.6
overlap) (1000 tC02e/y) Carbon sink potential - Mid - Avoid deforestation (1000 tC02e/y) Carbon sink potential - Mid - Extend rotation 0 0 0 3,923 length (1000 tC02e/y) Carbon sink potential - Mid - Improve plantations 0 0 0 35.9 (1000 tC02e/y) Carbon sink potential - Mid - Increase retention 0 0 0 3,110 of HWP (1000 tC02e/y) Carbon sink potential - Mid - Increase trees 0 0 0 651 outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest cropland 0 0 1,057 (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture 0 0 5,490 (1000 tC02e/y) Carbon sink potential - Mid - Restore 0 0 0 2,139 productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - 0 0 15.8 Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - 0 0 208 Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - 0 0 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - 0 0 17.7	regeneration (1000 tCO2e/y)			
Carbon sink potential - Mid - Avoid deforestation (1000 tC02e/y) Carbon sink potential - Mid - Extend rotation 0 0 3,923 length (1000 tC02e/y) Carbon sink potential - Mid - Improve plantations 0 0 35.9 (1000 tC02e/y) Carbon sink potential - Mid - Increase retention 0 0 0 3,110 of HWP (1000 tC02e/y) Carbon sink potential - Mid - Increase trees 0 0 0 651 outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest cropland 0 0 1,057 (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture 0 0 5,490 (1000 tC02e/y) Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - 0 0 15.8 Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - 0 0 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - 0 0 17.7	Carbon sink potential - Mid - All (not counting	0	0	17,376
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations of (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees of (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees of (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland of (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture of (1000 tCO2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 17.7	overlap) (1000 tC02e/y)			
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations of (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees of (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees of (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland of (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture of (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture of (1000 tCO2e/y) Carbon sink potential - Mid - Restore of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y)	Carbon sink potential - Mid - Avoid deforestation	0	0	897
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations of (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees of (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees of (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland of (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture of (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture of (1000 tCO2e/y) Carbon sink potential - Mid - Restore of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y) Land impacted for carbon sink potential - High - of (1000 tCO2e/y)	(1000 tC02e/y)			
length (1000 tCO2e/y) Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland outco2e/y) Carbon sink potential - Mid - Reforest pasture outco2e/y) Carbon sink potential - Mid - Reforest pasture outco2e/y) Carbon sink potential - Mid - Reforest pasture outco2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Outco2e/y Land impacted for carbon sink pote		0	0	3.923
Carbon sink potential - Mid - Improve plantations (1000 tC02e/y) Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y) Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest cropland (1000 tC02e/y) Carbon sink potential - Mid - Reforest cropland (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - O O 208 Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 17.7			-	-,- =-
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore outside for carbon sink potential - High - outside for carbon si		0	0	35.9
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O O 17.7				33.7
of HWP (1000 tC02e/y) Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest cropland (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 17.7	· ·	Ω	Ω	3 110
Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest cropland (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 17.7		Ŭ	0	0,110
outside forests (1000 tCO2e/y) Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O O 17.7		n	n	651
Carbon sink potential - Mid - Reforest cropland (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O 0 17.7		0	0	031
(1000 tCO2e/y) Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O 0 17.7	* **	0	0	1.057
Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O 0 17.7		U	0	1,057
(1000 tCO2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - OOO OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO		0	0	F / 00
Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO		U	U	5,490
productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - O O 15.8 Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - O O 208 Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 17.7		-		0.100
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - 0 0 15.8 0 0 208		U	U	2,139
Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential - High - 0 0 208 Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - 0 0 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - 0 0 17.7				
Land impacted for carbon sink potential - High - O O 208 Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - O O 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - O O 17.7		0	0	15.8
Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - High - 0 0 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - 0 0 17.7				
hectares) Land impacted for carbon sink potential - High - 0 0 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - 0 0 17.7		0	0	208
Land impacted for carbon sink potential - High - 0 0 2,891 Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - 0 0 17.7				
Extend rotation length (1000 hectares) Land impacted for carbon sink potential - High - 0 0 17.7				
Land impacted for carbon sink potential - High - 0 0 17.7		0	0	2,891
Land impacted for carbon sink potential - High - 0 0 17.7	Extend rotation length (1000 hectares)			
	Land impacted for carbon sink potential - High -	0	0	17.7
	Improve plantations (1000 hectares)			

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

Table 33: E+RE+ scenario - PILLAR 6: Land sinks		ontinueaj	
Item	2020	2025	2050
Land impacted for carbon sink potential - High -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	91.7
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	93.2
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	290
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	1,061
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	4,668
Total impacted (over 30 years) (1000 hectares)			·
Land impacted for carbon sink potential - Low -	0	0	7.91
Accelerate regeneration (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	195
Avoid deforestation (over 30 years) (1000			.,,
hectares)			
Land impacted for carbon sink potential - Low -	0	0	1,107
Extend rotation length (1000 hectares)		0	1,101
Land impacted for carbon sink potential - Low -	0	0	8.86
Improve plantations (1000 hectares)		0	0.00
Land impacted for carbon sink potential - Low -	0	0	0
Increase retention of HWP (1000 hectares)	0	0	U
Land impacted for carbon sink potential - Low -	0	0	48.3
Increase trees outside forests (1000 hectares)	0	0	40.3
	0	0	1//
Land impacted for carbon sink potential - Low -	0	0	46.6
Reforest cropland (1000 hectares)	0	0	FO 0
Land impacted for carbon sink potential - Low -	0	0	50.3
Reforest pasture (1000 hectares)		-	//0
Land impacted for carbon sink potential - Low -	0	0	642
Restore productivity (1000 hectares)			0.107
Land impacted for carbon sink potential - Low -	0	0	2,107
Total impacted (over 30 years) (1000 hectares)			44.0
Land impacted for carbon sink potential - Mid -	0	0	11.9
Accelerate regeneration (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	202
Avoid deforestation (over 30 years) (1000			
hectares)			
Land impacted for carbon sink potential - Mid -	0	0	1,999
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	13.3
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	70
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	69.9
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	363
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	1,293
Restore productivity (1000 hectares)			•
Land impacted for carbon sink potential - Mid -	0	0	4,022
Total impacted (over 30 years) (1000 hectares)		-	
[

