

Net-Zero America - Mississippi data

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See the Data Sheet Guide for explanations of the contents of this document. The data herein underlie graphs and tables found in Princeton's Net-Zero America report:

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, Final Report, Princeton University, Princeton, NJ, 29 October 2021. Report available at https://net-zeroamerica.princeton.edu.

Contents

1	E+ scenario - IMPACTS - Health	1
2	E+ scenario - IMPACTS - Jobs	2
3	E+ scenario - IMPACTS - Fossil fuel industries	3
4	E+ scenario - PILLAR 1: Efficiency/Electrification - Overview	3
5	E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	3
6	E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	3
7	E+ scenario - PILLAR 1: Efficiency/Electrification - Residential	4
8	E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	4
9	E+ scenario - PILLAR 2: Clean Electricity - Generating capacity	4
10	E+ scenario - PILLAR 2: Clean Electricity - Generation	5
11	E+ scenario - PILLAR 3: Clean fuels - Bioenergy	5
12	E+ scenario - PILLAR 4: CCUS - CO2 capture	5
13	E+ scenario - PILLAR 4: CCUS - CO2 pipelines	6
14	E+ scenario - PILLAR 4: CCUS - CO2 storage	6
15	E+ scenario - PILLAR 6: Land sinks - Forests	6
16	E+ scenario - PILLAR 6: Land sinks - Agriculture	8
17	E- scenario - IMPACTS - Health	9
18	E- scenario - IMPACTS - Jobs	10
19	E- scenario - PILLAR 1: Efficiency/Electrification - Overview	12
20	E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	12
21	E- scenario - PILLAR 1: Efficiency/Electrification - Transportation	12
22	E- scenario - PILLAR 1: Efficiency/Electrification - Residential	12
23	E- scenario - PILLAR 1: Efficiency/Electrification - Commercial	12
24	E- scenario - PILLAR 2: Clean Electricity - Generating capacity	13
25	E- scenario - PILLAR 6: Land sinks - Forests	13
26	E- scenario - PILLAR 6: Land sinks - Agriculture	15
27	E+RE+ scenario - IMPACTS - Health	16
28	E+RE+ scenario - IMPACTS - Jobs	17
29	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview	18
30	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand .	18
31	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	19
32	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential	19
33	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	19
34	E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity	19
35	E+RE+ scenario - PILLAR 2: Clean Electricity - Generation	20
36	E+RE+ scenario - PILLAR 6: Land sinks - Forests	20
37	E+RE+ scenario - PILLAR 6: Land sinks - Agriculture	23
38	E+RE- scenario - IMPACTS - Health	23
39	E+RE- scenario - IMPACTS - Jobs	25
40	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview	26
41	${\sf E+RE-scenario-PILLAR1:Efficiency/Electrification-Electricitydemand} \ \ . \ \ .$	26
42	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation	26
43	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential	26

44	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial	27
45	E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity	27
46	E+RE- scenario - PILLAR 2: Clean Electricity - Generation	27
47	E+RE- scenario - PILLAR 6: Land sinks - Forests	27
48	E+RE- scenario - PILLAR 6: Land sinks - Agriculture	30
49	E-B+ scenario - IMPACTS - Health	31
50	E-B+ scenario - IMPACTS - Jobs	32
51	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview	33
52	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	33
53	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	33
54	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential	34
55	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	34
56	E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity	34
57	E-B+ scenario - PILLAR 2: Clean Electricity - Generation	34
58	E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy	35
59	E-B+ scenario - PILLAR 4: CCUS - CO2 capture	35
60	E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines	35
61	E-B+ scenario - PILLAR 4: CCUS - CO2 storage	35
62	E-B+ scenario - PILLAR 6: Land sinks - Forests	36
63	E-B+ scenario - PILLAR 6: Land sinks - Agriculture	38
64	REF scenario - IMPACTS - Health	39
65	REF scenario - IMPACTS - Jobs	40
66	REF scenario - PILLAR 1: Efficiency/Electrification - Overview	41
67	REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	42
68	REF scenario - PILLAR 1: Efficiency/Electrification - Residential	42
69	REF scenario - PILLAR 1: Efficiency/Electrification - Commercial	42
70	REF scenario - PILLAR 2: Clean Electricity - Generating capacity	42
71	REF scenario - PILLAR 2: Clean Electricity - Generation	43
72	REF scenario - PILLAR 6: Land sinks - Forests - REF only	43
73	REF scenario - PILLAR 6: Land sinks - Forests	43

Table 1: E+ scenario - IMPACTS - Health

Table 1: <i>E+ scenario - IMPACTS - Health</i> Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -	2020	24.9	0.026	0.024	0.016	0.01	0.001
Fuel Comb - Electric Generation - Coal		2/	3.320	3.324	3.3.0	3.31	3.001
(deaths)		0.70	/ /7	0.71	0.05	1.00	0.500
Premature deaths from air pollution -		9.43	6.67	3.71	3.05	1.39	0.533
Fuel Comb - Electric Generation - Natural							
Gas (deaths) Premature deaths from air pollution -		48.3	44.8	33.9	19.4	8.78	3.42
Mobile - On-Road (deaths)		46.3	44.8	33.9	19.4	0.70	3.42
Premature deaths from air pollution - Gas		6.53	5.98	4.49	2.65	1.3	0.621
Stations (deaths)		0.55	3.70	4.47	2.00	1.5	0.021
Premature deaths from air pollution -		4.69	3.79	2.53	1.42	0.718	0.359
Fuel Comb - Residential - Natural Gas		4.07	0.17	2.00	1.72	0.110	0.007
(deaths)							
Premature deaths from air pollution -		0.212	0.172	0.118	0.069	0.032	0.012
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.09	0.957	0.716	0.457	0.234	0.103
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.942	0.898	0.85	0.798	0.747	0.692
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		3.35	2.92	2.12	1.33	0.813	0.526
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.589	0.488	0.384	0.283	0.195	0.125
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.293	0.245	0.199	0.154	0.113	0.074
Fuel Comb - Comm/Institutional - Other							
(deaths)		0.57	0.015	0.000	0.000	0.001	0.107
Premature deaths from air pollution -		0.54	0.215	0.209	0.202	0.201	0.196
Industrial Processes - Coal Mining							
(deaths) Premature deaths from air pollution -		29.8	27.8	25.1	19.4	14.3	8.78
Industrial Processes - Oil & Gas		27.0	21.0	20.1	17.4	14.5	0.10
Production (deaths)							
Monetary damages from air pollution -		221	0.234	0.211	0.138	0.085	0.005
Fuel Comb - Electric Generation - Coal			0.20	0.211	000	0.000	0.000
(million \$2019)							
Monetary damages from air pollution -		83.6	59.1	32.9	27	12.3	4.72
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		429	398	301	173	78.1	30.4
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		57.9	52.9	39.8	23.5	11.5	5.5
Gas Stations (million \$2019)							
Monetary damages from air pollution -		41.6	33.6	22.4	12.6	6.36	3.18
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		1.88	1.52	1.05	0.615	0.283	0.109
Fuel Comb - Residential - Oil (million							
\$2019)		0.40	0.40	. 05	, 05	0.07	0.010
Monetary damages from air pollution -		9.62	8.48	6.35	4.05	2.07	0.912
Fuel Comb - Residential - Other (million							
\$2019)		0.07	705	7.50	7.07	/ /1	/ 10
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal		8.34	7.95	7.52	7.07	6.61	6.13
(million \$2019)							
Monetary damages from air pollution -		29.7	25.8	18.8	11.8	7.2	4.66
Fuel Comb - Comm/Institutional - Natural		27.1	23.0	10.0	11.0	1.2	4.00

Table 1: E+ scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		5.21	4.32	3.4	2.5	1.73	1.1
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		2.6	2.17	1.76	1.37	0.997	0.653
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		4.76	1.89	1.85	1.78	1.77	1.73
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		264	247	223	172	127	77.9
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 2: E+ scenario - IMPACTS - Jobs

Table 2: E+ Scenario - IMPACTS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		189	485	978	1,218	1,526	1,173
By economic sector - Construction (jobs)		5,089	6,103	10,097	12,506	13,891	16,716
By economic sector - Manufacturing (jobs)		4,317	4,716	5,643	5,421	5,176	5,396
By economic sector - Mining (jobs)		4,845	4,039	3,230	2,135	1,564	986
By economic sector - Other (jobs)		373	424	1,165	2,143	2,559	3,447
By economic sector - Pipeline (jobs)		557	829	869	478	423	430
By economic sector - Professional (jobs)		2,889	3,019	4,871	6,557	7,933	8,893
By economic sector - Trade (jobs)		2,565	2,391	3,199	4,106	4,699	5,563
By economic sector - Utilities (jobs)		5,919	6,795	9,694	10,175	11,827	13,892
By resource sector - Biomass (jobs)		633	1,293	2,731	3,634	5,568	5,022
By resource sector - CO2 (jobs)		12.8	3,162	4,290	1,772	2,278	2,838
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		6,087	6,222	11,291	14,484	17,970	23,263
By resource sector - Natural Gas (jobs)		6,086	4,934	4,471	4,263	3,622	2,101
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,204	8,953	7,700	5,576	4,129	2,634
By resource sector - Solar (jobs)		2,064	2,510	7,235	13,070	14,420	18,692
By resource sector - Wind (jobs)		710	1,013	1,326	1,246	929	1,274
By education level - All sectors - High school diploma or less (jobs)		10,901	12,015	16,944	19,188	21,276	24,217
By education level - All sectors - Associates degree or some college (jobs)		8,042	8,777	12,318	13,926	15,456	17,895
By education level - All sectors - Bachelors degree (jobs)		6,132	6,305	8,212	9,037	9,958	11,131
By education level - All sectors - Masters or professional degree (jobs)		1,467	1,502	1,995	2,253	2,525	2,829
By education level - All sectors - Doctoral degree (jobs)		200	202	278	334	383	424
Related work experience - All sectors - None (jobs)		3,781	4,133	5,787	6,548	7,299	8,337
Related work experience - All sectors - Up to 1 year (jobs)		5,048	5,521	7,874	9,093	10,163	11,595
Related work experience - All sectors - 1 to 4 years (jobs)		9,868	10,554	14,410	16,123	17,826	20,239
Related work experience - All sectors - 4 to 10 years (jobs)		6,313	6,761	9,231	10,288	11,367	12,978
Related work experience - All sectors - Over 10 years (jobs)		1,733	1,832	2,446	2,687	2,943	3,347
On-the-Job Training - All sectors - None (jobs)		1,466	1,541	2,117	2,430	2,706	3,094
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,877	19,151	26,246	29,511	32,732	37,026

