

# Net-Zero America - Tennessee data

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

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Table 1: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		76.6	0.101	0.098	0.072	0.049	0.004
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		26.1	18.6	10.6	8.51	3.48	1.37
Fuel Comb - Electric Generation - Natural							
Gas (deaths)		170	1/1	100	71.1	20.7	13.3
Premature deaths from air pollution - Mobile - On-Road (deaths)		173	161	123	71.1	32.7	13.3
Premature deaths from air pollution - Gas		18.7	17.1	12.9	7.58	3.67	1.72
Stations (deaths)		10.1	11.1	12.7	1.56	3.01	1.12
Premature deaths from air pollution -		17.3	14.1	9.41	5.22	2.55	1.18
Fuel Comb - Residential - Natural Gas		11.5	14.1	7.41	3.22	2.55	1.10
(deaths)							
Premature deaths from air pollution -		1.52	1.21	0.813	0.47	0.211	0.075
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		3.46	3.07	2.32	1.49	0.767	0.335
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		3.38	3.21	3.03	2.84	2.65	2.45
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		15.1	13.2	9.74	6.29	4.07	2.91
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		2.33	1.95	1.53	1.11	0.759	0.483
Fuel Comb - Comm/Institutional - Oil							
(deaths)		1.01					
Premature deaths from air pollution -		1.01	0.845	0.688	0.536	0.393	0.259
Fuel Comb - Comm/Institutional - Other							
(deaths)		170	0.874	0.050	0.007	0.020	0.000
Premature deaths from air pollution -		1.72	0.874	0.859	0.837	0.839	0.822
Industrial Processes - Coal Mining (deaths)							
Premature deaths from air pollution -		62.3	58.3	52.7	41	30.2	18.6
Industrial Processes - Oil & Gas		02.3	36.5	32.1	41	30.2	10.0
Production (deaths)							
Monetary damages from air pollution -		678	0.891	0.866	0.635	0.43	0.035
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		231	165	93.7	75.4	30.8	12.1
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		1,540	1,435	1,091	632	291	118
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		166	152	114	67.1	32.5	15.3
Gas Stations (million \$2019)							
Monetary damages from air pollution -		153	125	83.4	46.3	22.6	10.5
Fuel Comb - Residential - Natural Gas							
(million \$2019)		10.5	10.7	7.0	/ 1/	1.07	0.770
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million		13.5	10.7	7.2	4.16	1.87	0.668
\$2019)							
Monetary damages from air pollution -		30.6	27.2	20.6	13.2	6.79	2.97
Fuel Comb - Residential - Other (million		30.6	21.2	20.6	13.2	0.19	2.91
\$2019)							
Monetary damages from air pollution -		29.9	28.4	26.8	25.1	23.4	21.7
Fuel Comb - Comm/Institutional - Coal		27.7	20.4	20.0	۷.۱	20.4	۷.,۱
(million \$2019)							
Monetary damages from air pollution -		133	117	86.3	55.7	36	25.8
Fuel Comb - Comm/Institutional - Natural			•••				
Gas (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		20.7	17.3	13.6	9.86	6.72	4.27
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		8.93	7.48	6.09	4.75	3.48	2.29
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		15.2	7.71	7.58	7.39	7.4	7.26
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		553	517	468	364	268	166
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 2: E+ scenario - IMPACTS - Jobs