Table 34: E+RE+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal	0	766	2.45	2.43	2.28	1.74	0.169
(million 2019\$)							
Monetary damages from air pollution - Natural	0	138	98.7	54.5	33.5	10.3	3.24
Gas (million 2019\$)							
Monetary damages from air pollution -	0	1,223	1,135	858	493	225	90.1
Transportation (million 2019\$)							

Table 34: E+RE+ scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Coal	0	85.9	0.275	0.273	0.256	0.195	0.019
(deaths)							
Premature deaths from air pollution - Natural	0	15.6	11.1	6.16	3.78	1.16	0.366
Gas (deaths)							
Premature deaths from air pollution -	0	138	128	96.5	55.5	25.3	10.1
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF -	0	3.38	3.59	0	0	0	0
Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric Resistance (%)	76.9	81.8	96.9	99.8	100	100	100
Sales of cooking units - Gas (%)	23.1	18.2	3.11	0.157	0	0	0
Sales of space heating units - Electric Heat Pump (%)	26.6	42.5	77.8	85.8	86.2	86.1	86.1
Sales of space heating units - Electric Resistance (%)	26.5	25.4	10.6	7.34	7.19	7.29	7.32
Sales of space heating units - Fossil (%)	9.65	11.3	5.2	3.78	3.67	3.61	3.61
Sales of space heating units - Gas (%)	37.2	20.8	6.32	3.1	2.98	2.95	2.94
Sales of water heating units - Electric Heat Pump (%)	0	8.47	44.9	53	53.3	53.4	53.4
Sales of water heating units - Electric Resistance (%)	62.5	70	49.2	44.5	44.3	44.3	44.3
Sales of water heating units - Gas Furnace (%)	34.2	19.2	3.59	0.151	0	0	0
Sales of water heating units - Other (%)	3.3	2.39	2.36	2.36	2.36	2.37	2.38

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr	0	840	2,147	3,490	5,282	5,754	5,483
(million \$2018)							
Public EV charging plugs - DC Fast (1000 units)	0.06	0	1.72	0	7.66	0	12.4
Public EV charging plugs - L2 (1000 units)	0.251	0	41.4	0	184	0	298
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 (%)	1.56	1.82	1.26	0.403	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.9	15.1	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78.1	48.9	16.6	3.3	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.4	4.53	3.21	1.19	0.29	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	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 FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	119	118	113	105	99.3	96.6	97
Final energy use - Industry (PJ)	382	396	409	403	409	414	415
Final energy use - Residential (PJ)	184	171	156	137	121	111	106
Final energy use - Transportation (PJ)	426	391	344	288	236	205	193

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	12,650	14,338	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Sales of space heating units - Electric Heat Pump	5.4	31	77.5	91	92.2	92.3	92.3
(%)							
Sales of space heating units - Electric Resistance	3.11	4.17	4.51	5.9	6.19	6.19	6.21
(%)							
Sales of space heating units - Fossil (%)	15.1	4.35	0.819	0.034	0	0	0
Sales of space heating units - Gas Furnace (%)	76.4	60.5	17.1	3.03	1.58	1.53	1.52
Sales of water heating units - Electric Heat Pump	0.117	10.6	55.7	65.7	66.2	66.2	66.2
(%)							
Sales of water heating units - Electric Resistance	4.29	9.87	28	32.1	32.3	32.2	32.3
(%)							
Sales of water heating units - Gas Furnace (%)	94.4	77.9	14.7	0.621	0	0	0
Sales of water heating units - Other (%)	1.17	1.57	1.57	1.57	1.57	1.56	1.55

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -	0	3.26	3.36	4.91	5.18	4.05	4.16
Cumulative 5-yr (billion \$2018)							

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	0	0
Capital invested - Solar PV - Constrained (billion \$2018)	0	0	0	0	0	0	0

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

Item	2020	2025
Solar - Base land use assumptions (GWh)	145	0
Solar - Constrained land use assumptions (GWh)	145	0

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment -	0	0	-432
Corn-ethanol to energy grasses (1000 tC02e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-4,963
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-136
Permanent conservation cover (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-5,532
Total (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-432
Corn-ethanol to energy grasses (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-2,618
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-67.9
Permanent conservation cover (1000 tC02e/y)			
Carbon sink potential - Moderate deployment -	0	0	-3,118
Total (1000 tC02e/y)			
Land impacted for carbon sink - Aggressive	0	0	188
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	2,250
deployment - Cropland measures (1000			
hectares)			