Table 2. F+	scenario	- IMPACTS -	Inhe	(continued))
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Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,516	6,008	8,352	9,340	10,312	11,889
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,628	1,826	2,654	3,035	3,393	3,967
On-the-Job Training - All sectors - Over 10 years (jobs)		256	276	378	421	454	520
On-Site or In-Plant Training - All sectors - None (jobs)		4,283	4,600	6,380	7,256	8,054	9,150
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,206	17,363	23,800	26,743	29,654	33,627
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,303	4,679	6,496	7,271	8,026	9,237
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,739	1,923	2,732	3,085	3,434	3,981
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		212	237	339	384	430	500
Wage income - All (million \$2019)		1,368	1,474	2,008	2,246	2,514	2,872

Table 3: E+ scenario - IMPACTS - Fossil fuel industries

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		75.7	66.7	53.5	41	31.1	23.1
Oil consumption - Cumulative (million							1,650
bbls)							
Oil production - Annual (million bbls)		30.3	30.5	30.4	24.1	19.6	13
Natural gas consumption - Annual (tcf)		446	376	302	227	143	99.1
Natural gas consumption - Cumulative							9,085
(tcf)							
Natural gas production - Annual (tcf)		43.4	41	35.7	30.2	24	18.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.03	2.09	3.69	3.94	2.98	3.07
Cumulative 5-yr (billion \$2018)							

Table 6: E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

Table 7: E+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Heat Pump (%)							
Sales of space heating units - Electric	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Resistance (%)							
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric	0	12.1	64	75.6	76.1	76.1	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	16.1	3.02	0.128	0	0	0
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric	75.8	81	96.7	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Residential HVAC investment in 2020s vs.		2.27	2.78				
REF - Cumulative 5-yr (billion \$2018)							

Table 8: E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	29.3	77	90.8	91.9	92	92
Heat Pump (%)							
Sales of space heating units - Electric	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Resistance (%)							
Sales of space heating units - Gas (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Heat Pump (%)							
Sales of water heating units - Electric	5.64	9.97	28	32.1	32.3	32.3	32.3
Resistance (%)							
Sales of water heating units - Gas (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s -		8,123	9,222				
Cumulative 5-yr (million \$2018)							

Table 9: E+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	10,201	9,310	11,906	9,082	9,043	10,101
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	1,116	2,278	7,216	16,315	25,778	37,471
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	472	1,550
Installed renewables - Solar - Constrained land use assumptions (MW)	44.8	890	2,802	11,209	18,136	28,224	39,263
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	13,281	13,281	13,281
Capital invested - Solar PV - Base (billion \$2018)		1.43	1.39	5.45	9.46	9.29	10.8
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0.529	1.14

Table 9: E+ scenario - PILLAR 2: Clean Electricity - Generating capacity (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion \$2018)		0.876	2.23	4.75	5.05	7.97	9.84
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	15.8	0	0
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	0.002	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	2.86	0	0	2.52	0

Table 10: E+ scenario - PILLAR 2: Clean Electricity - Generation

	•						
Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	2,150	4,376	13,814	31,219	49,326	71,640
Wind - Base land use assumptions (GWh)	0	0	0	0	0	1,363	4,502
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Constrained land use assumptions	103	1,718	5,358	21,445	34,720	53,997	75,091
(GWh)							
Wind - Constrained land use assumptions	0	0	0	0	33,276	33,276	33,276
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	3,205	3,205	3,205	6,036	6,036
Biomass w/ccu allam power plant (GWh)	0	0	0	0	2.37	2.37	2.37
						·	

Table 11: E+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	2	2	2	4	4
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	1	1	1
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	4	7	14	14
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	1	1	1
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1
Conversion capital investment -		0	2,620	4,363	3,928	8,452	0
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	125	365	581	1,029	1,029

Table 12: E+ scenario - PILLAR 4: CCUS - CO2 capture

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	3.17	13.7	18.5	30.9	31.4
Annual - BECCS (MMT)		0	3.17	8.78	13.7	24.3	24.3
Annual - NGCC (MMT)		0	0	4.93	4.83	6.52	7.04
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	3.17	16.9	35.4	66.3	97.6
Cumulative - BECCS (MMT)		0	3.17	11.9	25.7	50	74.3
Cumulative - NGCC (MMT)		0	0	4.93	9.76	16.3	23.3
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

Table 13: E+ scenario - PILLAR 4: CCUS - CO2 pipelines

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	487	973	973	973	973
Spur (km)		0	103	1,060	1,633	2,269	2,604
All (km)		0	589	2,034	2,607	3,243	3,577
Cumulative investment - Trunk (million		0	2,854	5,707	5,707	5,707	5,707
\$2018)							
Cumulative investment - Spur (million		0	84.9	787	1,278	1,895	2,084
\$2018)							
Cumulative investment - All (million		0	2,939	6,495	6,986	7,602	7,791
\$2018)							

Table 14: E+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	6.58	21.1	37.9	60.2	80.1
Injection wells (wells)		0	6	24	42	70	86
Resource characterization, appraisal, permitting costs (million \$2020)		32.8	590	935	935	935	935
Wells and facilities construction costs (million \$2020)		0	181	705	1,257	2,102	2,610

Table 15: E+ scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-374
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-213
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-3,218
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,599
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-5,234
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-283
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,261
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-497
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,692
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-17,371
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-560
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tCO2e/y)							•

Table 15: E+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tC02e/y)							
Carbon sink potential - Mid - All (not							-33,702
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-746
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-8,378
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-15,703
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-809
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-6,522
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-6,558
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-50,122
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-5,019
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)		I .	I				

Table 15: E+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,273
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							122
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							173
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4,272
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,882
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							76.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							•
(1000 hectares)							

Table 16: E+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-172
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,250
deployment - Cropland measures (1000							
tCO2e/y)							

Table 16: E+ scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-34.3
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,456
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Aggressive							-172
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,293
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-68.6
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-6,534
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							69.5
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							939
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,070
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							69.5
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,815
Aggressive deployment - Cropland							•
measures (1000 hectares)							
Land impacted for carbon sink -							125
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,009
Aggressive deployment - Total (1000							_,00,
hectares)							
able 17: E- scenario - IMPACTS - Health							
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -	2020	24.9	0.026	0.024	0.016	0.01	0.001
Fuel Comb - Electric Generation - Coal		24.7	0.020	0.024	0.010	0.01	0.001
(deaths)							
Premature deaths from air pollution -		8.9	5.33	2.31	0.888	0.335	0.23
Fuel Comb - Electric Generation - Natural		0.7	3.33	2.51	0.000	0.555	0.20
Gas (deaths)							
Premature deaths from air pollution -		49	49.2	47.7	42.8	33.9	23.1
Mobile - On-Road (deaths)		77	47.2	41.1	42.0	33.7	20.1
Premature deaths from air pollution - Gas		6.67	6.69	6.42	5.73	4.53	3.13
Stations (deaths)		0.01	0.07	0.42	5.15	4.55	3.13
Premature deaths from air pollution -		4.73	4.24	3.71	3.04	2.27	1.53
Fuel Comb - Residential - Natural Gas		4.13	4.24	3./1	3.04	2.21	1.53
(deaths)		0.017	0.005	0.100	0.17	0.100	0.000
Premature deaths from air pollution -		0.217	0.205	0.193	0.17	0.132	0.093
Fuel Comb - Residential - Oil (deaths)		44	100	1.05	0.07.5	0.7/4	0.501
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.1	1.08	1.05	0.945	0.741	0.521
					1	I .	