Table 2: E+ Scenario - IMPACTS - Jobs	2222	2225	0000	0005	2212	00/5	
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		446	511	888	614	777	586
By economic sector - Construction (jobs)		4,908	5,306	6,808	7,592	9,699	13,910
By economic sector - Manufacturing		2,866	2,944	3,428	3,138	2,811	3,258
(jobs)							
By economic sector - Mining (jobs)		2,237	1,603	1,043	637	388	238
By economic sector - Other (jobs)		337	397	631	1,000	1,789	3,143
By economic sector - Pipeline (jobs)		452	517	487	296	258	237
By economic sector - Professional (jobs)		2,668	2,471	3,340	3,698	5,146	7,108
By economic sector - Trade (jobs)		2,310	2,015	2,131	2,295	3,076	4,623
By economic sector - Utilities (jobs)		7,759	7,753	9,527	9,650	9,611	12,067
By resource sector - Biomass (jobs)		1,166	1,223	2,297	1,712	2,853	2,565
By resource sector - CO2 (jobs)		13.5	1,134	1,618	735	1,111	1,373
By resource sector - Coal (jobs)		519	20.5	17.8	15.6	14.1	12.5
By resource sector - Grid (jobs)		7,990	8,104	11,539	12,813	13,557	18,310
By resource sector - Natural Gas (jobs)		4,373	3,586	3,247	2,992	1,666	1,688
By resource sector - Nuclear (jobs)		2,514	2,474	2,435	2,397	2,359	2,323
By resource sector - Oil (jobs)		5,546	4,342	3,023	1,949	1,189	650
By resource sector - Solar (jobs)		1,354	1,899	3,132	5,342	10,018	17,208
By resource sector - Wind (jobs)		507	734	973	963	786	1,040
By education level - All sectors - High		10,035	10,000	12,168	12,352	14,326	19,186
school diploma or less (jobs)		.				,	•
By education level - All sectors -		7,275	7,212	8,766	9,100	10,545	14,434
Associates degree or some college (jobs)				•			•
By education level - All sectors -		5,231	4,948	5,745	5,817	6,713	8,917
Bachelors degree (jobs)				-			
By education level - All sectors - Masters		1,270	1,196	1,413	1,449	1,713	2,289
or professional degree (jobs)							
By education level - All sectors - Doctoral		172	159	191	200	257	345
degree (jobs)							
Related work experience - All sectors -		3,472	3,428	4,156	4,240	4,925	6,648
None (jobs)							
Related work experience - All sectors - Up		4,729	4,695	5,728	5,836	6,879	9,247
to 1 year (jobs)				-			•
Related work experience - All sectors - 1		8,697	8,478	10,153	10,383	12,026	16,172
to 4 years (jobs)		.					
Related work experience - All sectors - 4		5,581	5,451	6,517	6,693	7,719	10,424
to 10 years (jobs)		.		•	,		•
Related work experience - All sectors -		1,505	1,464	1,731	1,766	2,004	2,681
Over 10 years (jobs)		.		•		•	•
On-the-Job Training - All sectors - None		1,325	1,281	1,512	1,556	1,852	2,516
(jobs)		,	,	,	,	,	,
On-the-Job Training - All sectors - Up to 1		15,990	15,600	18,710	18,989	22,006	29,405
year (jobs)		-, -	-,	-, -	-,	,	, , , ,

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)		4,931	4,888	5,915	6,121	7,049	9,594
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,517	1,529	1,888	1,987	2,337	3,235
On-the-Job Training - All sectors - Over 10 years (jobs)		220	219	259	267	310	421
On-Site or In-Plant Training - All sectors - None (jobs)		3,838	3,752	4,521	4,640	5,462	7,365
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		14,522	14,181	16,993	17,269	19,983	26,749
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,839	3,801	4,595	4,744	5,467	7,430
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,588	1,585	1,931	2,014	2,350	3,228
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		196	197	244	253	291	398
Wage income - All (million \$2019)		1,276	1,255	1,511	1,556	1,806	2,441

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		123	105	78.9	54.7	35.5	20.6
Oil consumption - Cumulative (million							2,449
bbls)							
Oil production - Annual (million bbls)		0.272	0.273	0.273	0.216	0.176	0.117
Natural gas consumption - Annual (tcf)		303	256	205	154	97.1	67.4
Natural gas consumption - Cumulative							6,175
(tcf)							
Natural gas production - Annual (tcf)		4.04	3.82	3.33	2.81	2.23	1.73

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	679	622	545	451	367	315	293
Final energy use - Residential (PJ)	260	243	223	197	176	163	157
Final energy use - Commercial (PJ)	171	171	165	155	148	145	145
Final energy use - Industry (PJ)	755	838	888	904	913	905	904

