

Net-Zero America - Missouri data

October 29, 2021 (updated January 9, 2022)

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:

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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	62.8	0.052	0.05	0.042	0.028	0.001
Fuel Comb - Electric Generation - Coal (deaths)		02.0	5.552	0.00	J.U-12	5.020	3.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural		23.4	12.4	6.2	4.87	2.59	1.25
Gas (deaths) Premature deaths from air pollution -		146	136	103	59.5	27.6	11.6
Mobile - On-Road (deaths) Premature deaths from air pollution - Gas		11.4	10.5	7.88	4.68	2.33	1.16
Stations (deaths) Premature deaths from air pollution -		22.2	17.8	11.6	6.23	2.82	1.1
Fuel Comb - Residential - Natural Gas (deaths)		0.5/5	0.770	0.215	0.100	0.007	0.0/.5
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.545	0.448	0.315	0.193	0.096	0.045
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		4.05	3.67	2.81	1.81	0.904	0.365
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		5.84	5.59	5.32	5.02	4.72	4.41
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		16.2	13.9	10.2	6.49	3.84	2.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.97	1.63	1.28	0.946	0.657	0.418
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.38	1.15	0.937	0.728	0.531	0.348
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.81	1.72	1.7	1.67	1.68	1.66
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		94	88.3	80.3	62.4	46.2	28.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		556	0.465	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		207	110	54.9	43.2	22.9	11.1
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,300	1,208	916	529	246	103
Monetary damages from air pollution - Gas Stations (million \$2019)		101	92.6	69.7	41.5	20.6	10.3
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		197	158	103	55.2	25	9.74
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4.83	3.97	2.79	1.71	0.849	0.394
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		35.9	32.5	24.9	16	8.01	3.23
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		51.7	49.5	47.1	44.5	41.8	39
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		144	123	90.6	57.5	34	19.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		17.5	14.4	11.3	8.38	5.81	3.7
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		12.2	10.2	8.29	6.44	4.7	3.08
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		24.8	15.2	15	14.8	14.9	14.6
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		835	784	713	554	411	254
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)		441	449	431	366	303	742
By economic sector - Construction (jobs)		14,888	16,430	24,010	31,112	25,367	25,647
By economic sector - Manufacturing (jobs)		3,126	3,542	4,437	5,025	4,625	5,280
By economic sector - Mining (jobs)		2,224	1,584	1,073	699	468	322
By economic sector - Other (jobs)		2,200	2,498	4,326	6,039	4,537	4,605
By economic sector - Pipeline (jobs)		404	504	279	221	179	217
By economic sector - Professional (jobs)		6,373	6,870	10,528	14,280	12,423	13,840
By economic sector - Trade (jobs)		4,817	4,937	7,159	9,484	7,994	8,604
By economic sector - Utilities (jobs)		8,787	10,795	15,278	21,439	21,466	22,993
By resource sector - Biomass (jobs)		1,042	1,028	963	946	1,127	3,240
By resource sector - CO2 (jobs)		14.7	1,318	91.3	194	438	1,118
By resource sector - Coal (jobs)		1,495	345	151	132	119	105
By resource sector - Grid (jobs)		12,320	17,375	28,156	40,662	42,700	45,353
By resource sector - Natural Gas (jobs)		3,513	2,388	2,008	2,340	1,045	799
By resource sector - Nuclear (jobs)		624	614	604	350	0	0
By resource sector - Oil (jobs)		5,419	4,356	3,168	2,195	1,500	1,003
By resource sector - Solar (jobs)		15,499	16,130	26,727	34,639	22,327	20,589
By resource sector - Wind (jobs)		3,334	4,056	5,651	7,206	8,109	10,043
By education level - All sectors - High school diploma or less (jobs)		18,642	20,560	29,045	37,859	32,813	34,765
By education level - All sectors - Associates degree or some college (jobs)		13,577	15,114	21,655	28,699	25,117	26,570
By education level - All sectors - Bachelors degree (jobs)		8,583	9,276	13,014	17,066	15,008	16,120
By education level - All sectors - Masters or professional degree (jobs)		2,130	2,312	3,301	4,374	3,858	4,173
By education level - All sectors - Doctoral degree (jobs)		328	347	504	665	568	621
Related work experience - All sectors - None (jobs)		6,304	6,974	9,898	13,028	11,370	12,092
Related work experience - All sectors - Up to 1 year (jobs)		8,929	9,800	13,931	18,117	15,578	16,581
Related work experience - All sectors - 1 to 4 years (jobs)		15,449	16,981	24,069	31,689	27,762	29,528
Related work experience - All sectors - 4 to 10 years (jobs)		10,013	11,029	15,637	20,605	18,056	19,160
Related work experience - All sectors - Over 10 years (jobs)		2,566	2,826	3,985	5,225	4,598	4,888
On-the-Job Training - All sectors - None (jobs)		2,429	2,633	3,743	4,883	4,176	4,434
On-the-Job Training - All sectors - Up to 1 year (jobs)		28,131	30,849	43,596	57,089	49,894	53,296

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)		9,156	10,180	14,513	19,187	16,798	17,718
On-the-Job Training - All sectors - 4 to 10 years (jobs)		3,117	3,484	5,014	6,666	5,793	6,067
On-the-Job Training - All sectors - Over 10 years (jobs)		427	464	653	839	703	734
On-Site or In-Plant Training - All sectors - None (jobs)		7,031	7,692	10,946	14,357	12,413	13,221
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		25,609	28,114	39,745	52,067	45,519	48,552
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		7,104	7,888	11,233	14,826	12,969	13,688
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		3,140	3,491	4,988	6,606	5,748	6,033
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		377	424	608	808	713	755
Wage income - All (million \$2019)		2,345	2,610	3,732	4,970	4,424	4,767

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		121	106	83.7	62.4	45.6	32.5
Oil consumption - Cumulative (million							2,577
bbls)							
Oil production - Annual (million bbls)		0.117	0.117	0.117	0.093	0.075	0.05
Natural gas consumption - Annual (tcf)		249	210	169	127	79.8	55.4
Natural gas consumption - Cumulative							5,077
(tcf)							
Natural gas production - Annual (tcf)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	669	623	550	461	380	331	311
Final energy use - Residential (PJ)	241	227	206	178	155	141	134
Final energy use - Commercial (PJ)	182	178	169	158	147	141	138
Final energy use - Industry (PJ)	241	249	271	274	290	326	330

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.82	3.92	6.23	6.6	6.19	6.47
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)	30.1	479	928	2,500	4,071	5,327	6,583
Vehicle stocks - LDV – All others (1000 units)	5,489	5,226	4,964	3,618	2,271	1,285	299
Light-duty vehicle capital costs vs. REF -		1.055	2,704	4,381	6,637	7.223	6,887
Cumulative 5-yr (million \$2018)		1,000	2,104	4,501	0,031	1,223	0,001
Public EV charging plugs - DC Fast (1000	0.178		1.98		8.67		14
units)							
Public EV charging plugs - L2 (1000 units)	1.67		47.5		208		337

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	7.5	22.5	72.3	86.1	87.5	87.8	87.4
Heat Pump (%)							
Sales of space heating units - Electric	19.7	22.4	10	6.61	6.36	6.55	6.72
Resistance (%)							
Sales of space heating units - Gas (%)	63.5	41.4	10.2	1.69	1.08	1.04	1.02
Sales of space heating units - Fossil (%)	9.34	13.6	7.39	5.58	5.03	4.63	4.86
Sales of water heating units - Electric	0	8.7	46.5	56.1	56.7	56.7	56.7
Heat Pump (%)							
Sales of water heating units - Electric	42.5	55.5	45.3	43.3	43.3	43.3	43.3
Resistance (%)							
Sales of water heating units - Gas Furnace	57.4	35.7	8.23	0.581	0.019	0	0
(%)							
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.035	0.035	0.036	0.036
Sales of cooking units - Electric	76.5	81.5	96.8	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	23.5	18.5	3.16	0.159	0	0	0
Residential HVAC investment in 2020s vs.		5.85	7.79				
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	4.52	24.4	70.6	87.7	89.7	89.7	89.7
Heat Pump (%)							
Sales of space heating units - Electric	8.06	5.73	7.1	9.32	9.79	9.8	9.8
Resistance (%)							
Sales of space heating units - Gas Furnace	87.4	68.1	22	2.94	0.553	0.458	0.459
(%)							
Sales of space heating units - Fossil (%)	0	1.75	0.337	0.014	0	0	0
Sales of water heating units - Electric	1.19	10.6	53.1	64.2	65	65	65
Heat Pump (%)							
Sales of water heating units - Electric	10.1	11	28.4	33.8	34.3	34.3	34.3
Resistance (%)							
Sales of water heating units - Gas Furnace	87.7	77.5	17.8	1.26	0.041	0	0
(%)							
Sales of water heating units - Other (%)	0.996	0.947	0.735	0.688	0.685	0.688	0.687
Sales of cooking units - Electric	44.8	57.1	84	89.3	89.6	89.6	89.6
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Commercial HVAC investment in 2020s -		16,269	17,611				
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)	7,000	1,299	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,692	4,262	4,288	3,916	2,586	2,383	2,172
Installed thermal - Nuclear (MW)	1,236	1,236	1,236	1,236	0	0	0
Installed renewables - Rooftop PV (MW)	153	269	400	605	898	1,277	1,767
Installed renewables - Solar - Base land	33.6	9,863	18,696	35,534	55,733	61,382	63,727
use assumptions (MW)							
Installed renewables - Wind - Base land	6,593	24,947	42,054	59,780	89,561	120,496	155,043
use assumptions (MW)							
Installed renewables - Solar -	1,074	7,271	17,708	32,235	48,623	52,207	53,235
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	4,745	26,146	49,853	78,238	92,807	95,002	95,116
land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		13.2	10.6	18.6	21	5.54	2.17
\$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Wind - Base (billion		28.5	22.8	22	35.2	34.7	36.6
\$2018)							
Capital invested - Solar PV - Constrained (billion \$2018)		9.58	11.6	13.9	23.7	1.24	0.374
Capital invested - Wind - Constrained (billion \$2018)		31.6	32.5	34.5	16.2	1.98	80.4
Capital invested - Biomass power plant (billion \$2018)	0	0.003	0.021	0	0.003	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0.009	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	1.19	0.005	0

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

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Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	72.4	18,541	35,193	66,831	104,688	115,313	119,768
Wind - Base land use assumptions (GWh)	19,737	83,563	139,217	196,305	291,874	389,204	494,930
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Constrained land use assumptions	0	13,674	33,346	60,726	91,519	98,271	100,217
(GWh)							
Wind - Constrained land use assumptions	17,665	86,986	161,857	250,834	294,590	301,857	302,230
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Biomass power plant (GWh)	0	5.97	46.4	46.4	52.4	52.4	52.4
Biomass w/ccu power plant (GWh)	0	0	0	0	1,335	1,341	1,341
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	9.08	9.08

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu	0	0	0	0	1	2	2
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	1	1
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	1	4	11
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu	0	0	0	0	1	2	2
(quantity)							
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment -		3.44	23	19.7	1,705	1,881	6,256
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		38.3	97	98	192	298	656

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	3.24	3.35	5.37	14.7	23.1
Annual - BECCS (MMT)		0	0	0	2.05	4.46	12.5
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	3.24	3.35	3.32	10.3	10.6
Cumulative - All (MMT)		0	3.24	6.59	12	26.7	49.8
Cumulative - BECCS (MMT)		0	0	0	2.05	6.51	19