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

Item	2020	2025	2050
Land impacted for carbon sink - Aggressive	0	0	247
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	2,685
deployment - Total (1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	188
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,187
deployment - Cropland measures (1000			
hectares)			
Land impacted for carbon sink - Moderate	0	0	124
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,498
deployment - Total (1000 hectares)			

Table 43: E+RE- scenario - PILLAR 6: Land sinks	- Forests		
Item	2020	2025	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)	0	0	96.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)	0	0	27,796
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)	0	0	1,537
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)	0	0	5,669
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)	0	0	48.1
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)	0	0	4,665
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)	0	0	965
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)	0	0	1,409
Carbon sink potential - High - Reforest pasture (1000 tC02e/y)	0	0	10,207
Carbon sink potential - High - Restore productivity (1000 tC02e/y)	0	0	3,200
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)	0	0	48.5
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)	0	0	6,956
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)	0	0	256
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)	0	0	2,177
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)	0	0	24.5
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)	0	0	1,555
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)	0	0	338
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)	0	0	704
Carbon sink potential - Low - Reforest pasture (1000 tC02e/y)	0	0	773
Carbon sink potential - Low - Restore productivity (1000 tC02e/y)	0	0	1,079
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)	0	0	72.6
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)	0	0	17,376

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

Table 43: E+RE- scenario - PILLAR 6: Land sinks	- Forests (c	ontinued)	
Item	2020	2025	2050
Carbon sink potential - Mid - Avoid deforestation	0	0	897
(1000 tC02e/y)			
Carbon sink potential - Mid - Extend rotation	0	0	3,923
length (1000 tCO2e/y)			
Carbon sink potential - Mid - Improve plantations	0	0	35.9
(1000 tC02e/y)		-	
Carbon sink potential - Mid - Increase retention	0	0	3,110
of HWP (1000 tCO2e/y)	0	0	3,110
Carbon sink potential - Mid - Increase trees	0	0	651
	U	0	631
outside forests (1000 tC02e/y)	-	0	1.057
Carbon sink potential - Mid - Reforest cropland	0	0	1,057
(1000 tC02e/y)			
Carbon sink potential - Mid - Reforest pasture	0	0	5,490
(1000 tC02e/y)			
Carbon sink potential - Mid - Restore	0	0	2,139
productivity (1000 tCO2e/y)			
Land impacted for carbon sink potential - High -	0	0	15.8
Accelerate regeneration (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	208
Avoid deforestation (over 30 years) (1000			
hectares)			
Land impacted for carbon sink potential - High -	0	0	2,891
Extend rotation length (1000 hectares)			_,07.
Land impacted for carbon sink potential - High -	0	0	17.7
Improve plantations (1000 hectares)	0	0	"""
Land impacted for carbon sink potential - High -	0	0	0
Increase retention of HWP (1000 hectares)	0	0	0
	0	0	91.7
Land impacted for carbon sink potential - High -	U	U	91.7
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	93.2
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	290
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	1,061
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	4,668
Total impacted (over 30 years) (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	7.91
Accelerate regeneration (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	195
Avoid deforestation (over 30 years) (1000			.,,
hectares)			
Land impacted for carbon sink potential - Low -	0	0	1,107
Extend rotation length (1000 hectares)	0	0	1,101
		0	0.07
Land impacted for carbon sink potential - Low -	0	0	8.86
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	48.3
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	46.6
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	50.3
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	642
Restore productivity (1000 hectares)		-	
Land impacted for carbon sink potential - Low -	0	0	2,107
Total impacted (over 30 years) (1000 hectares)	0	١	2,101
Land impacted for carbon sink potential - Mid -	0	0	11.9
	U	υ	11.7
Accelerate regeneration (1000 hectares)			000
Land impacted for carbon sink potential - Mid -	0	0	202
Avoid deforestation (over 30 years) (1000			
hectares)			

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

Item	2020	2025	2050
Land impacted for carbon sink potential - Mid -	0	0	1,999
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	13.3
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	70
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	69.9
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	363
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	1,293
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	4,022
Total impacted (over 30 years) (1000 hectares)			

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)	0	766	2.45	2.43	2.28	1.74	0.169
Monetary damages from air pollution - Natural Gas (million 2019\$)	0	139	91.6	117	86.8	29.1	8.95
Monetary damages from air pollution - Transportation (million 2019\$)	0	1,223	1,135	858	493	225	90.1
Premature deaths from air pollution - Coal (deaths)	0	85.9	0.275	0.273	0.256	0.195	0.019
Premature deaths from air pollution - Natural Gas (deaths)	0	15.7	10.3	13.2	9.81	3.29	1.01
Premature deaths from air pollution - Transportation (deaths)	0	138	128	96.5	55.5	25.3	10.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF -	0	3.35	3.47	0	0	0	0
Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric Resistance (%)	76.8	77.4	79.5	85.1	92.9	97.7	99.4
Sales of cooking units - Gas (%)	23.2	22.6	20.5	14.9	7.09	2.29	0.616
Sales of space heating units - Electric Heat Pump (%)	26.6	35.6	39.7	51.4	69.2	80.7	84.7
Sales of space heating units - Electric Resistance (%)	26.5	28.2	26.4	21.5	14.1	9.46	7.83
Sales of space heating units - Fossil (%)	9.65	12.5	11.9	9.77	6.6	4.55	3.88
Sales of space heating units - Gas (%)	37.2	23.6	22	17.4	10.1	5.25	3.56
Sales of water heating units - Electric Heat Pump (%)	0	1.46	5.6	17.5	35.8	47.8	51.9
Sales of water heating units - Electric Resistance (%)	62.5	74	71.8	64.8	54.3	47.5	45.1
Sales of water heating units - Gas Furnace (%)	34.2	22.2	20.3	15.3	7.52	2.39	0.624
Sales of water heating units - Other (%)	3.3	2.39	2.37	2.38	2.39	2.38	2.38