Table 17: E- scenario - IMPACTS - Health (continued)

Table II. L Scenario Ini Acro Health (continucuj						
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		0.942	0.898	0.85	0.798	0.747	0.692
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		3.38	3.32	3.15	2.77	2.21	1.64
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.59	0.535	0.482	0.417	0.346	0.278
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.293	0.263	0.233	0.204	0.176	0.15
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.519	0.215	0.212	0.207	0.201	0.186
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		29.7	26.7	23	19.9	17.5	12.2
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		221	0.234	0.211	0.138	0.085	0.005
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		78.8	47.2	20.4	7.86	2.97	2.04
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		436	438	424	380	301	205
Mobile - On-Road (million \$2019)		.55	.55			33.	
Monetary damages from air pollution -		59.1	59.2	56.9	50.7	40.2	27.7
Gas Stations (million \$2019)		07	07.2	00.7	00	10.2	
Monetary damages from air pollution -		41.9	37.6	32.9	26.9	20.1	13.6
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		1.92	1.82	1.71	1.51	1.17	0.828
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		9.75	9.61	9.33	8.38	6.57	4.62
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		8.34	7.95	7.52	7.07	6.61	6.13
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		29.9	29.4	27.9	24.5	19.6	14.5
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		5.23	4.73	4.27	3.69	3.06	2.46
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		2.6	2.33	2.06	1.81	1.56	1.33
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		4.58	1.9	1.87	1.82	1.77	1.64
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		264	237	204	177	155	108
Industrial Processes - Oil & Gas			20.				
Production (million \$2019)							

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		211	1,055	1,662	2,103	2,116	1,172
By economic sector - Construction (jobs)		5,095	7,025	10,501	12,868	16,198	17,771

Table 18: E- scenario - IMPACTS - Jobs (continued)

Table 18: E- scenario - IMPACTS - Jobs (coi	ntinuedJ						
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing		4,381	5,041	5,748	6,514	7,091	6,628
(jobs)							
By economic sector - Mining (jobs)		4,885	4,172	3,476	2,726	2,332	1,509
By economic sector - Other (jobs)		381	447	1,015	1,947	2,802	3,490
By economic sector - Pipeline (jobs)		558	1,061	1,197	638	655	702
By economic sector - Professional (jobs)		2,905	3,679	5,634	8,599	10,215	9,126
By economic sector - Trade (jobs)		2,604	2,550	3,409	4,852	5,837	5,833
By economic sector - Utilities (jobs)		5,823	7,767	10,426	10,981	13,807	14,759
By resource sector - Biomass (jobs)		665	2,798	5,421	8,754	9,011	4,853
By resource sector - CO2 (jobs)		15.2	5,385	7,345	3,063	3,906	4,835
By resource sector - Coal (jobs)		352	68.2	0	0	0	0
By resource sector - Grid (jobs)		5,910	6,515	9,877	15,188	20,451	23,456
By resource sector - Natural Gas (jobs)		5,993	4,484	4,411	3,965	3,942	2,212
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,239	9,126	8,155	7,121	6,084	3,958
By resource sector - Solar (jobs)		2,191	2,646	5,979	11,230	15,606	18,991
By resource sector - Wind (jobs)		750	1,061	1,176	1,213	1,370	2,015
By education level - All sectors - High		10,960	13,861	18,473	21,940	26,134	26,150
school diploma or less (jobs)		10,960	13,001	10,413	21,940	20,134	26,130
By education level - All sectors -		8,060	9,940	13,177	15,505	18,784	19,315
		8,060	9,940	13,177	15,505	10,764	19,313
Associates degree or some college (jobs)		/ 1E1	70/7	0.007	10 /71	10 / 00	10 OE1
By education level - All sectors -		6,151	7,067	8,924	10,671	12,482	12,051
Bachelors degree (jobs)		1 / 71	1 (00	0.100	0.400	0.1//	0.000
By education level - All sectors - Masters		1,471	1,698	2,182	2,692	3,164	3,028
or professional degree (jobs)		001	000	010	/10	/ 00	
By education level - All sectors - Doctoral		201	233	313	419	489	447
degree (jobs)		0.70/	, 7, 0	(01/	7.01	2015	
Related work experience - All sectors -		3,794	4,748	6,314	7,494	8,965	8,988
None (jobs)		F 000		0.400	10.51.0	10.5(0	40 / 50
Related work experience - All sectors - Up		5,080	6,384	8,609	10,548	12,562	12,452
to 1 year (jobs)				1==00	10.1.		
Related work experience - All sectors - 1		9,904	11,982	15,588	18,447	21,937	21,872
to 4 years (jobs)							
Related work experience - All sectors - 4		6,328	7,636	9,942	11,678	13,956	14,039
to 10 years (jobs)							
Related work experience - All sectors -		1,737	2,048	2,615	3,060	3,634	3,639
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,473	1,744	2,296	2,818	3,351	3,323
(jobs)							
On-the-Job Training - All sectors - Up to 1		17,962	21,859	28,592	34,287	40,580	39,988
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		5,525	6,797	8,931	10,353	12,505	12,856
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,627	2,089	2,847	3,301	4,060	4,257
years (jobs)							
On-the-Job Training - All sectors - Over 10		257	309	401	468	557	568
years (jobs)							
On-Site or In-Plant Training - All sectors -		4,302	5,262	6,941	8,355	9,933	9,857
None (jobs)							
On-Site or In-Plant Training - All sectors -		16,280	19,780	25,868	30,950	36,702	36,320
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		4,312	5,296	6,953	8,097	9,756	9,990
1 to 4 years (jobs)		, ,		,		,	
On-Site or In-Plant Training - All sectors -		1,738	2,191	2,940	3,397	4,140	4,286
4 to 10 years (jobs)		,	·	, -	, -	, -	,
On-Site or In-Plant Training - All sectors -		211	270	365	427	522	539
Over 10 years (jobs)						J	
Wage income - All (million \$2019)		1,371	1,672	2,181	2,592	3,107	3,109
. 3 (.,511	.,5.2	_,	_, _, _	5,.51	-,,

Table 19: E- scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	351	326	298	275	258	238	214
Final energy use - Residential (PJ)	99.2	93.3	89.2	84.7	79.1	73.1	68.2
Final energy use - Commercial (PJ)	70.6	70.8	69.9	68.7	66.7	64.8	63.6
Final energy use - Industry (PJ)	201	207	209	208	209	207	206

Table 20: E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.69	1.71	2.12	2.18	3.13	3.3
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2.87	52.7	102	333	564	1,075	1,585
Vehicle stocks - LDV – All others (1000 units)	2,072	2,072	2,072	1,966	1,859	1,433	1,006
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	63.7	135	456	1,438	2,094
Public EV charging plugs - DC Fast (1000 units)	0.053		0.263		1.45		4.06
Public EV charging plugs - L2 (1000 units)	0.175		6.32		34.8		97.8

Table 22: E- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	29.5	38.3	42.3	54.1	71.8	83.3	87.2
Heat Pump (%)							
Sales of space heating units - Electric	28.6	30.1	28.3	23	15.1	10.1	8.37
Resistance (%)							
Sales of space heating units - Gas (%)	30.2	18.6	17.3	13.8	8.07	4.19	2.84
Sales of space heating units - Fossil (%)	11.7	12.9	12.1	9.17	5.03	2.44	1.57
Sales of water heating units - Electric	0	2.08	7.99	25	51.1	68.1	74
Heat Pump (%)							
Sales of water heating units - Electric	67.2	76.8	72.5	59.6	40.1	27.4	23
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	18.6	17	12.9	6.35	2.02	0.528
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.51	2.49	2.49
Sales of cooking units - Electric	75.7	76.4	78.6	84.4	92.6	97.6	99.4
Resistance (%)							
Sales of cooking units - Gas (%)	24.3	23.6	21.4	15.6	7.42	2.39	0.644
Residential HVAC investment in 2020s vs.		2.25	2.65				
REF - Cumulative 5-yr (billion \$2018)							

Table 23: E- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	20.2	25.6	41.4	66.1	83.2	89.6
Heat Pump (%)							
Sales of space heating units - Electric	4.72	4.61	4.65	4.77	5.23	5.91	6.33
Resistance (%)							
Sales of space heating units - Gas (%)	85.8	71.8	66.6	51.4	27.5	10.5	3.93
Sales of space heating units - Fossil (%)	0	3.34	3.16	2.39	1.19	0.387	0.102
Sales of water heating units - Electric	0.153	1.96	7.08	21.8	44.4	59.2	64.3
Heat Pump (%)							
Sales of water heating units - Electric	5.64	6.47	8.38	14.4	23.5	29.5	31.6
Resistance (%)							
Sales of water heating units - Gas (%)	92.7	90	83	62.2	30.5	9.74	2.53
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56

Table 23: E- scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric	43.5	47.1	51.3	61.6	76.1	85	88
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Commercial HVAC investment in 2020s -		8,119	9,209				
Cumulative 5-yr (million \$2018)							

Table 24: E- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	9,884	9,801	9,472	9,379	9,241	8,716
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440

Table 25: E- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)							-283
Carbon sink potential - Low - Reforest							-3,261
cropland (1000 tC02e/y) Carbon sink potential - Low - Reforest pasture (1000 tC02e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tC02e/y) Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tC02e/y) Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tCO2e/y) Carbon sink potential - Mid - All (not							-33,702
counting overlap) (1000 tCO2e/y) Carbon sink potential - High - Accelerate							-746
regeneration (1000 tCO2e/y) Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tC02e/y)							

Table 25: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item Caphan sink notantial High Extend	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							-, -
Carbon sink potential - High - Increase							-15,703
retention of HWP (1000 tC02e/y)							000
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-809
Carbon sink potential - High - Reforest							-6,522
cropland (1000 tCO2e/y)							0,022
Carbon sink potential - High - Reforest							-6,558
pasture (1000 tC02e/y)							
Carbon sink potential - High - All (not							-50,122
counting overlap) (1000 tCO2e/y) Carbon sink potential - High - Restore							-5,019
productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							1,031
hectares)							
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000							0
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							00.0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							1,001
hectares)							
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							91.0
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000 hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							1, 110
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000		1					

Table 25: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,273
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							122
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							173
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4,272
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,882
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							76.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							•

Table 26: E- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-172
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,250
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-34.3
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,456
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-172
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,293
deployment - Cropland measures (1000							
tCO2e/y)							

Table 26: E- scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-68.6
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,534
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							69.5
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							939
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,070
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							69.5
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,815
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							125
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,009
Aggressive deployment - Total (1000							
hectares)							

Table 27: E+RE+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		10.1	7.01	3.73	2.37	0.648	0.267
Premature deaths from air pollution - Mobile - On-Road (deaths)		48.3	44.8	33.9	19.4	8.78	3.42
Premature deaths from air pollution - Gas Stations (deaths)		6.53	5.98	4.49	2.65	1.3	0.621
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.69	3.79	2.53	1.42	0.718	0.359
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.172	0.118	0.069	0.032	0.012
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.09	0.957	0.716	0.457	0.234	0.103
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.35	2.92	2.12	1.33	0.813	0.526
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.589	0.488	0.384	0.283	0.195	0.125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.245	0.199	0.154	0.113	0.074