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

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	3.24	6.59	9.91	20.2	30.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	409	409	409	409	409
Spur (km)		0	10.4	180	278	550	1,148
All (km)		0	420	589	687	959	1,557
Cumulative investment - Trunk (million \$2018)		0	1,950	1,950	1,950	1,950	1,950
Cumulative investment - Spur (million \$2018)		0	11.9	160	242	387	895
Cumulative investment - All (million \$2018)		0	1,962	2,109	2,192	2,337	2,845

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	0	0.88	1.81	3.44	3.73
Injection wells (wells)		0	1	2	4	7	9
Resource characterization, appraisal, permitting costs (million \$2020)		27.9	78.2	101	101	101	101
Wells and facilities construction costs (million \$2020)		0	18.6	72.5	129	216	268

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-82
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-379
deforestation (1000 tC02e/y)							
Carbon sink potential - Low - Extend							-2,973
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-77
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,071
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-787
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-5,328
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-1,597
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,244
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-13,537
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-123
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,326
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,357
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-113
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,141
retention of HWP (1000 tCO2e/y)							

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

Item Carbon sink potential - Mid - Increase	2020	2025	2030	2035	2040	2045	2050 -1,517
trees outside forests (1000 tC02e/y)							-1,511
Carbon sink potential - Mid - Reforest							-7,992
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-11,338
pasture (1000 tC02e/y) Carbon sink potential - Mid - Restore							0 / / 7
productivity (1000 tCO2e/y)							-2,467
Carbon sink potential - Mid - All (not							-32,374
counting overlap) (1000 tCO2e/y)							0_,0
Carbon sink potential - High - Accelerate							-164
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-2,274
deforestation (1000 tC02e/y)							77/4
Carbon sink potential - High - Extend rotation length (1000 tC02e/y)							-7,741
Carbon sink potential - High - Improve							-151
plantations (1000 tCO2e/y)							-101
Carbon sink potential - High - Increase							-3,212
retention of HWP (1000 tCO2e/y)							-,
Carbon sink potential - High - Increase							-2,247
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-10,656
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-21,079
pasture (1000 tC02e/y)							F1 010
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-51,213
Carbon sink potential - High - Restore							-3,690
productivity (1000 tCO2e/y)							0,070
Land impacted for carbon sink potential -							13.4
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							289
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,512
Low - Extend rotation length (1000							
hectares) Land impacted for carbon sink potential -							27.9
Low - Improve plantations (1000							21.9
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							_
hectares)							
Land impacted for carbon sink potential -							112
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							352
Low - Reforest cropland (1000 hectares)							107
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							104
Land impacted for carbon sink potential -							740
Low - Restore productivity (1000							140
hectares)							
Land impacted for carbon sink potential -							3,151
Low - Total impacted (over 30 years)							3,131
(1000 hectares)							
Land impacted for carbon sink potential -							20.1
Mid - Accelerate regeneration (1000							
hectares)							

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

Thom	2020	2025	2030	2035	2040	2045	2050
Item	2020	2025	2030	2035	2040	2045	
Land impacted for carbon sink potential -							298
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							0.700
Land impacted for carbon sink potential -							2,730
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							41.9
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 -							163
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							528
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							751
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,490
Mid - Restore productivity (1000							1,470
hectares)							
Land impacted for carbon sink potential -							6,022
·							0,022
Mid - Total impacted (over 30 years) (1000							
hectares)							0/ 0
Land impacted for carbon sink potential -							26.8
High - Accelerate regeneration (1000							
hectares)							200
Land impacted for carbon sink potential -							308
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,947
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							55.7
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 -							214
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							705
High - Reforest cropland (1000 hectares)							, 00
Land impacted for carbon sink potential -		-					599
High - Reforest pasture (1000 hectares)							377
Land impacted for carbon sink potential -							1,223
							1,223
High - Restore productivity (1000							
hectares)							7.077
Land impacted for carbon sink potential -							7,077
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							0
deployment - Corn-ethanol to energy							
grasses (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 deployment - Cropland measures (1000							-7,068
tCO2e/y)							
Carbon sink potential - Moderate							-157
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-7,225
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-13,495
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-313
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-13,808
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,016
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							285
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							3,301
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							5,748
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							570
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							6,318
Aggressive deployment - Total (1000							
hectares)							

Table 17: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		62.8	0.052	0.05	0.042	0.028	0.001
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		22.7	10.5	4.66	2.24	0.862	0.676
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		149	149	145	131	104	71.3
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		11.6	11.7	11.2	10	7.95	5.51
Stations (deaths)							
Premature deaths from air pollution -		22.4	20.3	17.8	14.5	10.6	6.8
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.556	0.531	0.505	0.451	0.363	0.271
Fuel Comb - Residential - Oil (deaths)							

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

Table 17: E- scenario - IMPACTS - Health (c	ontinueaj						
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.1	4.16	4.14	3.78	2.98	2.08
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		5.84	5.59	5.32	5.02	4.72	4.41
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		16.3	15.6	14.6	12.7	10.1	7.49
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil		1.98	1.78	1.59	1.38	1.14	0.924
(deaths) Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.38	1.24	1.1	0.962	0.831	0.708
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.74	1.72	1.71	1.69	1.69	1.62
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		93.8	85.1	74.1	64.9	57.4	39.9
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		556	0.465	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		201	92.7	41.3	19.8	7.64	5.99
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,321	1,328	1,290	1,161	924	634
Monetary damages from air pollution - Gas Stations (million \$2019)		103	103	99.3	88.7	70.4	48.8
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		199	180	157	128	93.6	60.3
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4.93	4.7	4.47	4	3.22	2.4
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		36.3	36.9	36.7	33.5	26.4	18.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		51.7	49.5	47.1	44.5	41.8	39
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		144	138	129	112	89.8	66.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		17.5	15.7	14.1	12.2	10.1	8.18
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		12.2	11	9.72	8.52	7.36	6.27
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		24.2	15.2	15.1	14.9	14.9	14.3
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		833	756	658	576	509	355

Table 18: E- scenario - IMPACTS - Jobs

Table 18: E- scenario - IMPACTS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		442	456	434	475	411	742
By economic sector - Construction (jobs)		15,446	17,340	20,900	27,638	27,436	28,355
By economic sector - Manufacturing (jobs)		3,177	3,662	4,109	4,855	5,647	6,355
By economic sector - Mining (jobs)		2,243	1,665	1,293	984	751	515
By economic sector - Other (jobs)		2,313	2,613	3,701	5,295	4,715	4,801
By economic sector - Pipeline (jobs)		407	616	302	280	279	359
By economic sector - Professional (jobs)		6,578	7,120	9,303	13,059	13,678	15,345
By economic sector - Trade (jobs)		4,959	5,141	6,485	8,741	8,775	9,525
By economic sector - Utilities (jobs)		8,781	11,261	13,206	18,628	23,638	26,061
By resource sector - Biomass (jobs)		1,043	1,047	980	1,569	1,751	3,132
By resource sector - CO2 (jobs)		14.9	2,248	159	343	751	1,904
By resource sector - Coal (jobs)		1,495	345	151	132	119	105
By resource sector - Grid (jobs)		12,259	17,524	23,993	35,092	46,771	50,566
By resource sector - Natural Gas (jobs)		3,513	2,226	1,859	1,999	1,224	1,177
By resource sector - Nuclear (jobs)		624	614	604	350	0	0
By resource sector - Oil (jobs)		5,479	4,662	3,974	3,256	2,545	1,708
By resource sector - Solar (jobs)		16,442	16,985	22,657	30,205	22,719	20,505
By resource sector - Wind (jobs)		3,477	4,225	5,355	7,008	9,450	12,960
By education level - All sectors - High		19,122	21,553	25,679	34,131	36,181	38,831
school diploma or less (jobs)							
By education level - All sectors -		13,921	15,853	19,056	25,715	27,606	29,754
Associates degree or some college (jobs)				11.110		11.11.0	
By education level - All sectors -		8,784	9,697	11,612	15,525	16,648	18,108
Bachelors degree (jobs)		0.100	0./10	0.007	0.07/	/ 0/0	/ /70
By education level - All sectors - Masters		2,182	2,412	2,937	3,974	4,268	4,673
or professional degree (jobs) By education level - All sectors - Doctoral		338	361	450	610	/00	691
degree (jobs)		336	301	450	610	628	091
Related work experience - All sectors -		6,461	7,311	8,746	11,734	12,529	13,516
None (jobs)		0,401	1,511	0,140	11,104	12,027	10,010
Related work experience - All sectors - Up		9,169	10,257	12,320	16,365	17,171	18,475
to 1 year (jobs)		7,107	10,201	12,020	10,000	,	.0, 0
Related work experience - All sectors - 1		15,829	17,787	21,313	28,591	30,635	33,075
to 4 years (jobs)							•
Related work experience - All sectors - 4		10,261	11,562	13,823	18,552	19,909	21,495
to 10 years (jobs)							
Related work experience - All sectors -		2,627	2,958	3,531	4,714	5,086	5,496
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		2,495	2,757	3,320	4,421	4,601	4,940
(jobs)							
On-the-Job Training - All sectors - Up to 1		28,823	32,282	38,670	51,651	55,159	59,650
year (jobs)		0.007	10 (05	10.77/	47407	10.777	40.070
On-the-Job Training - All sectors - 1 to 4		9,387	10,685	12,776	17,187	18,464	19,862
years (jobs)		0.001	0.775	/ 200	E 000	7 001	/ 700
On-the-Job Training - All sectors - 4 to 10		3,201	3,665	4,390	5,939	6,331	6,782
years (jobs) On-the-Job Training - All sectors - Over 10		440	488	577	756	774	823
years (jobs)		440	400	511	136	774	023
On-Site or In-Plant Training - All sectors -		7,217	8,059	9,685	12,966	13,683	14,778
None (jobs)		1,211	0,007	7,000	12,700	10,000	14,110
On-Site or In-Plant Training - All sectors -		26,238	29,425	35,237	47,068	50,300	54,342
Up to 1 year (jobs)		_5,255	, 120	55,251	,000	55,555	0.,012
On-Site or In-Plant Training - All sectors -		7,283	8,276	9,898	13,295	14,265	15,337
1 to 4 years (jobs)		,	, -			,	,
On-Site or In-Plant Training - All sectors -		3,223	3,671	4,380	5,903	6,298	6,754
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		386	445	534	722	783	846
Over 10 years (jobs)							
Wage income - All (million \$2019)		2,402	2,734	3,304	4,480	4,882	5,345

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	670	628	574	531	498	459	413
Final energy use - Residential (PJ)	241	228	218	206	189	170	154
Final energy use - Commercial (PJ)	182	179	174	169	162	155	149
Final energy use - Industry (PJ)	241	250	272	277	295	331	335

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.2	3.23	3.9	4.01	5.79	6.1
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)	23.3	155	287	899	1,510	2,863	4,216
Vehicle stocks - LDV – All others (1000 units)	5,511	5,511	5,511	5,228	4,944	3,810	2,676
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	171	359	1,211	3,810	5,551
Public EV charging plugs - DC Fast (1000 units)	0.178		0.611		3.21		8.98
Public EV charging plugs - L2 (1000 units)	1.67		14.7		77.3		216