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr	0	0	135	286	962	3,037	4,422
(million \$2018)							
Public EV charging plugs - DC Fast (1000 units)	0.06	0	0.518	0	2.83	0	7.94
Public EV charging plugs - L2 (1000 units)	0.251	0	12.5	0	68	0	191
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051

Table / / . C D .		DILLAD 1.	TEC:-:	./Flaaka:£:aak:aa	- Transportation	(1)
18018 40: E-D+	· SCEHUFIU -	PILLARI	EHICIERC	v/ = 12.CH 1111.CH 1011	- munsuumunun	rconnueur

2020	2025	2030	2035	2040	2045	2050
0.083	0.094	0.104	0.107	0.092	0.06	0.03
0.332	0.969	2.74	7.17	15.7	26.3	34
1.5	1.28	1.46	1.95	2.25	1.96	1.14
1.57	1.98	2.06	1.64	1.05	0.538	0.231
1.88	4.66	11.8	25.8	48.3	72	87.5
91.8	87.5	79.7	66.7	46.3	24.9	11
4.56	5.37	6.03	5.49	4.12	2.44	1.18
0.113	0.38	0.326	0.249	0.177	0.098	0.046
0.103	0.107	0.097	0.085	0.061	0.034	0.015
64.8	62.2	57.7	49.4	35.6	19.6	8.37
0.664	1.94	5.49	14.3	31.4	52.6	68
33.8	34.7	34.7	31.9	24.4	14.2	6.33
0.363	0.418	0.464	0.478	0.414	0.275	0.141
0.166	0.485	1.37	3.58	7.86	13.2	17
0.253	0.266	0.279	0.286	0.258	0.184	0.102
	0.083 0.332 1.5 1.57 1.88 91.8 4.56 0.113 0.103 64.8 0.664 33.8 0.363 0.166	0.083 0.094 0.332 0.969 1.5 1.28 1.57 1.98 1.88 4.66 91.8 87.5 4.56 5.37 0.113 0.38 0.103 0.107 64.8 62.2 0.664 1.94 33.8 34.7 0.363 0.418 0.166 0.485	0.083 0.094 0.104 0.332 0.969 2.74 1.5 1.28 1.46 1.57 1.98 2.06 1.88 4.66 11.8 91.8 87.5 79.7 4.56 5.37 6.03 0.113 0.38 0.326 0.103 0.107 0.097 64.8 62.2 57.7 0.664 1.94 5.49 33.8 34.7 34.7 0.363 0.418 0.464 0.166 0.485 1.37	0.083 0.094 0.104 0.107 0.332 0.969 2.74 7.17 1.5 1.28 1.46 1.95 1.57 1.98 2.06 1.64 1.88 4.66 11.8 25.8 91.8 87.5 79.7 66.7 4.56 5.37 6.03 5.49 0.113 0.38 0.326 0.249 0.103 0.107 0.097 0.085 64.8 62.2 57.7 49.4 0.664 1.94 5.49 14.3 33.8 34.7 34.7 31.9 0.363 0.418 0.464 0.478 0.166 0.485 1.37 3.58	0.083 0.094 0.104 0.107 0.092 0.332 0.969 2.74 7.17 15.7 1.5 1.28 1.46 1.95 2.25 1.57 1.98 2.06 1.64 1.05 1.88 4.66 11.8 25.8 48.3 91.8 87.5 79.7 66.7 46.3 4.56 5.37 6.03 5.49 4.12 0.113 0.38 0.326 0.249 0.177 0.103 0.107 0.097 0.085 0.061 64.8 62.2 57.7 49.4 35.6 0.664 1.94 5.49 14.3 31.4 33.8 34.7 34.7 31.9 24.4 0.363 0.418 0.464 0.478 0.414 0.166 0.485 1.37 3.58 7.86	0.083 0.094 0.104 0.107 0.092 0.06 0.332 0.969 2.74 7.17 15.7 26.3 1.5 1.28 1.46 1.95 2.25 1.96 1.57 1.98 2.06 1.64 1.05 0.538 1.88 4.66 11.8 25.8 48.3 72 91.8 87.5 79.7 66.7 46.3 24.9 4.56 5.37 6.03 5.49 4.12 2.44 0.113 0.38 0.326 0.249 0.177 0.098 0.103 0.107 0.097 0.085 0.061 0.034 64.8 62.2 57.7 49.4 35.6 19.6 0.664 1.94 5.49 14.3 31.4 52.6 33.8 34.7 34.7 31.9 24.4 14.2 0.363 0.418 0.464 0.478 0.414 0.275 0.166 0.485