Table 27: E+RE+ scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.593	0.215	0.209	0.201	0.2	0.174
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.3	27.4	23.4	16.7	10.1	1.47
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		89.4	62.1	33.1	21	5.74	2.37
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		429	398	301	173	78.1	30.4
Monetary damages from air pollution - Gas Stations (million \$2019)		57.9	52.9	39.8	23.5	11.5	5.5
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		41.6	33.6	22.4	12.6	6.36	3.18
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.88	1.52	1.05	0.615	0.283	0.109
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.62	8.48	6.35	4.05	2.07	0.912
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		29.7	25.8	18.8	11.8	7.2	4.66
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		5.21	4.32	3.4	2.5	1.73	1.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.6	2.17	1.76	1.37	0.997	0.653
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.23	1.89	1.84	1.78	1.77	1.54
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		260	243	208	149	90.1	13.1

Table 28: E+RE+ scenario - IMPACTS - Jobs

0						
2020	2025	2030	2035	2040	2045	2050
	190	295	909	1,120	1,303	1,173
	6,147	7,558	10,605	19,997	27,931	38,149
	4,553	5,177	6,555	7,029	8,263	9,975
	4,809	3,803	2,843	1,734	973	167
	561	940	1,641	4,170	6,517	8,511
	542	464	344	233	143	51.9
	3,276	3,734	5,508	9,903	14,042	18,493
	2,797	2,950	3,641	6,429	9,221	12,234
	6,540	6,630	8,819	13,013	18,089	31,071
	597	783	2,404	3,611	4,844	5,179
	0	0.001	0.001	0.001	0.001	0.001
	218	0	0	0	0	0
	7,169	8,709	13,514	21,865	33,151	61,983
	2020	2020 2025 190 6,147 4,553 4,809 561 542 3,276 2,797 6,540 597 0	2020 2025 2030 190 295 6,147 7,558 4,553 5,177 4,809 3,803 561 940 542 464 3,276 3,734 2,797 2,950 6,540 6,630 597 783 0 0.001 218 0	2020 2025 2030 2035 190 295 909 6,147 7,558 10,605 4,553 5,177 6,555 4,809 3,803 2,843 561 940 1,641 542 464 344 3,276 3,734 5,508 2,797 2,950 3,641 6,540 6,630 8,819 597 783 2,404 0 0.001 0.001 218 0 0	2020 2025 2030 2035 2040 190 295 909 1,120 6,147 7,558 10,605 19,997 4,553 5,177 6,555 7,029 4,809 3,803 2,843 1,734 561 940 1,641 4,170 542 464 344 233 3,276 3,734 5,508 9,903 2,797 2,950 3,641 6,429 6,540 6,630 8,819 13,013 597 783 2,404 3,611 0 0.001 0.001 0.001 218 0 0 0	2020 2025 2030 2035 2040 2045 190 295 909 1,120 1,303 6,147 7,558 10,605 19,997 27,931 4,553 5,177 6,555 7,029 8,263 4,809 3,803 2,843 1,734 973 561 940 1,641 4,170 6,517 542 464 344 233 143 3,276 3,734 5,508 9,903 14,042 2,797 2,950 3,641 6,429 9,221 6,540 6,630 8,819 13,013 18,089 597 783 2,404 3,611 4,844 0 0.001 0.001 0.001 0.001 218 0 0 0 0

Table 28: E+RE+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Natural Gas (jobs)		6,196	4,797	4,048	3,787	3,212	2,360
By resource sector - Nuclear (jobs)		727	715	704	693	402	0
By resource sector - Oil (jobs)		10,205	8,924	7,495	5,102	3,220	503
By resource sector - Solar (jobs)		3,492	6,441	10,842	26,608	39,430	45,812
By resource sector - Wind (jobs)		811	1,182	1,858	1,962	2,223	3,987
By education level - All sectors - High		12,065	13,203	17,442	27,334	37,142	51,413
school diploma or less (jobs)		,000	.5,255	,	2.700	0.,	0.,
By education level - All sectors -		8,920	9,652	12,610	20,076	27,576	38,763
Associates degree or some college (jobs)		-,	.,	,			
By education level - All sectors -		6,621	6,826	8,450	12,572	16,825	22,940
Bachelors degree (jobs)		-,	2,222	,,,,,,	,	,	,
By education level - All sectors - Masters		1,589	1,641	2,066	3,162	4,281	5,854
or professional degree (jobs)		,	, -	,	-, -	, -	-,
By education level - All sectors - Doctoral		219	230	298	483	659	855
degree (jobs)							
Related work experience - All sectors -		4,174	4,506	5,909	9,309	12,726	17,723
None (jobs)		·	,	., -	,	, -	, -
Related work experience - All sectors - Up		5,603	6,176	8,248	13,130	17,935	24,594
to 1 year (jobs)		-,	-,	-, -	-,	,	, -
Related work experience - All sectors - 1		10,814	11,509	14,782	22,799	30,905	42,827
to 4 years (jobs)			,		•	,	•
Related work experience - All sectors - 4		6,934	7,365	9,413	14,606	19,827	27,609
to 10 years (jobs)			·				
Related work experience - All sectors -		1,890	1,994	2,513	3,783	5,088	7,072
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,612	1,724	2,216	3,526	4,814	6,538
(jobs)							
On-the-Job Training - All sectors - Up to 1		19,581	20,959	27,134	41,687	56,455	77,796
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		6,105	6,556	8,475	13,371	18,253	25,677
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,834	2,003	2,648	4,429	6,138	8,715
years (jobs)							
On-the-Job Training - All sectors - Over 10		283	308	393	614	823	1,099
years (jobs)							
On-Site or In-Plant Training - All sectors -		4,719	5,074	6,614	10,397	14,142	19,327
None (jobs)							
On-Site or In-Plant Training - All sectors -		17,762	19,009	24,573	37,829	51,277	70,866
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		4,757	5,116	6,616	10,401	14,183	19,904
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,941	2,093	2,721	4,449	6,118	8,640
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		236	258	341	551	761	1,088
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,491	1,588	2,039	3,127	4,265	6,004

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

Table 30: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.03	2.09	3.69	3.94	2.98	3.07
Cumulative 5-yr (billion \$2018)							

Table 31: <i>E+RE+ scenario -</i>	PILLAR 1: Efficiency	/Electrification -	Transportation
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Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

Table 32: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Heat Pump (%)							
Sales of space heating units - Electric	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Resistance (%)							
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric	0	12.1	64	75.6	76.1	76.1	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	16.1	3.02	0.128	0	0	0
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric	75.8	81	96.7	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Residential HVAC investment in 2020s vs.		2.27	2.78				
REF - Cumulative 5-yr (billion \$2018)							

${\it Table~33:~E+RE+~scenario~-~PILLAR~1:~Efficiency/Electrification~-~Commercial}$

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	29.3	77	90.8	91.9	92	92
Heat Pump (%)							
Sales of space heating units - Electric	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Resistance (%)							
Sales of space heating units - Gas (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Heat Pump (%)							
Sales of water heating units - Electric	5.64	9.97	28	32.1	32.3	32.3	32.3
Resistance (%)							
Sales of water heating units - Gas (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s -		8,123	9,222				
Cumulative 5-yr (million \$2018)							

Table 34: E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,833	11,809	11,975	9,573	9,533	13,831

Table 34: E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	0	0
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land	49.1	2,076	5,698	12,500	31,216	56,368	90,754
use assumptions (MW)							
Installed renewables - Wind - Base land	0	0	0	0	205	1,597	33,504
use assumptions (MW)							
Installed renewables - Solar -	49.1	2,280	5,511	14,111	35,911	67,096	101,794
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	0	0	0	3,031	13,398	13,398	14,643
land use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	0	0	0
Constrained land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		2.71	4.34	7.5	19.5	24.7	31.9
\$2018)							
Capital invested - Wind - Base (billion		0	0	0	0.242	1.56	33.8
\$2018)							

Table 35: E+RE+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	3,996	10,932	23,931	59,775	107,942	173,782
Wind - Base land use assumptions (GWh)	0	0	0	0	582	4,639	85,097
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	225	8,761	21,079	53,942	137,442	256,617	389,257
Wind - Constrained land use assumptions (GWh)	0	0	0	15,051	67,125	67,125	74,355
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

Table 36: E+RE+ scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-374
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-213
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-3,218
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,599
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-5,234
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-283
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,261
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-497
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,692
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-17,371
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-560
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							

Table 36: E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tC02e/y)							10 / /0
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tC02e/y)							E/./
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tC02e/y)							/ 001
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tC02e/y)							0.500
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tC02e/y)							0.057
Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tC02e/y)							00.700
Carbon sink potential - Mid - All (not							-33,702
counting overlap) (1000 tC02e/y)							7//
Carbon sink potential - High - Accelerate							-746
regeneration (1000 tCO2e/y)							1.070
Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tC02e/y)							0.070
Carbon sink potential - High - Extend							-8,378
rotation length (1000 tC02e/y)							F 100
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							45.700
Carbon sink potential - High - Increase							-15,703
retention of HWP (1000 tCO2e/y)							200
Carbon sink potential - High - Increase							-809
trees outside forests (1000 tC02e/y)							, 500
Carbon sink potential - High - Reforest							-6,522
cropland (1000 tCO2e/y)							/ 550
Carbon sink potential - High - Reforest							-6,558
pasture (1000 tC02e/y)							E0 100
Carbon sink potential - High - All (not							-50,122
counting overlap) (1000 tC02e/y)							F 010
Carbon sink potential - High - Restore							-5,019
productivity (1000 tCO2e/y)							/11
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							1/0
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							1 / 07
Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							
hectares)	+						941
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							
hectares)	+						
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							/ 0 /
Land impacted for carbon sink potential - Low - Increase trees outside forests							40.4
(1000 hectares)							01/
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							00.0
Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares)							1 007
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							
hectares)							