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	7.5	13	18.7	35.2	61.1	79	85.2
Heat Pump (%)							
Sales of space heating units - Electric	19.7	24.8	23.3	19.2	12.8	8.51	7.04
Resistance (%)							
Sales of space heating units - Gas (%)	63.5	47.3	43.7	33.5	17.6	6.67	2.55
Sales of space heating units - Fossil (%)	9.34	14.9	14.4	12.2	8.46	5.78	5.24
Sales of water heating units - Electric	0	1.51	5.81	18.2	37.5	50.4	55
Heat Pump (%)							
Sales of water heating units - Electric	42.5	57.5	56.3	52.9	47.8	44.7	43.6
Resistance (%)							
Sales of water heating units - Gas Furnace	57.4	40.9	37.8	28.9	14.7	4.93	1.34
(%)							
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.036	0.036	0.036	0.036
Sales of cooking units - Electric	76.4	77	79.2	84.9	92.8	97.7	99.4
Resistance (%)							
Sales of cooking units - Gas (%)	23.6	23	20.8	15.1	7.21	2.33	0.626
Residential HVAC investment in 2020s vs.		5.81	7.68				
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	4.52	15.9	21.2	36.6	61.3	79.5	86.8
Heat Pump (%)							
Sales of space heating units - Electric	8.06	5.57	5.72	6.25	7.38	8.69	9.45
Resistance (%)							
Sales of space heating units - Gas Furnace	87.4	76.5	71.1	55.7	30.6	11.6	3.64
(%)							
Sales of space heating units - Fossil (%)	0	2.02	1.9	1.42	0.689	0.224	0.059
Sales of water heating units - Electric	1.19	2.53	7.36	21.3	43.1	57.7	63
Heat Pump (%)							
Sales of water heating units - Electric	10.1	7.76	9.75	15.5	24.6	31	33.4
Resistance (%)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	87.7	88.7	81.9	62.3	31.6	10.6	2.88
Sales of water heating units - Other (%)	0.996	0.987	0.962	0.892	0.786	0.72	0.695
- ,							
Sales of cooking units - Electric	44.8	49.3	53.1	63	76.9	85.5	88.5
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	50.7	46.9	37	23.1	14.5	11.5
Commercial HVAC investment in 2020s -		16,266	17,675				
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)	7,000	1,299	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,692	4,262	4,134	3,511	647	2,254	3,204
Installed thermal - Nuclear (MW)	1,236	1,236	1,236	1,236	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-82
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-379
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,973
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-77
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,071
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-787
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-5,328
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-1,597
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,244
productivity (1000 tCO2e/y)							·
Carbon sink potential - Low - All (not							-13,537
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - Mid - Accelerate							-123
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,326
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,357
rotation length (1000 tC02e/y)							•
Carbon sink potential - Mid - Improve							-113
plantations (1000 tC02e/y)							
Carbon sink potential - Mid - Increase							-2,141
retention of HWP (1000 tCO2e/y)							_,
Carbon sink potential - Mid - Increase							-1,517
trees outside forests (1000 tC02e/y)							,-
Carbon sink potential - Mid - Reforest							-7,992
cropland (1000 tCO2e/y)							., =
Carbon sink potential - Mid - Reforest							-11,338
pasture (1000 tCO2e/y)							,555
Carbon sink potential - Mid - Restore							-2,467
productivity (1000 tCO2e/y)							2, .01
Carbon sink potential - Mid - All (not							-32,374
counting overlap) (1000 tC02e/y)							02,014

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-164
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-2,274
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,741
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-151
plantations (1000 tCO2e/y)							0.010
Carbon sink potential - High - Increase							-3,212
retention of HWP (1000 tCO2e/y)							0.047
Carbon sink potential - High - Increase							-2,247
trees outside forests (1000 tC02e/y)							10 / E /
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-10,656
Carbon sink potential - High - Reforest							-21,079
pasture (1000 tC02e/y)							-21,019
Carbon sink potential - High - All (not			+				-51,213
counting overlap) (1000 tCO2e/y)							01,210
Carbon sink potential - High - Restore							-3,690
productivity (1000 tCO2e/y)							0,070
Land impacted for carbon sink potential -							13.4
Low - Accelerate regeneration (1000							10. 1
hectares)							
Land impacted for carbon sink potential -							289
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,512
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							27.9
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 -							112
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							352
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							104
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							740
Low - Restore productivity (1000							
hectares)							0.454
Land impacted for carbon sink potential -							3,151
Low - Total impacted (over 30 years)							
(1000 hectares)							001
Land impacted for carbon sink potential -							20.1
Mid - Accelerate regeneration (1000							
hectares)							000
Land impacted for carbon sink potential -							298
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)						-	0.700
Land impacted for carbon sink potential -							2,730
Mid - Extend rotation length (1000 hectares)							
Land impacted for carbon sink potential -							41.9
Mid - Improve plantations (1000 hectares)							41.7
ma minipi ove plantations (1000 lieutal'es)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							163
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							528
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							751
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,490
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,022
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							26.8
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							308
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,947
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							55.7
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 -							214
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							705
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							599
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,223
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,077
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-7,068
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-157
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-7,225
deployment - Total (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							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-13,495
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-313
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-13,808
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,016
deployment - Cropland measures (1000							•
hectares)							
Land impacted for carbon sink - Moderate							285
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							3,301
deployment - Total (1000 hectares)							-,
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							·
energy grasses (1000 hectares)							
Land impacted for carbon sink -						+	5,748
Aggressive deployment - Cropland							٥,٥
measures (1000 hectares)							
Land impacted for carbon sink -							570
Aggressive deployment - Permanent							0.0
conservation cover (1000 hectares)							
Land impacted for carbon sink -							6,318
Aggressive deployment - Total (1000							0,010
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		62.8	0.052	0.05	0.042	0.028	0.001
(deaths)							
Premature deaths from air pollution -		21.6	11.3	4.17	2.81	1.05	0.61
Fuel Comb - Electric Generation - Natural Gas (deaths)							
Premature deaths from air pollution - Mobile - On-Road (deaths)		146	136	103	59.5	27.6	11.6
Premature deaths from air pollution - Gas Stations (deaths)		11.4	10.5	7.88	4.68	2.33	1.16
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		22.2	17.8	11.6	6.23	2.82	1.1
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.545	0.448	0.315	0.193	0.096	0.045
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		4.05	3.67	2.81	1.81	0.904	0.365
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		5.84	5.59	5.32	5.02	4.72	4.41
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		16.2	13.9	10.2	6.49	3.84	2.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.97	1.63	1.28	0.946	0.657	0.418
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.38	1.15	0.937	0.728	0.531	0.348
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.98	1.72	1.7	1.67	1.68	1.58
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		92.5	87	75.2	54	33.1	5.02
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		556	0.465	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		192	100	36.9	24.9	9.27	5.4
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,300	1,208	916	529	246	103
Monetary damages from air pollution - Gas Stations (million \$2019)		101	92.6	69.7	41.5	20.6	10.3
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		197	158	103	55.2	25	9.74
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4.83	3.97	2.79	1.71	0.849	0.394
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		35.9	32.5	24.9	16	8.01	3.23
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		51.7	49.5	47.1	44.5	41.8	39
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		144	123	90.6	57.5	34	19.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		17.5	14.4	11.3	8.38	5.81	3.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		12.2	10.2	8.29	6.44	4.7	3.08
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		26.3	15.2	15	14.7	14.8	14
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		821	773	668	480	294	44.6

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		441	446	430	355	264	745
By economic sector - Construction (jobs)		13,828	18,696	28,091	33,430	58,740	52,620
By economic sector - Manufacturing		3,195	3,904	5,511	6,401	8,744	9,497
(jobs)							
By economic sector - Mining (jobs)		2,202	1,533	978	566	288	44.1
By economic sector - Other (jobs)		1,997	3,091	4,987	6,102	12,901	11,224
By economic sector - Pipeline (jobs)		396	335	243	162	94.2	25
By economic sector - Professional (jobs)		6,024	7,936	12,504	15,809	28,121	27,643

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

Table 20. ETRET BEETIGHTO THIT ACTO BODG (COIT	•					
	020 2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)	4,586	5,627	8,283	10,157	18,886	18,018
By economic sector - Utilities (jobs)	8,494	10,886	18,461	25,291	39,654	41,537
By resource sector - Biomass (jobs)	1,040	1,021	960	945	997	3,349
By resource sector - CO2 (jobs)	0	0	0	0	0	0
By resource sector - Coal (jobs)	1,495	345	151	132	119	104
By resource sector - Grid (jobs)	11,811	18,790	34,856	48,618	78,648	83,166
By resource sector - Natural Gas (jobs)	3,426	2,258	1,689	1,907	1,442	1,520
By resource sector - Nuclear (jobs)	624	614	604	595	345	0
By resource sector - Oil (jobs)	5,420	4,307	3,062	1,951	1,060	1.61
By resource sector - Solar (jobs)	13,899	20,652	30,438	33,691	71,377	55,179
By resource sector - Wind (jobs)	3,448	4,468	7,728	10,436	13,702	18,032
By education level - All sectors - High	17,713	22,675	34,120	41,804	71,179	68,063
school diploma or less (jobs)						
By education level - All sectors -	12,897	16,638	25,562	31,843	54,574	52,441
Associates degree or some college (jobs)	,	,				·
By education level - All sectors -	8,209	10,195	15,321	19,021	32,300	31,440
Bachelors degree (jobs)		-, -	-,-	, -	- ,	-,
By education level - All sectors - Masters	2,033	2,555	3,892	4,873	8,355	8,171
or professional degree (jobs)		_,000	5,572	.,0.0	3,555	O ₁
By education level - All sectors - Doctoral	311	393	593	732	1,283	1,238
degree (jobs)		0,0	0,0	.02	1,200	1,200
Related work experience - All sectors -	5,995	7,666	11,641	14,408	24,655	23,722
None (jobs)	0,770	1,000	11,041	14,400	24,000	20,122
Related work experience - All sectors - Up	8,482	10,887	16,363	19,976	34,213	32,683
to 1 year (jobs)	0,402	10,001	10,000	12,210	04,210	02,000
Related work experience - All sectors - 1	14,710	18,683	28,343	35,158	59,991	57,851
to 4 years (jobs)	14,110	10,000	20,040	33,130	37,771	31,031
Related work experience - All sectors - 4	9,529	12,119	18,436	22,896	38,976	37,556
to 10 years (jobs)	7,527	12,117	10,430	22,070	30,710	31,330
Related work experience - All sectors -	2,448	3,102	4,704	5,836	9,856	9,539
Over 10 years (jobs)	2,440	3,102	4,104	3,030	2,000	7,007
On-the-Job Training - All sectors - None	2,308	2,930	4,388	5,365	9,288	8,831
(jobs)	2,306	2,730	4,366	5,365	7,200	0,031
On-the-Job Training - All sectors - Up to 1	26,817	33,993	51,305	63,349	107,868	104,208
year (jobs)	20,011	33,773	31,303	03,349	101,000	104,206
On-the-Job Training - All sectors - 1 to 4	8,693	11,182	17,122	21,292	36,320	34,837
=	0,073	11,102	11,122	21,292	30,320	34,031
years (jobs) On-the-Job Training - All sectors - 4 to 10	2,942	3,833	5,907	7,345	10.77.0	12,007
	2,942	3,833	5,907	7,345	12,640	12,007
years (jobs)	/ 05	F17	7/7	000	1 575	1 / / 0
On-the-Job Training - All sectors - Over 10	405	517	767	922	1,575	1,469
years (jobs)	(() (0.500	10.001	45.07/	07.050	0 (100
On-Site or In-Plant Training - All sectors -	6,684	8,522	12,881	15,874	27,252	26,120
None (jobs)						
On-Site or In-Plant Training - All sectors -	24,406	30,965	46,772	57,770	98,368	94,960
Up to 1 year (jobs)						
On-Site or In-Plant Training - All sectors -	6,747	8,670	13,245	16,443	28,054	26,906
1 to 4 years (jobs)						
On-Site or In-Plant Training - All sectors -	2,969	3,833	5,871	7,288	12,487	11,889
4 to 10 years (jobs)						
On-Site or In-Plant Training - All sectors -	357	464	719	899	1,530	1,477
Over 10 years (jobs)						
Wage income - All (million \$2019)	2,233	2,862	4,395	5,524	9,493	9,295