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	119	119	117	114	110	106	103
Final energy use - Industry (PJ)	382	396	410	408	416	420	420
Final energy use - Residential (PJ)	184	172	163	153	142	129	118
Final energy use - Transportation (PJ)	427	394	360	333	312	287	259

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	12,642	14,325	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric Resistance (%)	43.5	47.1	51.3	61.6	76.1	85	88
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Sales of space heating units - Electric Heat Pump (%)	5.4	22.1	27.3	42.8	66.9	83.6	89.9
Sales of space heating units - Electric Resistance (%)	3.11	4.17	4.24	4.4	4.84	5.52	5.99
Sales of space heating units - Fossil (%)	15.1	5.03	4.61	3.36	1.65	0.539	0.139
Sales of space heating units - Gas Furnace (%)	76.4	68.7	63.8	49.5	26.6	10.3	3.94
Sales of water heating units - Electric Heat Pump (%)	0.117	1.95	7.08	21.8	44.5	59.3	64.4
Sales of water heating units - Electric Resistance (%)	4.29	6.36	8.3	14.3	23.5	29.4	31.5
Sales of water heating units - Gas Furnace (%)	94.4	90.1	83.1	62.2	30.5	9.74	2.54
Sales of water heating units - Other (%)	1.17	1.57	1.57	1.57	1.57	1.56	1.55

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -	0	2.71	2.75	3.26	3.36	4.25	4.44
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0.018	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	31.9	0	7.92	5.72	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	18	18
Biomass w/ccu power plant (GWh)	0	0	35,757	35,757	44,647	51,069	51,069

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

•	U ,						
Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)	0	0	2,298	2,298	2,870	3,689	3,789
Conversion capital investment - Cumulative 5-yr	0	0	29,223	0	7,265	9,733	1,101
(million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	1	1
(quantity)							
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	5	6
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	29	29	36	40	40
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)	0	0	35.4	35.4	47.5	59.7	61.2
Annual - BECCS (MMT)	0	0	35.4	35.4	44.2	56.3	57.5
Annual - Cement and lime (MMT)	0	0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)	0	0	0	0	0	0	0.14
Cumulative - All (MMT)	0	0	35.4	70.8	118	178	239
Cumulative - BECCS (MMT)	0	0	35.4	70.8	115	171	229
Cumulative - Cement and lime (MMT)	0	0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)	0	0	0	0	0	0	0.14

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)	0	0	1.85	6.42	13.1	17.7	18.4
Injection wells (wells)	0	0	3	12	21	35	44
Resource characterization, appraisal, permitting costs (million \$2020)	0	45.8	201	311	311	311	311
Wells and facilities construction costs (million \$2020)	0	0	91.4	356	635	1,062	1,318

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)	0	0	1,500	1,584	1,637	2,764	3,373
Cumulative investment - All (million \$2018)	0	0	3,203	3,800	4,513	5,600	6,265
Cumulative investment - Spur (million \$2018)	0	0	1,678	1,677	1,686	2,774	3,438
Cumulative investment - Trunk (million \$2018)	0	0	1,525	2,123	2,827	2,827	2,827
Spur (km)	0	0	1,225	1,225	1,195	2,322	2,931
Trunk (km)	0	0	275	359	442	442	442

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment -	0	0	-971
Corn-ethanol to energy grasses (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-4,584
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	0
Cropland to woody energy crops (1000 tCO2e/y)			

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

Table 56: E-B+ scenario - PILLAR 6: Land sinks :	- Agricuiture		1)
Item	2020	2025	2050
Carbon sink potential - Aggressive deployment -	0	0	0
Pasture to energy crops (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-124
Permanent conservation cover (1000 tCO2e/y)			
Carbon sink potential - Aggressive deployment -	0	0	-5,680
Total (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-971
Corn-ethanol to energy grasses (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-2,418
Cropland measures (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	0
Cropland to woody energy crops (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	0
Pasture to energy crops (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-62.1
Permanent conservation cover (1000 tCO2e/y)			
Carbon sink potential - Moderate deployment -	0	0	-3,451
Total (1000 tC02e/y)			
Land impacted for carbon sink - Aggressive	0	0	395
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	5,086
deployment - Cropland measures (1000			
hectares)			
Land impacted for carbon sink - Aggressive	0	0	92.2
deployment - Cropland to woody energy crops			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	432
deployment - Pasture to energy crops (1000			
hectares)			
Land impacted for carbon sink - Aggressive	0	0	226
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Aggressive	0	0	6,231
deployment - Total (1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	395
deployment - Corn-ethanol to energy grasses			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	1,086
deployment - Cropland measures (1000			
hectares)			
Land impacted for carbon sink - Moderate	0	0	92.2
deployment - Cropland to woody energy crops			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	432
deployment - Pasture to energy crops (1000			
hectares)			
Land impacted for carbon sink - Moderate	0	0	113
deployment - Permanent conservation cover			
(1000 hectares)			
Land impacted for carbon sink - Moderate	0	0	2,118
deployment - Total (1000 hectares)			

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

Item	2020	2025	2050
Carbon sink potential - High - Accelerate	0	0	96.7
regeneration (1000 tCO2e/y)			
Carbon sink potential - High - All (not counting	0	0	27,796
overlap) (1000 tCO2e/y)			
Carbon sink potential - High - Avoid deforestation	0	0	1,537
(1000 tCO2e/y)			
Carbon sink potential - High - Extend rotation	0	0	5,669
length (1000 tCO2e/y)			