Table 36: E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares)							01.4
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							
hectares)							1/0
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							0.057
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000 hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							1,410
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -						+	58.6
Mid - Increase trees outside forests (1000							30.0
hectares)							
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							020
Land impacted for carbon sink potential -						+	234
Mid - Reforest pasture (1000 hectares)							20-
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							_,
hectares)							
Land impacted for carbon sink potential -							7,273
Mid - Total impacted (over 30 years) (1000							•
hectares)							
Land impacted for carbon sink potential -							122
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							173
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4,272
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,882
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							76.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							
(1000 hectares)							

Table 37: E+RE+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-172
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,250
deployment - Cropland measures (1000							
tCO2e/y)							01.0
Carbon sink potential - Moderate							-34.3
deployment - Permanent conservation							
cover (1000 tC02e/y)							0.454
Carbon sink potential - Moderate							-3,456
deployment - Total (1000 tC02e/y)							170
Carbon sink potential - Aggressive							-172
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-6,293
deployment - Cropland measures (1000							
tC02e/y)							
Carbon sink potential - Aggressive							-68.6
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-6,534
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							69.5
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							939
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,070
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							69.5
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,815
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							125
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,009
Aggressive deployment - Total (1000							
hectares)							

Table 38: E+RE- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		24.9	0.026	0.024	0.016	0.01	0.001
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		9.59	6.13	5.65	4.53	1.69	0.525
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		48.3	44.8	33.9	19.4	8.78	3.42
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		6.53	5.98	4.49	2.65	1.3	0.621
Stations (deaths)							

Table 38: E+RE- scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.69	3.79	2.53	1.42	0.718	0.359
Fuel Comb - Residential - Natural Gas							
(deaths)		0.010	0.170	0.110	0.070	0.000	0.010
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.172	0.118	0.069	0.032	0.012
Premature deaths from air pollution -		1.09	0.957	0.716	0.457	0.234	0.103
Fuel Comb - Residential - Other (deaths)		1.09	0.931	0.710	0.431	0.234	0.103
Premature deaths from air pollution -		0.942	0.898	0.85	0.798	0.747	0.692
Fuel Comb - Comm/Institutional - Coal		0.7 12	0.070	0.00	0.170	0	0.072
(deaths)							
Premature deaths from air pollution -		3.35	2.92	2.12	1.33	0.813	0.526
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.589	0.488	0.384	0.283	0.195	0.125
Fuel Comb - Comm/Institutional - Oil							
(deaths)		0.000	0.075	0.100	0.157	0.110	0.07/
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other		0.293	0.245	0.199	0.154	0.113	0.074
(deaths)							
Premature deaths from air pollution -		0.487	0.214	0.209	0.202	0.201	0.174
Industrial Processes - Coal Mining		0.401	0.214	0.207	0.202	0.201	0.114
(deaths)							
Premature deaths from air pollution -		30.1	29	28.2	23.8	19.7	14.5
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		221	0.234	0.211	0.138	0.085	0.005
Fuel Comb - Electric Generation - Coal							
(million \$2019)			51.0	504		45	
Monetary damages from air pollution -		84.9	54.3	50.1	40.1	15	4.65
Fuel Comb - Electric Generation - Natural Gas (million \$2019)							
Monetary damages from air pollution -		429	398	301	173	78.1	30.4
Mobile - On-Road (million \$2019)		427	376	301	113	10.1	30.4
Monetary damages from air pollution -		57.9	52.9	39.8	23.5	11.5	5.5
Gas Stations (million \$2019)							
Monetary damages from air pollution -		41.6	33.6	22.4	12.6	6.36	3.18
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		1.88	1.52	1.05	0.615	0.283	0.109
Fuel Comb - Residential - Oil (million							
\$2019)		0.40	0.40	. 05	, 05	0.07	0.010
Monetary damages from air pollution -		9.62	8.48	6.35	4.05	2.07	0.912
Fuel Comb - Residential - Other (million \$2019)							
Monetary damages from air pollution -		8.34	7.95	7.52	7.07	6.61	6.13
Fuel Comb - Comm/Institutional - Coal		0.54	1.75	1.02	1.01	0.01	0.10
(million \$2019)							
Monetary damages from air pollution -		29.7	25.8	18.8	11.8	7.2	4.66
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		5.21	4.32	3.4	2.5	1.73	1.1
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		2.6	2.17	1.76	1.37	0.997	0.653
Fuel Comb - Comm/Institutional - Other							
(million \$2019) Monetary damages from air pollution -		/. 0	1.89	1 0 5	170	1.77	1.54
Industrial Processes - Coal Mining		4.3	1.09	1.85	1.78	1.11	1.54
			I .				

Table 38: E+RE- scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		268	257	250	211	175	129
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 39: E+RE- scenario - IMPACTS - Jobs

Table 39: E+RE- scenario - IMPACTS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		203	1,126	1,680	1,709	1,711	1,172
By economic sector - Construction (jobs)		4,623	6,691	9,255	8,798	9,851	8,631
By economic sector - Manufacturing (jobs)		4,061	4,150	4,531	4,499	4,242	3,459
By economic sector - Mining (jobs)		4,876	4,260	3,575	2,448	1,979	1,393
By economic sector - Other (jobs)		276	302	521	857	1,169	701
By economic sector - Pipeline (jobs)		571	1,181	1,384	746	745	818
By economic sector - Professional (jobs)		2,692	3,478	4,977	5,786	6,352	4,798
By economic sector - Trade (jobs)		2,440	2,374	2,860	3,109	3,342	2,450
By economic sector - Utilities (jobs)		5,789	8,152	10,944	10,102	10,841	11,560
By resource sector - Biomass (jobs)		605	2,859	5,653	6,323	6,703	4,884
By resource sector - CO2 (jobs)		16.2	6,099	8,313	3,446	4,394	5,455
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		5,800	5,549	9,976	12,223	13,044	13,117
By resource sector - Natural Gas (jobs)		6,181	5,814	5,005	5,420	5,273	4,225
By resource sector - Nuclear (jobs)		727	715	704	693	682	1,580
By resource sector - Oil (jobs)		10,204	8,953	7,700	5,576	4,230	2,977
By resource sector - Solar (jobs)		1,235	1,308	2,076	3,890	5,511	2,465
By resource sector - Wind (jobs)		547	416	299	483	393	279
By education level - All sectors - High		10,374	13,360	17,002	16,264	17,195	14,921
school diploma or less (jobs)		,-	,	,	, -	, -	,
By education level - All sectors -		7,652	9,633	12,151	11,568	12,355	10,916
Associates degree or some college (jobs)		,	,	, -	,	,	-, -
By education level - All sectors -		5,902	6,844	8,264	7,937	8,274	7,114
Bachelors degree (jobs)			,				•
By education level - All sectors - Masters		1,412	1,652	2,026	1,990	2,092	1,781
or professional degree (jobs)							·
By education level - All sectors - Doctoral		191	225	283	294	314	251
degree (jobs)							
Related work experience - All sectors -		3,608	4,613	5,850	5,594	5,937	5,167
None (jobs)							
Related work experience - All sectors - Up		4,784	6,091	7,819	7,653	8,127	6,948
to 1 year (jobs)							
Related work experience - All sectors - 1		9,444	11,617	14,424	13,769	14,508	12,614
to 4 years (jobs)							
Related work experience - All sectors - 4		6,037	7,419	9,219	8,747	9,253	8,131
to 10 years (jobs)							
Related work experience - All sectors -		1,659	1,973	2,414	2,292	2,405	2,122
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,396	1,670	2,082	2,029	2,152	1,836
(jobs)							
On-the-Job Training - All sectors - Up to 1		17,086	21,056	26,316	25,391	26,714	23,020
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		5,262	6,625	8,298	7,800	8,301	7,387
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,546	2,069	2,673	2,497	2,706	2,429
years (jobs)							
On-the-Job Training - All sectors - Over 10		242	294	359	337	356	310
years (jobs)							
On-Site or In-Plant Training - All sectors -		4,080	5,067	6,343	6,126	6,487	5,571
None (jobs)							
On-Site or In-Plant Training - All sectors -		15,489	19,065	23,830	22,948	24,165	20,899
Up to 1 year (jobs)							

Table 39: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors -		4,105	5,148	6,445	6,079	6,457	5,720
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,657	2,169	2,766	2,577	2,773	2,481
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		201	264	342	324	349	312
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,314	1,631	2,040	1,961	2,087	1,856

Table 40: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

Table 41: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.03	2.09	3.69	3.94	2.98	3.07
Cumulative 5-yr (billion \$2018)							

Table 42: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

Table 43: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Heat Pump (%)							
Sales of space heating units - Electric	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Resistance (%)							
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric	0	12.1	64	75.6	76.1	76.1	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	16.1	3.02	0.128	0	0	0
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric	75.8	81	96.7	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Residential HVAC investment in 2020s vs.		2.27	2.78				
REF - Cumulative 5-yr (billion \$2018)							

Table 44: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	29.3	77	90.8	91.9	92	92
Heat Pump (%)							
Sales of space heating units - Electric	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Resistance (%)							
Sales of space heating units - Gas (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Heat Pump (%)							
Sales of water heating units - Electric	5.64	9.97	28	32.1	32.3	32.3	32.3
Resistance (%)							
Sales of water heating units - Gas (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s -		8,123	9,222				
Cumulative 5-yr (million \$2018)							

Table 45: E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	9,801	8,049	10,629	12,114	12,194	14,760
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,840
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	2,182	2,854	4,094	7,495	12,385	12,385
Installed renewables - Solar - Constrained land use assumptions (MW)	49.1	2,357	4,482	6,491	12,991	15,897	15,993
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	420
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0.952	0.805	1.37	3.54	4.8	0
Capital invested - Solar PV - Constrained (billion \$2018)		3.09	2.54	2.21	6.75	2.85	0.089
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	0.445