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	669	623	550	461	380	331	311
Final energy use - Residential (PJ)	241	227	206	178	155	141	134
Final energy use - Commercial (PJ)	182	178	169	158	147	141	138
Final energy use - Industry (PJ)	241	249	271	274	290	326	330

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.82	3.92	6.23	6.6	6.19	6.47
Cumulative 5-yr (billion \$2018)							

Table 31: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	30.1	479	928	2,500	4,071	5,327	6,583
Vehicle stocks - LDV – All others (1000 units)	5,489	5,226	4,964	3,618	2,271	1,285	299
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,055	2,704	4,381	6,637	7,223	6,887
Public EV charging plugs - DC Fast (1000 units)	0.178		1.98		8.67		14
Public EV charging plugs - L2 (1000 units)	1.67		47.5		208		337

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	7.5	22.5	72.3	86.1	87.5	87.8	87.4
Heat Pump (%)							
Sales of space heating units - Electric	19.7	22.4	10	6.61	6.36	6.55	6.72
Resistance (%)							
Sales of space heating units - Gas (%)	63.5	41.4	10.2	1.69	1.08	1.04	1.02
Sales of space heating units - Fossil (%)	9.34	13.6	7.39	5.58	5.03	4.63	4.86
Sales of water heating units - Electric	0	8.7	46.5	56.1	56.7	56.7	56.7
Heat Pump (%)							
Sales of water heating units - Electric	42.5	55.5	45.3	43.3	43.3	43.3	43.3
Resistance (%)							
Sales of water heating units - Gas Furnace	57.4	35.7	8.23	0.581	0.019	0	0
(%)							
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.035	0.035	0.036	0.036
Sales of cooking units - Electric	76.5	81.5	96.8	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	23.5	18.5	3.16	0.159	0	0	0
Residential HVAC investment in 2020s vs.		5.85	7.79				
REF - Cumulative 5-yr (billion \$2018)							

Table 33: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	4.52	24.4	70.6	87.7	89.7	89.7	89.7
Sales of space heating units - Electric Resistance (%)	8.06	5.73	7.1	9.32	9.79	9.8	9.8
Sales of space heating units - Gas Furnace (%)	87.4	68.1	22	2.94	0.553	0.458	0.459
Sales of space heating units - Fossil (%)	0	1.75	0.337	0.014	0	0	0
Sales of water heating units - Electric Heat Pump (%)	1.19	10.6	53.1	64.2	65	65	65
Sales of water heating units - Electric Resistance (%)	10.1	11	28.4	33.8	34.3	34.3	34.3
Sales of water heating units - Gas Furnace (%)	87.7	77.5	17.8	1.26	0.041	0	0
Sales of water heating units - Other (%)	0.996	0.947	0.735	0.688	0.685	0.688	0.687
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		16,269	17,611				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	7,000	1,299	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,692	4,262	4,134	3,844	2,056	5,529	8,394
Installed thermal - Nuclear (MW)	1,236	1,236	1,236	1,236	1,236	0	0
Installed renewables - Rooftop PV (MW)	153	269	400	605	898	1,277	1,767
Installed renewables - Solar - Base land	110	8,903	20,953	40,065	57,163	102,834	132,465
use assumptions (MW)							
Installed renewables - Wind - Base land	5,327	25,030	42,116	75,250	119,064	170,086	198,707
use assumptions (MW)							
Installed renewables - Solar -	33.6	8,809	22,631	37,113	57,486	98,641	116,501
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	5,101	27,080	51,233	93,031	97,026	99,812	231,168
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		11.8	14.4	21.1	17.8	44.8	27.5
\$2018)							
Capital invested - Wind - Base (billion		29	22.7	41.1	51.8	57.2	30.3
\$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)	216	16,765	39,441	75,390	107,459	193,354	249,128
Wind - Base land use assumptions (GWh)	19,737	84,539	140,172	247,311	386,254	545,010	631,310
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	145	33,147	85,095	139,507	215,976	370,604	437,809
Wind - Constrained land use assumptions (GWh)	35,330	177,376	330,559	588,274	614,269	631,531	1,466,853
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							-82
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-379
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,973
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-77
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,071
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-787
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-5,328
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-1,597
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,244
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-13,537
counting overlap) (1000 tCO2e/y)							

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

Item Conhon sink notantial, Mid. Assolanata	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate							-12:
regeneration (1000 tC02e/y)							1.00
Carbon sink potential - Mid - Avoid							-1,32
deforestation (1000 tC02e/y)							F 0F
Carbon sink potential - Mid - Extend							-5,35
rotation length (1000 tC02e/y)							
Carbon sink potential - Mid - Improve							-11
plantations (1000 tCO2e/y)							0.17
Carbon sink potential - Mid - Increase							-2,14
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-1,51
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-7,99
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-11,33
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-2,46
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-32,37
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-16
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-2,27
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,74
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-15
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-3,21
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-2,24
trees outside forests (1000 tC02e/y)							•
Carbon sink potential - High - Reforest							-10,65
cropland (1000 tCO2e/y)							,
Carbon sink potential - High - Reforest							-21,07
pasture (1000 tC02e/y)							21,01
Carbon sink potential - High - All (not							-51,21
counting overlap) (1000 tCO2e/y)							0.,
Carbon sink potential - High - Restore							-3,69
productivity (1000 tCO2e/y)							0,07
Land impacted for carbon sink potential -							13.
Low - Accelerate regeneration (1000							10.
hectares)							
Land impacted for carbon sink potential -							28
Low - Avoid deforestation (over 30 years)							20
(1000 hectares)							
Land impacted for carbon sink potential -							1,51
Low - Extend rotation length (1000							1,51
hectares)							
,							07
and impacted for carbon sink potential -							27
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							11
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							35
Low - Reforest cropland (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 -							104
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							740
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,15
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							20.
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							298
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,730
Mid - Extend rotation length (1000							2,10
hectares)							
Land impacted for carbon sink potential -							41.9
Mid - Improve plantations (1000 hectares)							41.
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							16
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							52
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							75
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,49
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,02
Mid - Total impacted (over 30 years) (1000							-,
hectares)							
Land impacted for carbon sink potential -							26.
High - Accelerate regeneration (1000							20.
hectares)							
•							30
Land impacted for carbon sink potential -							30
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,94
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							55.
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							21
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							70
							10
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							59
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,22
High - 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 - High - Total impacted (over 30 years)							7,077
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-7,068
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-157
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-7,225
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-13,495
deployment - Cropland measures (1000							107 170
tCO2e/y)							
Carbon sink potential - Aggressive							-313
deployment - Permanent conservation							010
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-13,808
deployment - Total (1000 tC02e/y)							-13,000
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							U
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,016
							3,010
deployment - Cropland measures (1000							
hectares)							005
Land impacted for carbon sink - Moderate							285
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							3,301
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							5,748
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							570
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							6,318
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 - Fuel Comb - Electric Generation - Coal (deaths)		62.8	0.052	0.05	0.042	0.028	0.001

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

Table 38: E+RE- scenario - IMPACTS - Healt	th (continu	edJ					
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		24.1	12.1	12.8	9.67	3.68	1.31
Fuel Comb - Electric Generation - Natural							
Gas (deaths)		1//	10.4	100	50.5	07.6	11. (
Premature deaths from air pollution -		146	136	103	59.5	27.6	11.6
Mobile - On-Road (deaths) Premature deaths from air pollution - Gas		11.4	10.5	7.88	/. / 0	2.33	1.16
Stations (deaths)		11.4	10.5	7.00	4.68	2.33	1.10
Premature deaths from air pollution -		22.2	17.8	11.6	6.23	2.82	1.1
Fuel Comb - Residential - Natural Gas		22.2	17.0	11.0	0.23	2.62	1.1
(deaths)							
Premature deaths from air pollution -		0.545	0.448	0.315	0.193	0.096	0.045
Fuel Comb - Residential - Oil (deaths)		0.0.10	0.1.0	0.0.0	0.170	0.070	0.0 10
Premature deaths from air pollution -		4.05	3.67	2.81	1.81	0.904	0.365
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		5.84	5.59	5.32	5.02	4.72	4.41
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		16.2	13.9	10.2	6.49	3.84	2.2
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		1.97	1.63	1.28	0.946	0.657	0.418
Fuel Comb - Comm/Institutional - Oil							
(deaths)		100				2 - 2 - 2	
Premature deaths from air pollution -		1.38	1.15	0.937	0.728	0.531	0.348
Fuel Comb - Comm/Institutional - Other							
(deaths)		0.77	170	17	1 / 7	1.40	1.50
Premature deaths from air pollution -		2.64	1.72	1.7	1.67	1.68	1.58
Industrial Processes - Coal Mining (deaths)							
Premature deaths from air pollution -		95.1	91.8	89.6	75.3	62.5	46.2
Industrial Processes - Oil & Gas		93.1	71.0	09.0	10.0	02.5	40.2
Production (deaths)							
Monetary damages from air pollution -	+	556	0.465	0.445	0.372	0.247	0.01
Fuel Comb - Electric Generation - Coal			0.400	0.440	0.012	0.241	0.01
(million \$2019)							
Monetary damages from air pollution -		213	107	114	85.7	32.6	11.6
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		1,300	1,208	916	529	246	103
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		101	92.6	69.7	41.5	20.6	10.3
Gas Stations (million \$2019)							
Monetary damages from air pollution -		197	158	103	55.2	25	9.74
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		4.83	3.97	2.79	1.71	0.849	0.394
Fuel Comb - Residential - Oil (million							
\$2019)		25.0	20.5	0/ 0	1/	0.01	0.00
Monetary damages from air pollution - Fuel Comb - Residential - Other (million		35.9	32.5	24.9	16	8.01	3.23
•							
\$2019) Monetary damages from air pollution -		51.7	49.5	47.1	44.5	41.8	39
Fuel Comb - Comm/Institutional - Coal		1.16	47.0	41.1	44.5	41.0	37
(million \$2019)							
Monetary damages from air pollution -		144	123	90.6	57.5	34	19.5
Fuel Comb - Comm/Institutional - Natural		144	120	70.0	31.3	34	17.0
Gas (million \$2019)							
Monetary damages from air pollution -		17.5	14.4	11.3	8.38	5.81	3.7
Fuel Comb - Comm/Institutional - Oil							.
(million \$2019)							
•							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		12.2	10.2	8.29	6.44	4.7	3.08
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		23.3	15.2	15	14.7	14.9	14
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		845	815	796	669	555	410
Industrial Processes - Oil & Gas							
Production (million \$2019)							