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

Table 57: E-B+ scenario - PILLAR 6: Land sinks -	Forests (con	tinued)	
Item	2020	2025	2050
Carbon sink potential - High - Improve	0	0	48.1
plantations (1000 tCO2e/y)			
Carbon sink potential - High - Increase retention	0	0	4,665
of HWP (1000 tC02e/y)			
Carbon sink potential - High - Increase trees	0	0	965
outside forests (1000 tCO2e/y)			
Carbon sink potential - High - Reforest cropland	0	0	1,409
(1000 tC02e/y)			
Carbon sink potential - High - Reforest pasture	0	0	10,207
(1000 tC02e/y)			
Carbon sink potential - High - Restore	0	0	3,200
productivity (1000 tC02e/y)			
Carbon sink potential - Low - Accelerate	0	0	48.5
regeneration (1000 tC02e/y)		0	/ 05/
Carbon sink potential - Low - All (not counting	0	0	6,956
overlap) (1000 tCO2e/y) Carbon sink potential - Low - Avoid deforestation	0	0	256
The state of the s	"	0	256
(1000 tC02e/y) Carbon sink potential - Low - Extend rotation	0	0	2,177
length (1000 tC02e/y)	"	0	2,111
Carbon sink potential - Low - Improve	0	0	24.5
plantations (1000 tCO2e/y)	"	0	24.5
Carbon sink potential - Low - Increase retention	0	0	1,555
of HWP (1000 tCO2e/y)		0	1,555
Carbon sink potential - Low - Increase trees	0	0	338
outside forests (1000 tC02e/y)		0	330
Carbon sink potential - Low - Reforest cropland	0	0	704
(1000 tC02e/y)		0	104
Carbon sink potential - Low - Reforest pasture	0	0	773
(1000 tC02e/y)		0	113
Carbon sink potential - Low - Restore	0	0	1,079
productivity (1000 tCO2e/y)		0	1,017
Carbon sink potential - Mid - Accelerate	0	0	72.6
regeneration (1000 tCO2e/y)			12.0
Carbon sink potential - Mid - All (not counting	0	0	17,376
overlap) (1000 tC02e/y)			,
Carbon sink potential - Mid - Avoid deforestation	0	0	897
(1000 tC02e/y)			-
Carbon sink potential - Mid - Extend rotation	0	0	3,923
length (1000 tC02e/y)			•
Carbon sink potential - Mid - Improve plantations	0	0	35.9
(1000 tC02e/y)			
Carbon sink potential - Mid - Increase retention	0	0	3,110
of HWP (1000 tC02e/y)			
Carbon sink potential - Mid - Increase trees	0	0	651
outside forests (1000 tC02e/y)			
Carbon sink potential - Mid - Reforest cropland	0	0	1,057
(1000 tC02e/y)			
Carbon sink potential - Mid - Reforest pasture	0	0	5,490
(1000 tC02e/y)			
Carbon sink potential - Mid - Restore	0	0	2,139
productivity (1000 tCO2e/y)			
Land impacted for carbon sink potential - High -	0	0	15.8
Accelerate regeneration (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	208
Avoid deforestation (over 30 years) (1000			
hectares)			
Land impacted for carbon sink potential - High -	0	0	2,891
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	17.7
Improve plantations (1000 hectares)			
	0	0	0
Land impacted for carbon sink potential - High -	0	•	•

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

Table 57: E-B+ scenario - PILLAR 6: Land sinks -	- Forests (coi		
Item	2020	2025	2050
Land impacted for carbon sink potential - High -	0	0	91.7
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	93.2
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	290
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - High -	0	0	1,061
Restore productivity (1000 hectares)			.,00.
Land impacted for carbon sink potential - High -	0	0	4,668
Total impacted (over 30 years) (1000 hectares)		•	1,000
Land impacted for carbon sink potential - Low -	0	0	7.91
Accelerate regeneration (1000 hectares)		0	1.71
Land impacted for carbon sink potential - Low -	0	0	195
	"	0	195
Avoid deforestation (over 30 years) (1000			
hectares)			1107
Land impacted for carbon sink potential - Low -	0	0	1,107
Extend rotation length (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	8.86
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	48.3
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	46.6
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	50.3
Reforest pasture (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	642
Restore productivity (1000 hectares)			
Land impacted for carbon sink potential - Low -	0	0	2,107
Total impacted (over 30 years) (1000 hectares)		ŭ	2,101
Land impacted for carbon sink potential - Mid -	0	0	11.9
Accelerate regeneration (1000 hectares)		0	11.7
Land impacted for carbon sink potential - Mid -	0	0	202
	"	U	202
Avoid deforestation (over 30 years) (1000			
hectares)			1000
Land impacted for carbon sink potential - Mid -	0	0	1,999
Extend rotation length (1000 hectares)		_	
Land impacted for carbon sink potential - Mid -	0	0	13.3
Improve plantations (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	0
Increase retention of HWP (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	70
Increase trees outside forests (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	69.9
Reforest cropland (1000 hectares)			
Land impacted for carbon sink potential - Mid -	0	0	363
Reforest pasture (1000 hectares)		-	223
Land impacted for carbon sink potential - Mid -	0	0	1,293
Restore productivity (1000 hectares)		·	1,270
Land impacted for carbon sink potential - Mid -	0	0	4,022
Total impacted (over 30 years) (1000 hectares)		١ ٠	4,022
Total impacted (over 30 years) (1000 nectares)			