Table 46: E+RE- scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	1,477	2,771	5,143	11,643	20,968	20,968
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	112	4,533	8,599	12,450	24,940	30,501	30,686
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	1,052
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

Table 47: E+RE- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-374
regeneration (1000 tCO2e/y)							

Table 47: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend							-3,218
rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve	+						-2,599
plantations (1000 tCO2e/y)							-2,377
Carbon sink potential - Low - Increase	+						-5,234
retention of HWP (1000 tCO2e/y)							-0,204
Carbon sink potential - Low - Increase							-283
trees outside forests (1000 tC02e/y)							200
Carbon sink potential - Low - Reforest	+						-3,261
cropland (1000 tCO2e/y)							0,201
Carbon sink potential - Low - Reforest							-497
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,692
productivity (1000 tCO2e/y)							,-
Carbon sink potential - Low - All (not							-17,371
counting overlap) (1000 tCO2e/y)							·
Carbon sink potential - Mid - Accelerate							-560
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-33,702
counting overlap) (1000 tCO2e/y)							7 , ,
Carbon sink potential - High - Accelerate							-746
regeneration (1000 tC02e/y)							1.070
Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tCO2e/y) Carbon sink potential - High - Extend							-8,378
rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase							-15,703
retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase							-809
trees outside forests (1000 tC02e/y)							-007
Carbon sink potential - High - Reforest							-6,522
cropland (1000 tC02e/y)							-0,322
Carbon sink potential - High - Reforest							-6,558
pasture (1000 tC02e/y)							0,000
Carbon sink potential - High - All (not	+						-50,122
counting overlap) (1000 tCO2e/y)							00,122
Carbon sink potential - High - Restore	+						-5,019
productivity (1000 tC02e/y)							0,017
Land impacted for carbon sink potential -	+						61.1
Low - Accelerate regeneration (1000							01.1
hectares)							

Table 47: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050 162
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000							1,637
hectares) Land impacted for carbon sink potential - Low - Improve plantations (1000							941
hectares) Land impacted for carbon sink potential - Low - Increase retention of HWP (1000							0
hectares) Land impacted for carbon sink potential - Low - Increase trees outside forests							40.4
(1000 hectares) Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000							1,007
hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years)							4,096
(1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000							91.6
hectares) Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years)							168
(1000 hectares) Land impacted for carbon sink potential - Mid - Extend rotation length (1000							2,954
hectares) Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares) Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000							0
hectares) Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000							58.6
hectares) Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000							2,027
hectares) Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272

Table 47: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							1,882
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							76.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							
(1000 hectares)							

Table 48: E+RE- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-172
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,250
deployment - Cropland measures (1000							
tCO2e/y)							0/ 0
Carbon sink potential - Moderate							-34.3
deployment - Permanent conservation cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,456
deployment - Total (1000 tCO2e/y)							-3,430
Carbon sink potential - Aggressive							-172
deployment - Corn-ethanol to energy							-112
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive		+					-6,293
deployment - Cropland measures (1000							0,270
tCO2e/y)							
Carbon sink potential - Aggressive							-68.6
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-6,534
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							69.5
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							939
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.4
deployment - Permanent conservation							
cover (1000 hectares)							1.070
Land impacted for carbon sink - Moderate							1,070
deployment - Total (1000 hectares) Land impacted for carbon sink -							69.5
Aggressive deployment - Corn-ethanol to							09.5
energy grasses (1000 hectares)							
eriei gy gi asses (1000 lieutai es)							

Table 48: E+RE- scenario - PILLAR 6: Land sinks - Agriculture (continued)

lable 48: E+RE- scenario - PILLAR 6: Land							
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							1,815
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							125
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,009
Aggressive deployment - Total (1000							
hectares)							
			·	·	·		
able 49: E-B+ scenario - IMPACTS - Health)						
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		24.9	0.026	0.024	0.016	0.01	0.00
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		10.3	6.12	3.09	1.95	0.99	0.438
Fuel Comb - Electric Generation - Natural		10.5	0.12	3.07	1.75	0.77	0.430
Gas (deaths)			400	177	(0.0	00.0	00
Premature deaths from air pollution -		49	49.2	47.7	42.8	33.9	23.
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		6.67	6.69	6.42	5.73	4.53	3.13
Stations (deaths)							
Premature deaths from air pollution -		4.73	4.24	3.71	3.04	2.27	1.5
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.217	0.205	0.193	0.17	0.132	0.09
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.1	1.08	1.05	0.945	0.741	0.52
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.942	0.898	0.85	0.798	0.747	0.692
Fuel Comb - Comm/Institutional - Coal		0.742	0.070	0.03	0.170	0.141	0.07
(deaths)		0.00	0.00	0.15	0.77	0.01	1./
Premature deaths from air pollution -		3.38	3.32	3.15	2.77	2.21	1.64
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.59	0.535	0.482	0.417	0.346	0.278
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.293	0.263	0.233	0.204	0.176	0.1
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.537	0.215	0.212	0.207	0.206	0.19
Industrial Processes - Coal Mining			0.2.0	512.12		0.20	
(deaths)							
Premature deaths from air pollution -		29.7	26.7	23	19.9	17.5	12.
Industrial Processes - Oil & Gas		27.1	20.1	20	17.7	11.0	12.
Production (deaths)							
		001	0.007	0.011	0.100	0.005	0.00
Monetary damages from air pollution -		221	0.234	0.211	0.138	0.085	0.00
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		91.1	54.2	27.4	17.2	8.77	3.8
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		436	438	424	380	301	20
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		59.1	59.2	56.9	50.7	40.2	27.
Gas Stations (million \$2019)		27		55.7			
Monetary damages from air pollution -		41.9	37.6	32.9	26.9	20.1	13.0
Fuel Comb - Residential - Natural Gas		41.7	31.0	32.7	20.7	20.1	13.
(million \$2010)							

(million \$2019)

Table 49: E-B+ scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.92	1.82	1.71	1.51	1.17	0.828
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.75	9.61	9.33	8.38	6.57	4.62
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		29.9	29.4	27.9	24.5	19.6	14.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		5.23	4.73	4.27	3.69	3.06	2.46
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.6	2.33	2.06	1.81	1.56	1.33
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		4.74	1.9	1.87	1.83	1.81	1.75
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		264	237	204	177	155	108

Table 50: E-B+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		201	1,320	1,223	1,792	1,805	1,598
By economic sector - Construction (jobs)		5,228	7,252	9,825	10,499	12,251	16,027
By economic sector - Manufacturing		4,440	5,199	5,241	5,370	5,769	6,038
(jobs)							
By economic sector - Mining (jobs)		4,846	4,151	3,480	2,774	2,361	1,450
By economic sector - Other (jobs)		391	459	885	1,444	1,927	3,104
By economic sector - Pipeline (jobs)		553	1,076	1,223	653	659	705
By economic sector - Professional (jobs)		2,967	4,043	4,809	7,185	8,347	9,438
By economic sector - Trade (jobs)		2,608	2,628	3,120	4,126	4,683	5,580
By economic sector - Utilities (jobs)		6,131	8,185	9,858	9,491	10,811	12,998
By resource sector - Biomass (jobs)		647	3,513	4,036	7,433	8,350	7,554
By resource sector - CO2 (jobs)		15.2	5,481	7,513	3,169	4,030	4,915
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		6,357	6,937	9,079	12,372	15,061	19,978
By resource sector - Natural Gas (jobs)		6,223	4,835	3,987	3,798	3,149	1,775
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,239	9,126	8,155	7,198	6,115	3,811
By resource sector - Solar (jobs)		2,158	2,610	5,170	8,040	10,421	16,910
By resource sector - Wind (jobs)		780	1,096	1,018	631	806	1,323
By education level - All sectors - High		11,163	14,546	16,950	18,494	20,720	24,394
school diploma or less (jobs)							
By education level - All sectors -		8,244	10,364	12,213	13,043	14,780	17,749
Associates degree or some college (jobs)							
By education level - All sectors -		6,254	7,373	8,226	9,140	10,141	11,439
Bachelors degree (jobs)							
By education level - All sectors - Masters		1,497	1,782	1,994	2,301	2,572	2,908
or professional degree (jobs)							
By education level - All sectors - Doctoral		204	247	279	357	402	448
degree (jobs)							
Related work experience - All sectors -		3,873	4,979	5,806	6,333	7,120	8,389
None (jobs)							

Table 50: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - Up to 1 year (jobs)		5,170	6,718	7,842	8,852	9,975	11,757
Related work experience - All sectors - 1 to 4 years (jobs)		10,091	12,528	14,376	15,649	17,499	20,386
Related work experience - All sectors - 4 to 10 years (jobs)		6,459	7,960	9,212	9,901	11,114	13,032
Related work experience - All sectors - Over 10 years (jobs)		1,771	2,129	2,428	2,599	2,906	3,375
On-the-Job Training - All sectors - None (jobs)		1,497	1,821	2,108	2,380	2,678	3,139
On-the-Job Training - All sectors - Up to 1 year (jobs)		18,284	22,918	26,219	29,045	32,473	37,612
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,650	7,077	8,306	8,740	9,854	11,780
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,670	2,177	2,656	2,777	3,169	3,884
On-the-Job Training - All sectors - Over 10 years (jobs)		261	320	373	392	440	523
On-Site or In-Plant Training - All sectors - None (jobs)		4,383	5,518	6,359	7,045	7,905	9,256
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,576	20,716	23,763	26,220	29,341	34,081
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,406	5,517	6,458	6,837	7,699	9,174
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,781	2,280	2,745	2,873	3,259	3,932
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		217	282	339	360	411	496
Wage income - All (million \$2019)		1,397	1,747	2,015	2,212	2,497	2,910