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

Table 39: E+RE- scenario - IMPACIS - Jobs		2225	2222	2225	2010	00/5	2052
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		442	458	434	426	337	740
By economic sector - Construction (jobs)		13,084	14,336	15,959	19,524	18,099	16,870
By economic sector - Manufacturing		2,922	2,766	2,771	3,225	3,042	3,196
(jobs)							
By economic sector - Mining (jobs)		2,237	1,668	1,197	830	618	460
By economic sector - Other (jobs)		1,840	2,110	2,805	3,630	3,364	2,854
By economic sector - Pipeline (jobs)		412	666	323	291	283	397
By economic sector - Professional (jobs)		5,738	5,713	6,855	8,925	8,621	8,664
By economic sector - Trade (jobs)		4,407	4,327	4,942	6,046	5,734	5,377
By economic sector - Utilities (jobs)		8,469	9,767	10,758	14,513	14,772	15,826
By resource sector - Biomass (jobs)		1,040	1,048	982	1,274	1,331	3,145
By resource sector - CO2 (jobs)		15.1	2,547	187	382	841	2,148
By resource sector - Coal (jobs)		1,494	587	505	469	440	228
By resource sector - Grid (jobs)		11,690	13,416	18,369	25,774	27,725	29,162
By resource sector - Natural Gas (jobs)		3,603	3,048	2,613	3,073	1,958	1,644
By resource sector - Nuclear (jobs)		624	614	604	350	0	0
By resource sector - Oil (jobs)		5,418	4,356	3,168	2,195	1,553	1,173
By resource sector - Solar (jobs)		12,561	13,824	17,350	20,611	17,363	12,893
By resource sector - Wind (jobs)		3,107	2,372	2,266	3,284	3,661	3,990
By education level - All sectors - High		16,997	18,100	19,873	24,574	23,378	23,180
school diploma or less (jobs)		-,	-,	,	,-	-,	-,
By education level - All sectors -		12,383	13,273	14,677	18,501	17,762	17,516
Associates degree or some college (jobs)		,	-, -	, -	-,	, -	, -
By education level - All sectors -		7,913	8,128	8,910	11,086	10,612	10,573
Bachelors degree (jobs)		, -	-, -	-, -	,	-,-	-,-
By education level - All sectors - Masters		1,961	2,012	2,247	2,826	2,717	2,719
or professional degree (jobs)		,			•	.	•
By education level - All sectors - Doctoral		298	298	338	424	401	397
degree (jobs)							
Related work experience - All sectors -		5,765	6,150	6,770	8,458	8,092	8,044
None (jobs)					•	.	•
Related work experience - All sectors - Up		8,120	8,573	9,491	11,704	11,084	10,969
to 1 year (jobs)		-,	-,	,	, -	,	-, -
Related work experience - All sectors - 1		14,149	14,921	16,429	20,537	19,682	19,516
to 4 years (jobs)			.		,	.	•
Related work experience - All sectors - 4		9,163	9,695	10,643	13,329	12,772	12,640
to 10 years (jobs)		,	,	, , ,	-,-		,
Related work experience - All sectors -		2,354	2,473	2,712	3,383	3,242	3,215
Over 10 years (jobs)		_,	_,	_,	5,555	-,	-,
On-the-Job Training - All sectors - None		2,212	2,307	2,552	3,148	2,977	2,914
(jobs)		_,	_,	_,	7, 10	_,,,,,	_,
On-the-Job Training - All sectors - Up to 1		25,772	27,054	29,797	37,049	35,405	35,246
year (jobs)		,	,,,,,,	/	,	,	,0
On-the-Job Training - All sectors - 1 to 4		8,354	8,961	9,856	12,387	11,880	11,715
years (jobs)		-,55	3,70.	,,,,,,	,	,555	,3
On-the-Job Training - All sectors - 4 to 10		2,827	3,082	3,399	4,290	4,108	4,028
years (jobs)		_,	-,	2,0	.,_,_	.,	.,525
1 U)							

Table 20:	E+RE-scenario	TMDMCTC	Inha I	(nontinued)
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Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - Over 10		386	407	441	537	501	482
years (jobs)							
On-Site or In-Plant Training - All sectors -		6,408	6,734	7,430	9,258	8,810	8,697
None (jobs)							
On-Site or In-Plant Training - All sectors -		23,460	24,671	27,172	33,789	32,298	32,120
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		6,483	6,940	7,637	9,577	9,179	9,055
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		2,856	3,093	3,393	4,265	4,080	4,011
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		344	374	413	522	504	501
Over 10 years (jobs)							
Wage income - All (million \$2019)		2,150	2,298	2,553	3,228	3,133	3,159

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	669	623	550	461	380	331	311
Final energy use - Residential (PJ)	241	227	206	178	155	141	134
Final energy use - Commercial (PJ)	182	178	169	158	147	141	138
Final energy use - Industry (PJ)	241	249	271	274	290	326	330

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.82	3.92	6.23	6.6	6.19	6.47
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)	30.1	479	928	2,500	4,071	5,327	6,583
Vehicle stocks - LDV – All others (1000 units)	5,489	5,226	4,964	3,618	2,271	1,285	299
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,055	2,704	4,381	6,637	7,223	6,887
Public EV charging plugs - DC Fast (1000 units)	0.178		1.98		8.67		14
Public EV charging plugs - L2 (1000 units)	1.67		47.5		208		337

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	7.5	22.5	72.3	86.1	87.5	87.8	87.4
Heat Pump (%)							
Sales of space heating units - Electric	19.7	22.4	10	6.61	6.36	6.55	6.72
Resistance (%)							
Sales of space heating units - Gas (%)	63.5	41.4	10.2	1.69	1.08	1.04	1.02
Sales of space heating units - Fossil (%)	9.34	13.6	7.39	5.58	5.03	4.63	4.86
Sales of water heating units - Electric	0	8.7	46.5	56.1	56.7	56.7	56.7
Heat Pump (%)							
Sales of water heating units - Electric	42.5	55.5	45.3	43.3	43.3	43.3	43.3
Resistance (%)							
Sales of water heating units - Gas Furnace	57.4	35.7	8.23	0.581	0.019	0	0
(%)							
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.035	0.035	0.036	0.036
Sales of cooking units - Electric	76.5	81.5	96.8	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	23.5	18.5	3.16	0.159	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		5.85	7.79				
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 Heat Pump (%)	4.52	24.4	70.6	87.7	89.7	89.7	89.7
Sales of space heating units - Electric Resistance (%)	8.06	5.73	7.1	9.32	9.79	9.8	9.8
Sales of space heating units - Gas Furnace (%)	87.4	68.1	22	2.94	0.553	0.458	0.459
Sales of space heating units - Fossil (%)	0	1.75	0.337	0.014	0	0	0
Sales of water heating units - Electric Heat Pump (%)	1.19	10.6	53.1	64.2	65	65	65
Sales of water heating units - Electric Resistance (%)	10.1	11	28.4	33.8	34.3	34.3	34.3
Sales of water heating units - Gas Furnace (%)	87.7	77.5	17.8	1.26	0.041	0	0
Sales of water heating units - Other (%)	0.996	0.947	0.735	0.688	0.685	0.688	0.687
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		16,269	17,611				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	7,000	1,299	999	999	999	999	0
Installed thermal - Natural gas (MW)	6,692	4,262	5,706	6,189	4,839	4,341	4,057
Installed thermal - Nuclear (MW)	1,236	1,236	1,236	1,236	0	0	0
Installed renewables - Rooftop PV (MW)	153	269	400	605	898	1,277	1,767
Installed renewables - Solar - Base land	33.6	10,071	19,446	29,638	43,884	51,858	51,858
use assumptions (MW)							
Installed renewables - Wind - Base land	4,409	21,499	26,901	26,901	36,539	49,328	70,070
use assumptions (MW)							
Installed renewables - Solar -	111	9,629	19,626	28,260	40,546	47,421	47,421
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	4,138	23,048	29,268	29,541	43,453	65,037	90,259
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		13.4	11.2	11.2	14.8	7.82	0
\$2018)							
Capital invested - Wind - Base (billion		25.1	7.19	0	11.4	14.3	21.8
\$2018)							
Capital invested - Solar PV - Constrained		12.7	12	9.51	12.8	6.74	0
(billion \$2018)							
Capital invested - Wind - Constrained		27.8	8.28	0.338	16.4	24.2	26.7
(billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	72.4	18,933	36,537	55,667	82,436	97,369	97,369
Wind - Base land use assumptions (GWh)	16,617	73,100	90,582	90,582	122,043	163,615	228,918
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Constrained land use assumptions (GWh)	216	18,113	36,914	53,140	76,195	89,104	89,104
Wind - Constrained land use assumptions (GWh)	14,915	76,207	96,035	97,035	141,929	209,549	285,205
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Table 47: E+RE- scenario - PILLAR 6: Land							
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-82
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-379
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,973
rotation length (1000 tC02e/y)							
Carbon sink potential - Low - Improve							-77
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,071
retention of HWP (1000 tC02e/y)							
Carbon sink potential - Low - Increase							-787
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							-5,328
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-1,597
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,244
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-13,537
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-123
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,326
deforestation (1000 tC02e/y)							
Carbon sink potential - Mid - Extend							-5,357
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-113
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,141
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-1,517
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-7,992
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-11,338
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-2,467
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-32,374
counting overlap) (1000 tC02e/y)							4//
Carbon sink potential - High - Accelerate							-164
regeneration (1000 tC02e/y)							
Carbon sink potential - High - Avoid							-2,274
deforestation (1000 tC02e/y)							77/4
Carbon sink potential - High - Extend							-7,741
rotation length (1000 tCO2e/y)							454
Carbon sink potential - High - Improve							-151
plantations (1000 tCO2e/y)							0.040
Carbon sink potential - High - Increase							-3,212
retention of HWP (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 - High - Increase							-2,24
trees outside forests (1000 tC02e/y)							
Carbon sink potential - High - Reforest							-10,656
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-21,079
pasture (1000 tC02e/y)							=
Carbon sink potential - High - All (not							-51,213
counting overlap) (1000 tC02e/y)							
Carbon sink potential - High - Restore							-3,690
productivity (1000 tC02e/y)							
Land impacted for carbon sink potential -							13.4
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							289
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,512
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							27.9
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 -							112
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							352
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							104
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							740
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,151
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							20.1
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							298
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,730
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							41.9
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 -							163
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							528
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							751
Mid - Reforest pasture (1000 hectares)							

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 -							1,490
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,022
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							26.8
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							308
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,947
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							55.7
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 -							214
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							705
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							599
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,223
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,077
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							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-7,068
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-157
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-7,225
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-13,495
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-313
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-13,808
deployment - Total (1000 tC02e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,016
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							285
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							3,301
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							5,748
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							570
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							6,318
Aggressive deployment - Total (1000							
hectares)							

Table 49: E-B+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		62.8	0.052	0.05	0.042	0.028	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		22.7	9.88	5.78	3.74	1.65	0.849
Premature deaths from air pollution - Mobile - On-Road (deaths)		149	149	145	131	104	71.3
Premature deaths from air pollution - Gas Stations (deaths)		11.6	11.7	11.2	10	7.95	5.51
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		22.4	20.3	17.8	14.5	10.6	6.8
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.556	0.531	0.505	0.451	0.363	0.271
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		4.1	4.16	4.14	3.78	2.98	2.08
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		5.84	5.59	5.32	5.02	4.72	4.41
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		16.3	15.6	14.6	12.7	10.1	7.49
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.98	1.78	1.59	1.38	1.14	0.924
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.38	1.24	1.1	0.962	0.831	0.708
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.8	1.72	1.71	1.69	1.7	1.66

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		93.8	85.1	74.1	64.9	57.4	39.9
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		556	0.465	0.445	0.372	0.247	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		201	87.5	51.2	33.1	14.6	7.52
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,321	1,328	1,290	1,161	924	634
Monetary damages from air pollution - Gas Stations (million \$2019)		103	103	99.3	88.7	70.4	48.8
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		199	180	157	128	93.6	60.3
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4.93	4.7	4.47	4	3.22	2.4
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		36.3	36.9	36.7	33.5	26.4	18.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		51.7	49.5	47.1	44.5	41.8	39
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		144	138	129	112	89.8	66.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		17.5	15.7	14.1	12.2	10.1	8.18
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		12.2	11	9.72	8.52	7.36	6.27
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		24.7	15.2	15.1	14.9	15	14.7
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		833	756	658	576	509	355