Table 58: REF scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF -	0	3.33	3.22	0	0	0	0
Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric Resistance (%)	76.6	76.6	76.6	76.6	76.6	76.6	76.6
Sales of cooking units - Gas (%)	23.4	23.4	23.4	23.4	23.4	23.4	23.4
Sales of space heating units - Electric Heat Pump	24.6	48.5	49.4	50.7	51.9	53.4	55.7
(%)							
Sales of space heating units - Electric Resistance	27.3	23.3	22.9	22.2	21.3	19.9	17.6
(%)							

Table 58: REF scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Fossil (%)	9.89	9.17	7.81	7.09	6.94	6.85	6.89
Sales of space heating units - Gas (%)	38.3	19	19.9	20	19.9	19.9	19.8
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	62.5	74.8	75	74.8	74.6	74.6	74.6
Sales of water heating units - Gas Furnace (%)	34.2	22.8	22.6	22.8	23	23	23
Sales of water heating units - Other (%)	3.3	2.39	2.37	2.39	2.4	2.4	2.41

Table 59: 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 (%)	1.56	1.97	2.19	2.03	1.83	1.71	1.62
Vehicle sales - Light-duty - EV (%)	3.54	5.57	6.35	7.81	9.51	11	12.2
Vehicle sales - Light-duty - gasoline (%)	90.3	86.7	84.6	82.7	80.7	78.7	77.2
Vehicle sales - Light-duty - hybrid (%)	4.42	5.26	6.45	7.01	7.58	8.17	8.62
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.377	0.346	0.308	0.305	0.305	0.316
Vehicle sales - Light-duty - other (%)	0.102	0.106	0.103	0.103	0.103	0.101	0.104
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7
Vehicle sales - Medium-duty - hybrid (%)	0.365	0.427	0.496	0.577	0.674	0.793	0.929
Vehicle sales - Medium-duty - hydrogen 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 60: REF scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	119	120	121	120	120	122	127
Final energy use - Industry (PJ)	382	406	427	438	455	470	488
Final energy use - Residential (PJ)	184	172	165	159	157	156	157
Final energy use - Transportation (PJ)	426	395	363	345	346	357	372

Table 61: REF scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	12,419	12,935	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric Resistance (%)	43.5	45.6	45.9	45.7	46	45.9	45.7
Sales of cooking units - Gas (%)	56.5	54.4	54.1	54.3	54	54.1	54.3
Sales of space heating units - Electric Heat Pump	5.4	26.5	53.4	75.5	79.2	79.6	79.6
(%)							
Sales of space heating units - Electric Resistance	3.11	5.03	9.13	15	18.3	18.8	18.9
(%)							
Sales of space heating units - Fossil (%)	15.1	4.63	2.27	0.341	0.034	0	0
Sales of space heating units - Gas Furnace (%)	76.4	63.9	35.2	9.15	2.46	1.58	1.52
Sales of water heating units - Electric Heat Pump	0.117	0.149	0.144	0.146	0.145	0.143	0.145
(%)							
Sales of water heating units - Electric Resistance	4.29	5.63	5.49	5.57	5.54	5.49	5.54
(%)							
Sales of water heating units - Gas Furnace (%)	94.4	92.6	92.8	92.7	92.7	92.8	92.8
Sales of water heating units - Other (%)	1.17	1.57	1.57	1.57	1.57	1.56	1.55

Table 62: REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -	0	3.28	3.39	4.37	4.58	4.26	4.41
Cumulative 5-vr (billion \$2018)							

Table 63: REF scenario - PILLAR 6: Land sinks - Forests

Table 63: REF scenario - PILLAR 6: Land sinks - I				
Item	2020	2025	2030	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	-13.6	0	-9.57	-7.76
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-1.27	0	-2.12	-2.23
Business-as-usual carbon sink - Total (Mt CO2e/y)	-14.9	0	-11.7	-9.99
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)	0	0	0	96.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)	0	0	0	27,796
Carbon sink potential - High - Avoid deforestation (1000 tC02e/y)	0	0	0	1,537
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)	0	0	0	5,669
Carbon sink potential - High - Improve plantations (1000 tC02e/y)	0	0	0	48.1
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)	0	0	0	4,665
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)	0	0	0	965
Carbon sink potential - High - Reforest cropland (1000 tC02e/y)	0	0	0	1,409
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)	0	0	0	10,207
Carbon sink potential - High - Restore	0	0	0	3,200
productivity (1000 tC02e/y) Carbon sink potential - Low - Accelerate	0	0	0	48.5
regeneration (1000 tCO2e/y) Carbon sink potential - Low - All (not counting	0	0	0	6,956
overlap) (1000 tC02e/y) Carbon sink potential - Low - Avoid deforestation	0	0	0	256
(1000 tCO2e/y) Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)	0	0	0	2,177
Carbon sink potential - Low - Improve plantations (1000 tC02e/y)	0	0	0	24.5
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)	0	0	0	1,555
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)	0	0	0	338
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)	0	0	0	704
Carbon sink potential - Low - Reforest pasture (1000 tC02e/y)	0	0	0	773
Carbon sink potential - Low - Restore productivity (1000 tC02e/y)	0	0	0	1,079
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)	0	0	0	72.6
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)	0	0	0	17,376
Carbon sink potential - Mid - Avoid deforestation (1000 tC02e/y)	0	0	0	897
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)	0	0	0	3,923
Carbon sink potential - Mid - Improve plantations (1000 tC02e/y)	0	0	0	35.9
Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)	0	0	0	3,110