Table 51: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	351	326	298	275	258	238	214
Final energy use - Residential (PJ)	99.2	93.3	89.2	84.7	79.1	73.1	68.2
Final energy use - Commercial (PJ)	70.6	70.8	69.9	68.7	66.7	64.8	63.6
Final energy use - Industry (PJ)	201	207	209	208	209	207	206

Table 52: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.69	1.71	2.12	2.18	3.13	3.3
Cumulative 5-yr (billion \$2018)							

Table 53: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2.87	52.7	102	333	564	1,075	1,585
Vehicle stocks - LDV – All others (1000 units)	2,072	2,072	2,072	1,966	1,859	1,433	1,006
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	63.7	135	456	1,438	2,094
Public EV charging plugs - DC Fast (1000 units)	0.053		0.263		1.45		4.06
Public EV charging plugs - L2 (1000 units)	0.175		6.32		34.8		97.8

Table 54: E-B+ scenario	- PTI I AR 1. Efficiency	//Flectrification .	- Residential
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Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	29.5	38.3	42.3	54.1	71.8	83.3	87.2
Heat Pump (%)							
Sales of space heating units - Electric	28.6	30.1	28.3	23	15.1	10.1	8.37
Resistance (%)							
Sales of space heating units - Gas (%)	30.2	18.6	17.3	13.8	8.07	4.19	2.84
Sales of space heating units - Fossil (%)	11.7	12.9	12.1	9.17	5.03	2.44	1.57
Sales of water heating units - Electric	0	2.08	7.99	25	51.1	68.1	74
Heat Pump (%)							
Sales of water heating units - Electric	67.2	76.8	72.5	59.6	40.1	27.4	23
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	18.6	17	12.9	6.35	2.02	0.528
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.51	2.49	2.49
Sales of cooking units - Electric	75.7	76.4	78.6	84.4	92.6	97.6	99.4
Resistance (%)							
Sales of cooking units - Gas (%)	24.3	23.6	21.4	15.6	7.42	2.39	0.644
Residential HVAC investment in 2020s vs.		2.25	2.65				
REF - Cumulative 5-yr (billion \$2018)							

Table 55: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	20.2	25.6	41.4	66.1	83.2	89.6
Heat Pump (%)							
Sales of space heating units - Electric	4.72	4.61	4.65	4.77	5.23	5.91	6.33
Resistance (%)							
Sales of space heating units - Gas (%)	85.8	71.8	66.6	51.4	27.5	10.5	3.93
Sales of space heating units - Fossil (%)	0	3.34	3.16	2.39	1.19	0.387	0.102
Sales of water heating units - Electric	0.153	1.96	7.08	21.8	44.4	59.2	64.3
Heat Pump (%)							
Sales of water heating units - Electric	5.64	6.47	8.38	14.4	23.5	29.5	31.6
Resistance (%)							
Sales of water heating units - Gas (%)	92.7	90	83	62.2	30.5	9.74	2.53
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	47.1	51.3	61.6	76.1	85	88
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Commercial HVAC investment in 2020s -		8,119	9,209				
Cumulative 5-yr (million \$2018)							

Table 56: E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	514	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,425	10,510	9,315	7,770	4,599	5,086
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	10.1	11.5	24	0	0

Table 57: 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 power plant (GWh)	0	0	11,378	24,305	51,189	51,189	51,189
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

Table 58: E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	9	19	40	40	40
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	5	5
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment -		0	9,299	10,565	21,971	4,675	0
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	701	1,498	3,156	3,563	3,563

Table 59: E-B+ scenario - PILLAR 4: CCUS - CO2 capture

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	11.3	24.1	50.7	56.7	57
Annual - BECCS (MMT)		0	11.3	24	50.6	56.7	56.5
Annual - NGCC (MMT)		0	0	0.1	0.08	0.07	0.56
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	11.3	35.4	86.1	143	200
Cumulative - BECCS (MMT)		0	11.3	35.3	86	143	199
Cumulative - NGCC (MMT)		0	0	0.1	0.18	0.25	0.81
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

Table 60: E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	487	973	1,214	1,214	1,214
Spur (km)		0	350	822	1,958	2,566	2,471
All (km)		0	837	1,795	3,172	3,780	3,685
Cumulative investment - Trunk (million \$2018)		0	3,096	6,192	8,002	8,002	8,002
Cumulative investment - Spur (million \$2018)		0	434	909	2,297	2,923	2,787
Cumulative investment - All (million \$2018)		0	3,530	7,100	10,298	10,924	10,789

Table 61: E-B+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	7.39	36.4	71.3	98.5	104
Injection wells (wells)		0	8	34	60	100	124
Resource characterization, appraisal, permitting costs (million \$2020)		32.8	810	1,299	1,299	1,299	1,299
Wells and facilities construction costs (million \$2020)		0	257	1,000	1,782	2,980	3,700

Table 62: E-B+ scenario - PILLAR 6: Land sinks - Forests

Iable 62: E-B+ scenario - PILLAR 6: Land s Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate	2020	2023	2030	2000	2040	2040	-374
regeneration (1000 tC02e/y)							01-
Carbon sink potential - Low - Avoid							-213
deforestation (1000 tCO2e/y)							-210
Carbon sink potential - Low - Extend							-3,218
rotation length (1000 tCO2e/y)							-5,210
Carbon sink potential - Low - Improve							-2,599
plantations (1000 tCO2e/y)							-2,377
							-5,234
Carbon sink potential - Low - Increase							-5,234
retention of HWP (1000 tC02e/y)							000
Carbon sink potential - Low - Increase							-283
trees outside forests (1000 tC02e/y)							0.0/1
Carbon sink potential - Low - Reforest							-3,261
cropland (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							-497
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,692
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-17,371
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-560
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tCO2e/y)							-,
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tCO2e/y)							,
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tC02e/y)							0-10
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tCO2e/y)							4,071
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tC02e/y)							-3,320
Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tCO2e/y)							-3,330
Carbon sink potential - Mid - All (not							-33,702
							-33,102
counting overlap) (1000 tCO2e/y) Carbon sink potential - High - Accelerate							-746
							-740
regeneration (1000 tC02e/y)							1.070
Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tCO2e/y)							0.070
Carbon sink potential - High - Extend							-8,378
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-15,703
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-809
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-6,522
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-6,558
pasture (1000 tC02e/y)							
Carbon sink potential - High - All (not							-50,122
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - High - Restore							-5,019
oai boli silik potelitiai - riigii - Restoi e							

Table 62: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Extend rotation length (1000							1,637
hectares)							
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							7-71
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							
hectares)							/ 00/
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							71.0
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000							
hectares) Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							2,021
hectares)							
Land impacted for carbon sink potential -							7,273
Mid - Total impacted (over 30 years) (1000							, -
hectares)							
Land impacted for carbon sink potential -							122
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							173
High - Avoid deforestation (over 30 years)							
(1000 hectares)							

Table 62: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							4,272
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,882
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							76.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							
(1000 hectares)							

Table 63: E-B+ scenario - PILLAR 6: Land sinks - Agriculture

2020	2025	2030	2035	2040	2045	2050
						-637
						-2,929
						-29.1
						0
						0
						_
						-3,594
						-,-
					+	-637
					+	-5,685
						-,
						-58.1
						-
					+	0
						·
						0
						Ū
						-6,380
						0,000
	2020	2020 2025	2020 2025 2030	2020 2025 2030 2035	2020 2025 2030 2035 2040	2020 2025 2030 2035 2040 2045

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							257
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							848
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							52.9
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							119
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							265
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							1,542
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							257
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							4,057
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							106
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							119
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							265
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							4,803
Aggressive deployment - Total (1000							
hectares)							
Table 64: <i>REF scenario - IMPACTS - Health</i> Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air nollution -		107	71.4	487	39.3	35.9	35.6

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		107	71.4	48.7	39.3	35.9	35.6
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		10.7	11.3	11.9	11.4	11.6	12
Premature deaths from air pollution - Mobile - On-Road (deaths)		49	49.9	50.9	52	53.2	54.3
Premature deaths from air pollution - Gas Stations (deaths)		6.65	6.75	6.82	6.94	7.04	7.12
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.65	4.16	3.73	3.46	3.33	3.23
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.181	0.134	0.09	0.057	0.038
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.03	0.978	0.946	0.933	0.923	0.907
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.984	0.983	0.975	0.964	0.951	0.933

Table 64: REF scenario - IMPACTS - Health (continued)

Tuble 64. KET beenand Introde Treatme	-					
Item	2020 2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -	3.39	3.26	2.96	2.65	2.52	2.58
Fuel Comb - Comm/Institutional - Natural						
Gas (deaths)						
Premature deaths from air pollution -	0.613	0.611	0.598	0.574	0.554	0.543
Fuel Comb - Comm/Institutional - Oil						
(deaths)						
Premature deaths from air pollution -	0.307	0.312	0.317	0.322	0.326	0.331
Fuel Comb - Comm/Institutional - Other						
(deaths)						
Premature deaths from air pollution -	1.15	0.795	0.641	0.602	0.576	0.534
Industrial Processes - Coal Mining						
(deaths)						
Premature deaths from air pollution -	29.9	31.4	31.9	30.4	30	28
Industrial Processes - Oil & Gas						
Production (deaths)						
Monetary damages from air pollution -	950	633	432	349	318	316
Fuel Comb - Electric Generation - Coal						
(million \$2019)						
Monetary damages from air pollution -	94.8	100	105	101	103	106
Fuel Comb - Electric Generation - Natural						
Gas (million \$2019)						
Monetary damages from air pollution -	436	444	452	463	473	483
Mobile - On-Road (million \$2019)						
Monetary damages from air pollution -	58.8	59.7	60.4	61.5	62.4	63.1
Gas Stations (million \$2019)						
Monetary damages from air pollution -	41.2	36.9	33.1	30.6	29.5	28.6
Fuel Comb - Residential - Natural Gas						
(million \$2019)						
Monetary damages from air pollution -	1.88	1.6	1.19	0.8	0.503	0.333
Fuel Comb - Residential - Oil (million						
\$2019)						
Monetary damages from air pollution -	9.13	8.67	8.38	8.27	8.18	8.04
Fuel Comb - Residential - Other (million						
\$2019)						
Monetary damages from air pollution -	8.71	8.7	8.64	8.54	8.42	8.26
Fuel Comb - Comm/Institutional - Coal						
(million \$2019)						
Monetary damages from air pollution -	30	28.9	26.2	23.4	22.3	22.8
Fuel Comb - Comm/Institutional - Natural						
Gas (million \$2019)						
Monetary damages from air pollution -	5.43	5.4	5.29	5.08	4.9	4.81
Fuel Comb - Comm/Institutional - Oil						
(million \$2019)						
Monetary damages from air pollution -	2.71	2.76	2.81	2.85	2.89	2.93
Fuel Comb - Comm/Institutional - Other						
(million \$2019)						
Monetary damages from air pollution -	10.1	7.02	5.65	5.31	5.08	4.72
Industrial Processes - Coal Mining						
(million \$2019)						
Monetary damages from air pollution -	265	278	284	270	267	248
Industrial Processes - Oil & Gas						•
Production (million \$2019)						