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

14510 001 2 51 000114110 17 11 11010 0050							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		442	444	1,129	1,147	2,009	2,027
By economic sector - Construction (jobs)		15,343	17,280	19,378	21,856	21,766	24,266
By economic sector - Manufacturing		3,194	3,677	4,180	4,253	5,491	6,305
(jobs)							
By economic sector - Mining (jobs)		2,238	1,663	1,298	1,025	760	490
By economic sector - Other (jobs)		2,288	2,588	3,327	4,049	3,604	4,059
By economic sector - Pipeline (jobs)		404	623	305	289	278	356
By economic sector - Professional (jobs)		6,565	7,098	9,485	11,454	13,733	15,319
By economic sector - Trade (jobs)		4,942	5,125	6,225	7,309	7,739	8,602
By economic sector - Utilities (jobs)		8,787	11,290	12,750	15,187	18,861	22,242
By resource sector - Biomass (jobs)		1,042	1,013	3,332	4,389	9,281	9,633
By resource sector - CO2 (jobs)		14.9	2,304	163	363	779	1,935
By resource sector - Coal (jobs)		1,495	345	151	132	119	105
By resource sector - Grid (jobs)		12,290	17,523	23,046	28,041	36,793	42,899
By resource sector - Natural Gas (jobs)		3,481	2,220	1,847	2,025	1,143	859
By resource sector - Nuclear (jobs)		624	614	604	350	0	0
By resource sector - Oil (jobs)		5,479	4,662	3,974	3,387	2,560	1,630
·							

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

By resource sector - Solar (jobs) 16,191 16,757 19,944 22,698 16,907 17,568 17,568 17,758 19,900 17,568 19,900 18,500 18,200 1
By education level - All sectors - High school diploma or less (jobs) Sy education level - All sectors - Masters or professional degree (jobs) Sy education level - All sectors - Doctoral degree (jobs) Sy education level - All sectors - Doctoral degree (jobs) Sy education level - All sectors - Doctoral degree (jobs) Sy education level - All sectors - Doctoral degree (jobs) Sy education level - All sectors - Sy education
By education level - All sectors - High school diploma or less (jobs) Sy education level - All sectors - Masters or professional degree (jobs) Sy education level - All sectors - Masters or professional degree (jobs) Sy education level - All sectors - Doctoral degree (jobs) Sy education level - All sectors - Doctoral degree (jobs) Sy education level - All sectors - Doctoral degree (jobs) Sy education level - All sectors - Up to 1 year (jobs) Sy education level - All sectors - Up to 1 year (jobs) Sy education level - All sectors - Up to 1 year (jobs) Sy education level - All sectors - Up to 1 years (jobs
By education level - All sectors - Associates degree or some college (jobs) 13,874 15,830 18,274 21,062 23,244 26,407 Associates degree or some college (jobs) 14,858 16,698 11,378 13,097 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 16,698 14,858 14,858 16,698 14,851 14,858 16,698 14,851 14,858 16,698 14,851 14,858 14,858 16,698 14,851 14,858 16,698 14,851 14,858 14,858 14,851 14,858 14,858 14,858 14,851 14,858
Associates degree or some college (jobs) By education level - All sectors - 8,764 9,684 11,378 13,097 14,858 16,698 Bachelors degree (jobs) By education level - All sectors - Masters or professional degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - Doctoral degree (jobs) Related work experience - All sectors - 6,438 7,298 8,522 9,785 10,924 12,312 None (jobs) Related work experience - All sectors - Up 9,136 10,232 12,079 13,748 15,322 17,165 to 1 year (jobs) Related work experience - All sectors - 1 15,780 17,758 20,725 23,800 26,581 29,962 to 4 years (jobs) Related work experience - All sectors - 4 10,229 11,547 13,343 15,336 17,052 19,288 to 10 years (jobs) Related work experience - All sectors - 2,620 2,955 3,409 3,900 4,361 4,938 Over 10 years (jobs) On-the-Job Training - All sectors - Up to 1 year (jobs) On-the-Job Training - All sectors - 1 to 4 year (jobs) On-the-Job Training - All sectors - 4 to 10 years (jobs) On-the-Job Training - All sectors - 4 to 10 years (jobs) On-the-Job Training - All sectors - 4 to 10 years (jobs) On-the-Job Training - All sectors - 4 to 10 years (jobs) On-the-Job Training - All sectors - 4 to 10 years (jobs) On-the-Job Training - All sectors - 4 to 10 years (jobs) On-the-Job Training - All sectors - 0 to 1 years (jobs) On-the-Job Training - All sectors - 0 to 10 3,188 3,659 4,168 4,811 5,207 5,919 years (jobs) On-the-Job Training - All sectors - 0 to 10 years (jobs) On-the-Job Training - All sectors - 0 to 10 years (jobs) On-the-Job Training - All sectors - 0 to 10 years (jobs)
By education level - All sectors - Bachelors degree (jobs) By education level - All sectors - Masters or professional degree (jobs) By education level - All sectors - Masters or professional degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - Up to 1 year (jo
Bachelors degree (jobs) By education level - All sectors - Masters or professional degree (jobs) By education level - All sectors - Doctoral degree (jobs) By education level - All sectors - Doctoral degree (jobs) Related work experience - All sectors - Hone (jobs) Related work experience - All sectors - Up to 1 years (jobs) Related work experience - All sectors - 1 to 4 years (jobs) Related work experience - All sectors - 4 to 10 years (jobs) Related work experience - All sectors - 4 to 10 years (jobs) Related work experience - All sectors - 4 to 10 years (jobs) Related work experience - All sectors - 4 to 10 years (jobs) Related work experience - All sectors - 2,620
or professional degree (jobs) 337 360 450 527 606 673 degree (jobs) Related work experience - All sectors - None (jobs) 6,438 7,298 8,522 9,785 10,924 12,312 Related work experience - All sectors - Up to 1 year (jobs) 9,136 10,232 12,079 13,748 15,322 17,165 to 1 year (jobs) 15,780 17,758 20,725 23,800 26,581 29,962 to 4 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 to 10 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 to 10 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 to 10 years (jobs) 2,620 2,955 3,409 3,900 4,361 4,938 On-the-Job Training - All sectors - None (jobs) 2,486 2,750 3,225 3,694 4,065 4,548 On-the-Job Training - All sectors - Up to 1 years (jobs) 28,735 32,223 37,
or professional degree (jobs) 337 360 450 527 606 673 degree (jobs) Related work experience - All sectors - None (jobs) 6,438 7,298 8,522 9,785 10,924 12,312 Related work experience - All sectors - Up to 1 year (jobs) 9,136 10,232 12,079 13,748 15,322 17,165 to 1 year (jobs) 15,780 17,758 20,725 23,800 26,581 29,962 to 4 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 to 10 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 to 10 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 to 10 years (jobs) 2,620 2,955 3,409 3,900 4,361 4,938 On-the-Job Training - All sectors - None (jobs) 2,486 2,750 3,225 3,694 4,065 4,548 year (jobs) 2,486 2,750 3,223 37,900 43,
Related work experience - All sectors - None (jobs) Related work experience - All sectors - Up to 1 year (jobs) Related work experience - All sectors - Up to 1 year (jobs) Related work experience - All sectors - 1 15,780 17,758 20,725 23,800 26,581 29,962 10,924 10,929 10,924 10,925 10,925 10,925 10,926 10,926 10,927 10,927 10,928 10,928 10,928 10,929 11,547 13,343 15,336 17,052 19,288 10,928 10,9
Related work experience - All sectors - None (jobs) Related work experience - All sectors - Up to 1 years (jobs) Related work experience - All sectors - 4 to 10 years (jobs) Related work experience - All sectors - 1 to 4 years (jobs) On-the-Job Training - All sectors - 1 to 4 years (jobs) On-the-Job Training - All sectors - 1 to 4 years (jobs) On-the-Job Training - All sectors - 1 to 4 years (jobs) On-the-Job Training - All sectors - 4 to 10 years (jobs) On-the-Job Training - All sectors - 1 to 4 years (jobs) On-the-Job Training - All sectors - 1 to 4 years (jobs) On-the-Job Training - All sectors - 1 to 4 years (jobs) On-the-Job Training - All sectors - 1 to 4 years (jobs) On-the-Job Training - All sectors - 4 to 10 3,188 3,659 4,168 4,811 5,207 5,919 years (jobs) On-the-Job Training - All sectors - 0 over 10 438 487 550 618 653 734
None (jobs) Related work experience - All sectors - Up to 1 year (jobs) To 1 year (
Related work experience - All sectors - Up to 1 year (jobs) 9,136 10,232 12,079 13,748 15,322 17,165 Related work experience - All sectors - 1 to 4 years (jobs) 15,780 17,758 20,725 23,800 26,581 29,962 Related work experience - All sectors - 4 to 10 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 Related work experience - All sectors - 4 to 10 years (jobs) 2,620 2,955 3,409 3,900 4,361 4,938 Over 10 years (jobs) 2,486 2,750 3,225 3,694 4,065 4,548 (jobs) 0n-the-Job Training - All sectors - Up to 1 year (jobs) 28,735 32,223 37,900 43,393 48,869 54,928 On-the-Job Training - All sectors - 1 to 4 years (jobs) 9,355 10,670 12,234 14,052 15,446 17,537 On-the-Job Training - All sectors - 4 to 10 years (jobs) 3,188 3,659 4,168 4,811 5,207 5,919 On-the-Job Training - All sectors - Over 10 438 487 550 618 65
To 1 year (jobs) Related work experience - All sectors - 1 15,780 17,758 20,725 23,800 26,581 29,962
Related work experience - All sectors - 1 15,780 17,758 20,725 23,800 26,581 29,962 to 4 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 to 10 years (jobs) 2,620 2,955 3,409 3,900 4,361 4,938 Over 10 years (jobs) 2,486 2,750 3,225 3,694 4,065 4,548 (jobs) 28,735 32,223 37,900 43,393 48,869 54,928 vear (jobs) 20,486 2,750 12,234 14,052 15,446 17,537 vears (jobs) 20,486 2,750 3,223 37,900 43,393 48,869 54,928 vear (jobs) 20,486 2,750 12,234 14,052 15,446 17,537 vears (jobs) 3,188 3,659 4,168 4,811 5,207 5,919 vears (jobs) 3,188 3,659 4,168 4,811 5,207 5,919 On-the-Job Training - All sectors - Over 10 438 487 550 618 653 734
To 4 years (jobs) To 29
Related work experience - All sectors - 4 to 10 years (jobs) 10,229 11,547 13,343 15,336 17,052 19,288 Related work experience - All sectors - Over 10 years (jobs) 2,620 2,955 3,409 3,900 4,361 4,938 On-the-Job Training - All sectors - None (jobs) 2,486 2,750 3,225 3,694 4,065 4,548 On-the-Job Training - All sectors - Up to 1 years (jobs) 28,735 32,223 37,900 43,393 48,869 54,928 On-the-Job Training - All sectors - 1 to 4 years (jobs) 9,355 10,670 12,234 14,052 15,446 17,537 On-the-Job Training - All sectors - 4 to 10 years (jobs) 3,188 3,659 4,168 4,811 5,207 5,919 On-the-Job Training - All sectors - Over 10 438 487 550 618 653 734
to 10 years (jobs) Related work experience - All sectors - 2,620 2,955 3,409 3,900 4,361 4,938 Over 10 years (jobs) On-the-Job Training - All sectors - None (jobs) On-the-Job Training - All sectors - Up to 1 28,735 32,223 37,900 43,393 48,869 54,928 year (jobs) On-the-Job Training - All sectors - 1 to 4 9,355 10,670 12,234 14,052 15,446 17,537 years (jobs) On-the-Job Training - All sectors - 4 to 10 3,188 3,659 4,168 4,811 5,207 5,919 years (jobs) On-the-Job Training - All sectors - 0ver 10 438 487 550 618 653 734
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On-the-Job Training - All sectors - None (jobs) 2,486 2,750 3,225 3,694 4,065 4,548 On-the-Job Training - All sectors - Up to 1 year (jobs) 28,735 32,223 37,900 43,393 48,869 54,928 On-the-Job Training - All sectors - 1 to 4 years (jobs) 9,355 10,670 12,234 14,052 15,446 17,537 On-the-Job Training - All sectors - 4 to 10 years (jobs) 3,188 3,659 4,168 4,811 5,207 5,919 On-the-Job Training - All sectors - Over 10 438 487 550 618 653 734
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On-the-Job Training - All sectors - Up to 1 year (jobs) 28,735 32,223 37,900 43,393 48,869 54,928 On-the-Job Training - All sectors - 1 to 4 years (jobs) 9,355 10,670 12,234 14,052 15,446 17,537 On-the-Job Training - All sectors - 4 to 10 years (jobs) 3,188 3,659 4,168 4,811 5,207 5,919 On-the-Job Training - All sectors - Over 10 438 487 550 618 653 734
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On-the-Job Training - All sectors - 1 to 4 years (jobs) 9,355 10,670 12,234 14,052 15,446 17,537 On-the-Job Training - All sectors - 4 to 10 years (jobs) 3,188 3,659 4,168 4,811 5,207 5,919 On-the-Job Training - All sectors - Over 10 438 487 550 618 653 734
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On-the-Job Training - All sectors - 4 to 10 3,188 3,659 4,168 4,811 5,207 5,919 years (jobs) On-the-Job Training - All sectors - Over 10 438 487 550 618 653 734
years (jobs) 438 487 550 618 653 734
On-the-Job Training - All sectors - Over 10 438 487 550 618 653 734
(inha)
years (jobs)
On-Site or In-Plant Training - All sectors - 7,193 8,043 9,443 10,825 12,031 13,526
None (jobs)
On-Site or In-Plant Training - All sectors - 26,157 29,372 34,450 39,444 44,321 49,854
Up to 1 year (jobs)
On-Site or In-Plant Training - All sectors - 7,258 8,263 9,500 10,900 12,000 13,602
1 to 4 years (jobs)
On-Site or In-Plant Training - All sectors - 3,210 3,666 4,173 4,807 5,229 5,933
4 to 10 years (jobs)
On-Site or In-Plant Training - All sectors - 385 445 511 591 658 751
Over 10 years (jobs)
Wage income - All (million \$2019) 2,394 2,730 3,209 3,728 4,227 4,835