Table 63: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Table 63: REF scenario - PILLAR 6: Land sinks - H		-		
Item	2020	2025	2030	2050
Carbon sink potential - Mid - Increase trees	0	0	0	651
outside forests (1000 tCO2e/y)				
Carbon sink potential - Mid - Reforest cropland	0	0	0	1,057
(1000 tC02e/y)				
Carbon sink potential - Mid - Reforest pasture	0	0	0	5,490
(1000 tC02e/y)				0.100
Carbon sink potential - Mid - Restore	0	0	0	2,139
productivity (1000 tC02e/y)	0	0	0	15.0
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)	0	0	0	15.8
Land impacted for carbon sink potential - High -	0	0	0	208
Avoid deforestation (over 30 years) (1000	U	U	0	208
hectares)				
Land impacted for carbon sink potential - High -	0	0	0	2,891
Extend rotation length (1000 hectares)	o	0	0	2,071
Land impacted for carbon sink potential - High -	0	0	0	17.7
Improve plantations (1000 hectares)	0	0	0	"""
Land impacted for carbon sink potential - High -	0	0	0	0
Increase retention of HWP (1000 hectares)	0	0	0	0
Land impacted for carbon sink potential - High -	0	0	0	91.7
Increase trees outside forests (1000 hectares)				7
Land impacted for carbon sink potential - High -	0	0	0	93.2
Reforest cropland (1000 hectares)				
Land impacted for carbon sink potential - High -	0	0	0	290
Reforest pasture (1000 hectares)				
Land impacted for carbon sink potential - High -	0	0	0	1,061
Restore productivity (1000 hectares)				
Land impacted for carbon sink potential - High -	0	0	0	4,668
Total impacted (over 30 years) (1000 hectares)				
Land impacted for carbon sink potential - Low -	0	0	0	7.91
Accelerate regeneration (1000 hectares)				
Land impacted for carbon sink potential - Low -	0	0	0	195
Avoid deforestation (over 30 years) (1000				
hectares)				
Land impacted for carbon sink potential - Low -	0	0	0	1,107
Extend rotation length (1000 hectares)				
Land impacted for carbon sink potential - Low -	0	0	0	8.86
Improve plantations (1000 hectares)				
Land impacted for carbon sink potential - Low -	0	0	0	0
Increase retention of HWP (1000 hectares)				
Land impacted for carbon sink potential - Low -	0	0	0	48.3
Increase trees outside forests (1000 hectares)	0	0	0	
Land impacted for carbon sink potential - Low -	0	0	0	46.6
Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low -	0	0	0	F0.0
Reforest pasture (1000 hectares)	0	0	0	50.3
Land impacted for carbon sink potential - Low -	0	0	0	642
Restore productivity (1000 hectares)	U	0	0	042
Land impacted for carbon sink potential - Low -	0	0	0	2,107
Total impacted (over 30 years) (1000 hectares)	0	0	0	2,101
Land impacted for carbon sink potential - Mid -	0	0	0	11.9
Accelerate regeneration (1000 hectares)	0	0	0	11.7
Land impacted for carbon sink potential - Mid -	0	0	0	202
Avoid deforestation (over 30 years) (1000	0	0	0	202
hectares)				
Land impacted for carbon sink potential - Mid -	0	0	0	1,999
Extend rotation length (1000 hectares)			ı	.,,,,
Land impacted for carbon sink potential - Mid -	0	0	0	13.3
Improve plantations (1000 hectares)			ı	.5.0
Land impacted for carbon sink potential - Mid -	0	0	0	0
Increase retention of HWP (1000 hectares)	-	-	-	-
Land impacted for carbon sink potential - Mid -	0	0	0	70
Increase trees outside forests (1000 hectares)				

Table 63: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2050
Land impacted for carbon sink potential - Mid -	0	0	0	69.9
Reforest cropland (1000 hectares)				
Land impacted for carbon sink potential - Mid -	0	0	0	363
Reforest pasture (1000 hectares)				
Land impacted for carbon sink potential - Mid -	0	0	0	1,293
Restore productivity (1000 hectares)				
Land impacted for carbon sink potential - Mid -	0	0	0	4,022
Total impacted (over 30 years) (1000 hectares)				

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)	0	1,982	1,418	1,196	1,075	1,032	1,011
Monetary damages from air pollution - Natural Gas (million 2019\$)	0	134	176	193	250	199	173
Monetary damages from air pollution - Transportation (million 2019\$)	0	1,243	1,267	1,291	1,321	1,351	1,382
Premature deaths from air pollution - Coal (deaths)	0	222	159	134	121	116	113
Premature deaths from air pollution - Natural Gas (deaths)	0	15.2	19.9	21.8	28.2	22.5	19.5
Premature deaths from air pollution - Transportation (deaths)	0	140	142	145	149	152	155