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		195	184	183	166	166	173
By economic sector - Construction (jobs)		4,454	4,695	5,105	5,618	6,498	6,754
By economic sector - Manufacturing		3,348	3,517	3,595	3,679	3,602	3,544
(jobs)							
By economic sector - Mining (jobs)		4,911	4,120	3,436	2,774	2,300	1,790

Table 65: REF scenario - IMPACTS - Jobs (continued)

Table 65. REF SCEITUTTO - IMPACTS - JUDS (C	Jontinueuj						
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		192	204	248	413	587	491
By economic sector - Pipeline (jobs)		569	598	610	577	582	570
By economic sector - Professional (jobs)		2,731	2,610	2,631	2,794	3,082	2,941
By economic sector - Trade (jobs)		2,465	2,280	2,192	2,223	2,373	2,196
By economic sector - Utilities (jobs)		6,477	6,539	6,941	7,105	7,961	8,941
By resource sector - Biomass (jobs)		613	581	550	508	511	512
By resource sector - CO2 (jobs)		0	0.053	0.068	0.073	0.08	0.086
By resource sector - Coal (jobs)		352	192	182	65.7	0	0
By resource sector - Grid (jobs)		6,864	7,292	7,969	7,561	8,740	11,447
By resource sector - Natural Gas (jobs)		6,475	6,398	6,525	7,054	7,639	7,053
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,286	9,235	8,375	7,608	7,012	6,111
By resource sector - Solar (jobs)			183	450	1,479	2,328	1,441
By resource sector - Wind (jobs)		25.6	152	187	380	239	163
By education level - All sectors - High		10,231	10,108	10,284	10,506	11,328	11,558
school diploma or less (jobs)		,	,	,	10,000	,	,
By education level - All sectors -		7,609	7,497	7,638	7,852	8,509	8,661
Associates degree or some college (jobs)		1,007	., ., .	1,000	1,002	0,007	0,00.
By education level - All sectors -		5,889	5,617	5,522	5,496	5,745	5,648
Bachelors degree (jobs)		0,007	0,011	0,022	5,476	0,140	0,040
By education level - All sectors - Masters		1,421	1,348	1,323	1,318	1,384	1,358
or professional degree (jobs)		1,421	1,540	1,020	1,510	1,504	1,550
By education level - All sectors - Doctoral		191	179	175	176	185	175
degree (jobs)		171	117	113	110	100	113
Related work experience - All sectors -		3,591	3,525	3,576	3,656	3,946	4,007
		3,391	3,525	3,376	3,000	3,946	4,007
None (jobs) Related work experience - All sectors - Up		4,683	4,600	4,658	4,765	5,132	5,198
· · · · · · · · · · · · · · · · · · ·		4,663	4,600	4,000	4,765	5,132	5,196
to 1 year (jobs)		0 / 00	0.150	0.000	0.017	00//	10.000
Related work experience - All sectors - 1		9,408	9,159	9,202	9,316	9,946	10,009
to 4 years (jobs)		(010	5.040	F 000	(001	((00	(/70
Related work experience - All sectors - 4		6,019	5,868	5,908	6,001	6,423	6,472
to 10 years (jobs)		1 (/ 1	1.507	1.500	1 (10	170/	1710
Related work experience - All sectors -		1,641	1,596	1,598	1,610	1,704	1,713
Over 10 years (jobs)		1.07/	1.007	1.017	1.000	1 / 00	1/0/
On-the-Job Training - All sectors - None		1,376	1,324	1,316	1,333	1,420	1,406
(jobs)		11011		11.500	44.50		
On-the-Job Training - All sectors - Up to 1		16,916	16,472	16,532	16,727	17,817	17,923
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		5,252	5,165	5,252	5,374	5,808	5,912
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,567	1,559	1,612	1,679	1,857	1,910
years (jobs)							
On-the-Job Training - All sectors - Over 10		232	228	229	235	251	248
years (jobs)							
On-Site or In-Plant Training - All sectors -		4,022	3,904	3,916	3,987	4,261	4,256
None (jobs)							
On-Site or In-Plant Training - All sectors -		15,352	14,961	15,028	15,210	16,219	16,344
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		4,090	4,022	4,086	4,175	4,505	4,583
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,676	1,659	1,703	1,759	1,927	1,970
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		202	202	210	218	239	247
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,314	1,293	1,312	1,338	1,441	1,469
			,	•	•	,	<u> </u>

Table 66: REF scenario - PILLAR 1: Efficiency/Electrification - Overview

••							
Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	326	299	283	283	291	302

Table 66: REF scenario - PILLAR 1: Efficiency/Electrification - Overview (continued)

•••			•	•			
Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	99.2	93.5	91	89.7	89.7	90.9	92.4
Final energy use - Commercial (PJ)	70.6	71.9	72.2	72.2	72.8	74.9	78.5
Final energy use - Industry (PJ)	201	210	218	222	228	232	238

Table 67: REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.32	2.41	3.75	3.99	3.1	3.21
Cumulative 5-yr (billion \$2018)							

Table 68: REF scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	26.6	55.5	56.3	57.6	58.8	60.4	62.7
Heat Pump (%)							
Sales of space heating units - Electric	29.8	23.9	23.5	22.8	21.8	20.4	18
Resistance (%)							
Sales of space heating units - Gas (%)	31.4	13.8	13.3	12.9	12.8	12.7	12.7
Sales of space heating units - Fossil (%)	12.2	6.81	6.91	6.74	6.58	6.52	6.54
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	67.2	78.4	78.5	78.3	78.1	78.1	78
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	19.2	19	19.2	19.4	19.4	19.5
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.52	2.51	2.52
Sales of cooking units - Electric	75.5	75.5	75.5	75.5	75.5	75.5	75.5
Resistance (%)							
Sales of cooking units - Gas (%)	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Residential HVAC investment in 2020s vs.		2.2	2.3				
REF - Cumulative 5-yr (billion \$2018)							

Table 69: REF scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	31.9	71.2	79	79.3	79.4	79.4
Heat Pump (%)							
Sales of space heating units - Electric	4.72	6.4	12	15.8	18.7	19.2	19.2
Resistance (%)							
Sales of space heating units - Gas (%)	85.8	59	16.4	5.24	1.95	1.48	1.43
Sales of space heating units - Fossil (%)	0	2.67	0.47	0.024	0	0	0
Sales of water heating units - Electric	0.153	0.153	0.147	0.149	0.149	0.145	0.148
Heat Pump (%)							
Sales of water heating units - Electric	5.64	5.74	5.58	5.66	5.62	5.55	5.6
Resistance (%)							
Sales of water heating units - Gas (%)	92.7	92.5	92.7	92.6	92.7	92.7	92.7
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	45.6	45.9	45.7	46	45.9	45.7
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	54.4	54.1	54.3	54	54.1	54.3
Commercial HVAC investment in 2020s -		7,974	8,300				
Cumulative 5-yr (million \$2018)							

Table 70: REF scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	514	514	514	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,833	12,981	12,256	11,003	15,039	21,477
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146

Table 70: REF scenario - PILLAR 2: Clean Electricity - Generating capacity (continued)

	•						
Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Solar - Base land	49.1	49.1	49.1	347	1,971	4,007	4,940
use assumptions (MW)							

Table 71: REF scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	112	112	315	3,278	7,193	8,028
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							

Table 72: REF scenario - PILLAR 6: Land sinks - Forests - REF only

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural	-32.9		-14.9				-12.1
uptake (Mt CO2e/y)							
Business-as-usual carbon sink - Retained	-4.27		-7.13				-7.5
in Hardwood Products (Mt CO2e/y)							
Business-as-usual carbon sink - Total (Mt	-37.1		-22				-19.6
CO2e/y)							

Table 73: REF scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-374
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-213
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-3,218
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,599
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-5,234
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-283
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,261
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-497
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,692
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-17,371
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-560
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tCO2e/y)							

Table 73: REF scenario - PILLAR 6: Land sinks - Forests (continued)

			-3,356 -33,702
			00.700
			-33,102
			-746
			-140
			-1,278
			-1,210
			-8,378
			-0,510
			-5,109
			-3,107
			-15,703
			-15,703
			000
			-809
			4 500
			-6,522
			-6,558
			-50,122
			-5,019
			61.1
			162
			1,637
			941
			0
			40.4
			216
			32.3
			02.0
		+	1,007
			1,001
			4,096
			-1,0 70
		+	91.6
			71.0
			168
			108
			0.057
			2,954

Table 73: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807