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	670	628	574	531	498	459	413
Final energy use - Residential (PJ)	241	228	218	206	189	170	154
Final energy use - Commercial (PJ)	182	179	174	169	162	155	149
Final energy use - Industry (PJ)	241	250	272	277	295	331	335

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.2	3.23	3.9	4.01	5.79	6.1
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	23.3	155	287	899	1,510	2,863	4,216
Vehicle stocks - LDV – All others (1000	5,511	5,511	5,511	5,228	4,944	3,810	2,676
units)							
Light-duty vehicle capital costs vs. REF -		0	171	359	1,211	3,810	5,551
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.178		0.611		3.21		8.98
units)							
Public EV charging plugs - L2 (1000 units)	1.67		14.7		77.3		216

Table 54: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	7.5	13	18.7	35.2	61.1	79	85.2
Heat Pump (%)							
Sales of space heating units - Electric	19.7	24.8	23.3	19.2	12.8	8.51	7.04
Resistance (%)							
Sales of space heating units - Gas (%)	63.5	47.3	43.7	33.5	17.6	6.67	2.55
Sales of space heating units - Fossil (%)	9.34	14.9	14.4	12.2	8.46	5.78	5.24
Sales of water heating units - Electric	0	1.51	5.81	18.2	37.5	50.4	55
Heat Pump (%)							
Sales of water heating units - Electric	42.5	57.5	56.3	52.9	47.8	44.7	43.6
Resistance (%)							
Sales of water heating units - Gas Furnace	57.4	40.9	37.8	28.9	14.7	4.93	1.34
(%)							
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.036	0.036	0.036	0.036
Sales of cooking units - Electric	76.4	77	79.2	84.9	92.8	97.7	99.4
Resistance (%)							
Sales of cooking units - Gas (%)	23.6	23	20.8	15.1	7.21	2.33	0.626
Residential HVAC investment in 2020s vs.		5.81	7.68				
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	4.52	15.9	21.2	36.6	61.3	79.5	86.8
Heat Pump (%)							
Sales of space heating units - Electric	8.06	5.57	5.72	6.25	7.38	8.69	9.45
Resistance (%)							
Sales of space heating units - Gas Furnace	87.4	76.5	71.1	55.7	30.6	11.6	3.64
(%)							
Sales of space heating units - Fossil (%)	0	2.02	1.9	1.42	0.689	0.224	0.059
Sales of water heating units - Electric	1.19	2.53	7.36	21.3	43.1	57.7	63
Heat Pump (%)							
Sales of water heating units - Electric	10.1	7.76	9.75	15.5	24.6	31	33.4
Resistance (%)							
Sales of water heating units - Gas Furnace	87.7	88.7	81.9	62.3	31.6	10.6	2.88
(%)							
Sales of water heating units - Other (%)	0.996	0.987	0.962	0.892	0.786	0.72	0.695
Sales of cooking units - Electric	44.8	49.3	53.1	63	76.9	85.5	88.5
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	50.7	46.9	37	23.1	14.5	11.5
Commercial HVAC investment in 2020s -		16,266	17,675				
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)	7,000	1,299	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,692	4,262	4,134	3,736	1,071	1,404	1,302
Installed thermal - Nuclear (MW)	1,236	1,236	1,236	1,236	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0.01	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	3.67	21.9	3.22

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	0	0	4,118	28,723	32,333
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	9.64	9.64

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	0	0	3	23	26
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	1	1
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	7	10	18	21
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	1	1	2
(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	0	6,005	6,222	27,270	5,804
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	549	1,075	3,318	3,802

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	3.24	11.1	18.8	59.3	66.5
Annual - BECCS (MMT)		0	0	7.72	15.5	49	55.9
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	3.24	3.35	3.32	10.3	10.6
Cumulative - All (MMT)		0	3.24	14.3	33.1	92.3	159
Cumulative - BECCS (MMT)		0	0	7.72	23.2	72.2	128
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	3.24	6.59	9.91	20.2	30.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	409	409	409	409	409
Spur (km)		0	10.4	173	393	2,027	2,587
All (km)		0	420	582	802	2,436	2,996
Cumulative investment - Trunk (million \$2018)		0	1,950	1,950	2,145	2,145	2,145
Cumulative investment - Spur (million \$2018)		0	11.9	351	550	2,677	3,120
Cumulative investment - All (million \$2018)		0	1,962	2,301	2,695	4,822	5,266

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	0.92	4.28	7.13	10.8	10.9
Injection wells (wells)		0	2	7	13	22	27
Resource characterization, appraisal, permitting costs (million \$2020)		27.9	123	190	190	190	190
Wells and facilities construction costs (million \$2020)		0	55.8	217	387	648	804

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y)							-82
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-379
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,973
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-77
Carbon sink potential - Low - Increase							-1,07
retention of HWP (1000 tC02e/y) Carbon sink potential - Low - Increase							-787
trees outside forests (1000 tC02e/y) Carbon sink potential - Low - Reforest							-5,328
cropland (1000 tCO2e/y) Carbon sink potential - Low - Reforest							-1,59
pasture (1000 tC02e/y) Carbon sink potential - Low - Restore							-1,244
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,53
Carbon sink potential - Mid - Accelerate regeneration (1000 tC02e/y)							-123
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,32
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,35
Carbon sink potential - Mid - Improve							-11:
plantations (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-2,14
retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-1,51
trees outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest							-7,99
cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							-11,338
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore productivity (1000 tC02e/y)							-2,46
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-32,374
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-164
Carbon sink potential - High - Avoid deforestation (1000 tC02e/y)							-2,274
Carbon sink potential - High - Extend							-7,74
rotation length (1000 tCO2e/y) Carbon sink potential - High - Improve							-15
plantations (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase							-3,212
retention of HWP (1000 tC02e/y)							0.017
Carbon sink potential - High - Increase							-2,247
trees outside forests (1000 tC02e/y)							10 (5)
Carbon sink potential - High - Reforest							-10,656
cropland (1000 tCO2e/y)							04.070
Carbon sink potential - High - Reforest							-21,079
pasture (1000 tC02e/y)							=
Carbon sink potential - High - All (not							-51,213
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,690
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							13.4
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							289
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,512
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							27.9
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 -							112
Low - Increase trees outside forests							112
(1000 hectares)							
Land impacted for carbon sink potential -							352
Low - Reforest cropland (1000 hectares)							332
Land impacted for carbon sink potential -							104
Low - Reforest pasture (1000 hectares)							104
							7/0
Land impacted for carbon sink potential -							740
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,151
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							20.1
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							298
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,730
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							41.9
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 -							163
Mid - Increase trees outside forests (1000							100
hectares)							
Land impacted for carbon sink potential -							528
							328
Mid - Reforest cropland (1000 hectares)							751
Land impacted for carbon sink potential -							751
Mid - Reforest pasture (1000 hectares)		1					

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 -							1,490
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,022
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							26.8
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							308
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,947
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							55.7
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 -							214
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							705
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							599
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,223
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,077
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-1,072
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-6,467
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-142
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Moderate							-7,681
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,072
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-12,355
deployment - Cropland measures (1000							
tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-284
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							
crops (1000 tC02e/y)							
Carbon sink potential - Aggressive deployment - Pasture to energy crops							0
(1000 tCO2e/y)							
Carbon sink potential - Aggressive							-13,711
deployment - Total (1000 tC02e/y)							-13,111
Land impacted for carbon sink - Moderate							497
deployment - Corn-ethanol to energy							471
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							2,765
deployment - Cropland measures (1000							2,100
hectares)							
Land impacted for carbon sink - Moderate						+	259
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							292
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							979
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							4,793
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							497
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							10.010
Land impacted for carbon sink -							13,018
Aggressive deployment - Cropland							
measures (1000 hectares) Land impacted for carbon sink -							517
Aggressive deployment - Permanent							317
conservation cover (1000 hectares)							
Land impacted for carbon sink -							292
Aggressive deployment - Cropland to							272
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							979
Aggressive deployment - Pasture to							,
energy crops (1000 hectares)							
Land impacted for carbon sink -							15,303
Aggressive deployment - Total (1000							•
hectares)							

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		255	152	102	80	71.1	70.3
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		24.7	22.2	23.6	17.2	14.8	13.2
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		149	152	155	159	163	167
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		11.6	11.8	11.9	12.1	12.3	12.4
Stations (deaths)							

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

Table 64: REF scenario - IMPACTS - Health Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -	2020	22	19.9	17.9	16.7	16.1	15.7
Fuel Comb - Residential - Natural Gas			.,,,	,			1011
(deaths)							
Premature deaths from air pollution -		0.549	0.476	0.362	0.252	0.165	0.115
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		3.83	3.74	3.71	3.73	3.71	3.64
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		6.1	6.12	6.11	6.07	6.02	5.94
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		16.5	15.9	14.3	12.6	11.6	11.3
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		2.05	2.04	2.01	1.93	1.87	1.83
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		1.44	1.47	1.49	1.52	1.54	1.56
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		4.77	3.6	3.1	2.97	2.91	2.76
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		94.3	98.9	101	96.2	95.1	88.3
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		2,256	1,349	900	709	630	623
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		219	197	209	152	131	117
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		1,320	1,347	1,376	1,412	1,448	1,483
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		103	104	105	107	109	110
Gas Stations (million \$2019)							
Monetary damages from air pollution -		195	176	159	148	143	139
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		4.86	4.22	3.2	2.23	1.46	1.02
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		33.9	33.1	32.9	33.1	32.8	32.3
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		54	54.2	54.1	53.7	53.3	52.6
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		146	141	127	111	102	100
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		18.2	18.1	17.8	17.1	16.5	16.2
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		12.8	13	13.2	13.4	13.6	13.8
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		42.1	31.7	27.4	26.2	25.6	24.4
Industrial Processes - Coal Mining		ı	1	1			

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		837	878	895	855	844	784

Table 65: REF scenario - IMPACTS - Jobs

Table 65: REF scenario - IMPACTS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		442	441	441	440	440	441
By economic sector - Construction (jobs)		4,797	4,298	7,826	9,060	9,143	10,941
By economic sector - Manufacturing (jobs)		2,241	1,995	2,050	2,383	2,262	2,522
By economic sector - Mining (jobs)		2,463	1,853	1,511	1,213	1,005	855
By economic sector - Other (jobs)		260	306	1,229	1,456	1,617	2,061
By economic sector - Pipeline (jobs)		413	421	423	406	413	415
By economic sector - Professional (jobs)		2,748	2,204	3,465	4,212	4,237	5,110
By economic sector - Trade (jobs)		2,739	2,179	2,994	3,322	3,359	3,981
By economic sector - Utilities (jobs)		7,177	4,973	5,279	7,033	6,606	8,201
By resource sector - Biomass (jobs)		1,041	1,011	985	960	940	921
By resource sector - CO2 (jobs)		0	0.022	0.028	0.03	0.033	0.035
By resource sector - Coal (jobs)		2,494	1,346	875	603	246	106
By resource sector - Grid (jobs)		9,115	5,758	6,596	9,915	10,346	14,478
By resource sector - Natural Gas (jobs)		3,570	3,052	3,126	3,457	2,869	2,755
By resource sector - Nuclear (jobs)		624	614	604	595	345	0
By resource sector - Oil (jobs)		5,513	4,760	4,222	3,930	3,751	3,628
By resource sector - Solar (jobs)			1,017	7,618	7,965	8,523	10,196
By resource sector - Wind (jobs)		922	1,111	1,191	2,100	2,062	2,444
By education level - All sectors - High		9,856	7,996	10,920	12,687	12,541	14,876
school diploma or less (jobs)		,	,	, -	,	,-	,
By education level - All sectors -		7,116	5,655	7,810	9,273	9,153	10,975
Associates degree or some college (jobs)		, -	,,,,,,,	,	, -	,	-,
By education level - All sectors -		4,953	3,940	5,057	5,883	5,739	6,731
Bachelors degree (jobs)			,		,	,	,
By education level - All sectors - Masters		1,195	948	1,244	1,464	1,436	1,695
or professional degree (jobs)							•
By education level - All sectors - Doctoral		159	131	186	216	213	249
degree (jobs)							
Related work experience - All sectors -		3,396	2,729	3,700	4,342	4,291	5,112
None (jobs)							
Related work experience - All sectors - Up		4,593	3,755	5,209	6,034	5,971	7,064
to 1 year (jobs)							
Related work experience - All sectors - 1		8,466	6,745	9,024	10,574	10,405	12,359
to 4 years (jobs)							
Related work experience - All sectors - 4		5,404	4,305	5,791	6,819	6,696	7,959
to 10 years (jobs)							
Related work experience - All sectors -		1,420	1,134	1,493	1,755	1,718	2,034
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,257	1,023	1,414	1,630	1,608	1,892
(jobs)							
On-the-Job Training - All sectors - Up to 1		15,513	12,448	16,555	19,299	18,998	22,486
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		4,793	3,817	5,251	6,223	6,130	7,333
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,516	1,211	1,755	2,093	2,073	2,498
years (jobs)							
On-the-Job Training - All sectors - Over 10		200	169	242	278	273	318
years (jobs)							
On-Site or In-Plant Training - All sectors -		3,653	2,952	4,061	4,740	4,666	5,518
None (jobs)							
On-Site or In-Plant Training - All sectors -		14,114	11,315	15,064	17,572	17,301	20,496
Up to 1 year (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors -		3,739	2,984	4,092	4,834	4,765	5,695
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,576	1,261	1,784	2,117	2,091	2,506
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		197	157	217	260	258	311
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,292	1,042	1,400	1,665	1,656	1,990

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	670	629	580	552	553	571	593
Final energy use - Residential (PJ)	241	227	219	214	212	213	214
Final energy use - Commercial (PJ)	182	183	183	181	179	181	187
Final energy use - Industry (PJ)	241	258	268	276	288	303	318

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		3.46	3.52	3.75	3.83	4.56	4.72
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	4.86	29.6	30.8	32.6	34.1	35.7	37.6
Heat Pump (%)							
Sales of space heating units - Electric	20.4	20.8	20.3	19.8	19.4	18	15.9
Resistance (%)							
Sales of space heating units - Gas (%)	65.2	38.7	37.8	36.4	35.8	36	36
Sales of space heating units - Fossil (%)	9.54	10.9	11.1	11.1	10.6	10.2	10.6
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	42.5	58	57.9	57.7	57.7	57.6	57.5
Resistance (%)							
Sales of water heating units - Gas Furnace	57.4	42	42.1	42.3	42.3	42.4	42.4
(%)							
Sales of water heating units - Other (%)	0.034	0.035	0.036	0.036	0.036	0.036	0.036
Sales of cooking units - Electric	76.2	76.2	76.2	76.2	76.2	76.2	76.2
Resistance (%)							
Sales of cooking units - Gas (%)	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Residential HVAC investment in 2020s vs.		5.54	5.98				
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	4.52	20.5	48.3	71.1	74.8	75.2	75.2
Heat Pump (%)							
Sales of space heating units - Electric	8.06	6.43	10.8	18.4	23.5	24.2	24.3
Resistance (%)							
Sales of space heating units - Gas Furnace	87.4	71.1	39.3	9.83	1.63	0.522	0.461
(%)							
Sales of space heating units - Fossil (%)	0	1.98	1.55	0.695	0.102	0.009	0
Sales of water heating units - Electric	1.19	0.826	0.821	0.823	0.819	0.815	0.814
Heat Pump (%)							
Sales of water heating units - Electric	10.1	7.06	7.07	7.05	7.05	7.05	7.04
Resistance (%)							
Sales of water heating units - Gas Furnace	87.7	91.1	91.1	91.1	91.1	91.1	91.1
(%)							

Table 69. RFF st	renario - DTI I AR 1	Efficiency/Electrification -	Commercial (continued)
Table 07. NEF 30	CEIIUI IO - FILLAN I	LIIIGIGIIGV/LIGGII IIIGUIIUII :	- 6011111161 6141 1601111114641

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Other (%)	0.996	0.996	0.994	0.993	0.993	0.997	0.996
Sales of cooking units - Electric	44.8	47.8	47.9	47.8	47.9	47.9	48
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	52.2	52.1	52.2	52.1	52.1	52
Commercial HVAC investment in 2020s -		16,080	16,491				
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)	7,000	5,110	2,037	2,037	999	0	0
Installed thermal - Natural gas (MW)	6,687	4,262	4,724	4,828	1,659	3,268	3,730
Installed thermal - Nuclear (MW)	1,236	1,236	1,236	1,236	1,236	0	0
Installed renewables - Rooftop PV (MW)	153	269	400	605	898	1,277	1,767
Installed renewables - Solar - Base land use assumptions (MW)	33.6	33.6	33.6	3,454	10,567	15,905	20,289
Installed renewables - Wind - Base land use assumptions (MW)	12,646	13,206	13,883	13,883	20,577	25,228	34,849

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	72.4	72.4	72.4	6,548	19,946	29,977	38,210
Wind - Base land use assumptions (GWh)	44,187	46,024	48,266	48,266	70,093	85,166	116,445
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	-4.2		-13.4				-12
uptake (Mt CO2e/y)							
Business-as-usual carbon sink - Retained	-0.874		-1.57				-1.63
in Hardwood Products (Mt CO2e/y)							
Business-as-usual carbon sink - Total (Mt	-5.07		-15				-13.6
CO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-82
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-379
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,973
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-77
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,071
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-787
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-5,328
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-1,597
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,244
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-13,537
counting overlap) (1000 tCO2e/y)							

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

Table 13: REF SCENULIO - PILLAR 6: LUNU SINK				2225	2010	2015	
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate							-123
regeneration (1000 tC02e/y)							1.007
Carbon sink potential - Mid - Avoid							-1,326
deforestation (1000 tCO2e/y)							F 057
Carbon sink potential - Mid - Extend							-5,357
rotation length (1000 tC02e/y)							
Carbon sink potential - Mid - Improve							-113
plantations (1000 tC02e/y)							0.1/1
Carbon sink potential - Mid - Increase							-2,141
retention of HWP (1000 tC02e/y)							4 547
Carbon sink potential - Mid - Increase							-1,517
trees outside forests (1000 tC02e/y)							7000
Carbon sink potential - Mid - Reforest							-7,992
cropland (1000 tC02e/y)							11 000
Carbon sink potential - Mid - Reforest							-11,338
pasture (1000 tC02e/y)							0.77
Carbon sink potential - Mid - Restore							-2,467
productivity (1000 tC02e/y)							00.07/
Carbon sink potential - Mid - All (not							-32,374
counting overlap) (1000 tC02e/y)							
Carbon sink potential - High - Accelerate							-164
regeneration (1000 tC02e/y)							
Carbon sink potential - High - Avoid							-2,274
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,741
rotation length (1000 tC02e/y)							
Carbon sink potential - High - Improve							-151
plantations (1000 tC02e/y)							
Carbon sink potential - High - Increase							-3,212
retention of HWP (1000 tC02e/y)							
Carbon sink potential - High - Increase							-2,247
trees outside forests (1000 tC02e/y)							10 (5)
Carbon sink potential - High - Reforest							-10,656
cropland (1000 tC02e/y)							01.070
Carbon sink potential - High - Reforest							-21,079
pasture (1000 tC02e/y)							<u> </u>
Carbon sink potential - High - All (not							-51,213
counting overlap) (1000 tC02e/y)							
Carbon sink potential - High - Restore							-3,690
productivity (1000 tC02e/y)							
Land impacted for carbon sink potential -							13.4
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							289
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							1.510
Land impacted for carbon sink potential -							1,512
Low - Extend rotation length (1000							
hectares)							070
Land impacted for carbon sink potential -							27.9
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 -							112
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							352
					1		

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							104
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							740
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,151
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							20.1
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							298
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,730
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							41.9
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 -							163
Mid - Increase trees outside forests (1000							100
hectares)							
Land impacted for carbon sink potential -							528
Mid - Reforest cropland (1000 hectares)							320
Land impacted for carbon sink potential -							751
							151
Mid - Reforest pasture (1000 hectares)							1 / 00
Land impacted for carbon sink potential -							1,490
Mid - Restore productivity (1000							
hectares)							/ 000
Land impacted for carbon sink potential -							6,022
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							26.8
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							308
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,947
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							55.7
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 -							214
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							705
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							599
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -			+				1,223
High - Restore productivity (1000							.,0
	1	I					

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							7,077
High - Total impacted (over 30 years) (1000 hectares)							