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.81	4.94	6.83	7.17	5.85	5.99
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)	42.4	513	983	2,630	4,277	5,593	6,909
Vehicle stocks - LDV – All others (1000 units)	5,761	5,485	5,210	3,797	2,383	1,348	313
Light-duty vehicle capital costs vs. REF -		1.105	2,839	4.591	6.958	7,569	7,219
Cumulative 5-yr (million \$2018)		1,100	2,037	4,371	0,730	1,307	1,217
Public EV charging plugs - DC Fast (1000	0.165		2.15		9.36		15.1
units)							
Public EV charging plugs - L2 (1000 units)	0.888		51.7		225		363

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	32.2	47.8	80.2	87.5	87.8	87.7	87.7
Heat Pump (%)							
Sales of space heating units - Electric	31.3	29.8	12.5	8.63	8.46	8.57	8.59
Resistance (%)							
Sales of space heating units - Gas (%)	32.4	17.9	5.43	2.67	2.55	2.52	2.52
Sales of space heating units - Fossil (%)	4.13	4.49	1.84	1.23	1.19	1.17	1.17
Sales of water heating units - Electric	0	9.08	48.1	56.8	57.1	57.2	57.2
Heat Pump (%)							
Sales of water heating units - Electric	68.9	73.7	46.7	40.6	40.3	40.3	40.3
Resistance (%)							
Sales of water heating units - Gas Furnace	27.4	14.7	2.75	0.116	0	0	0
(%)							
Sales of water heating units - Other (%)	3.71	2.57	2.53	2.53	2.54	2.54	2.54
Sales of cooking units - Electric	83.2	86.7	97.7	99.9	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	16.8	13.3	2.27	0.114	0	0	0
Residential HVAC investment in 2020s vs.		5.23	5.68				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.56	30.6	77.3	90.8	91.9	92	92
Heat Pump (%)							
Sales of space heating units - Electric	4.81	4.61	4.92	6.26	6.57	6.58	6.55
Resistance (%)							
Sales of space heating units - Gas (%)	85.6	62	17.3	2.94	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.83	0.549	0.023	0	0	0
Sales of water heating units - Electric	0.155	10.6	55.7	65.7	66.1	66.2	66.1
Heat Pump (%)							
Sales of water heating units - Electric	5.74	9.97	28	32.1	32.3	32.3	32.3
Resistance (%)							
Sales of water heating units - Gas (%)	92.5	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.59	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s -		19,412	22,037				
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)	3,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,054	9,667	8,705	10,922	10,114	7,630	6,034
Installed thermal - Nuclear (MW)	4,981	4,981	4,981	4,981	4,981	4,981	4,981
Installed renewables - Rooftop PV (MW)	127	205	290	412	585	809	1,096
Installed renewables - Solar - Base land	260	532	1,089	2,367	5,134	12,099	23,955
use assumptions (MW)							
Installed renewables - Wind - Base land	29	75.6	115	115	115	115	115
use assumptions (MW)							
Installed renewables - Solar -	160	160	313	2,907	5,809	11,573	18,894
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	29	29	29	29	29	29	29
land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		0.364	0.667	1.41	2.88	6.84	11
\$2018)							
Capital invested - Wind - Base (billion		0.069	0.052	0	0	0	0
\$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion \$2018)		0.173	0	1.86	2.57	9.47	7
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	3.78	0

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

Item	2020	2025	2030	0005	00/0	00/5	
		2023	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	538	1,056	2,116	4,533	9,759	22,749	44,773
Wind - Base land use assumptions (GWh)	106	245	361	361	361	361	361
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	282	282	575	5,431	10,875	21,631	35,152
Wind - Constrained land use assumptions (GWh)	106	106	106	106	106	106	106
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	4,245	4,245
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	0	2	2
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	3	3	7	7
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment -		0	0	3,213	0	6,799	0
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	170	170	506	506

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	5.99	5.7	17.2	16.5
Annual - BECCS (MMT)		0	0	4.13	4.13	12.5	12.5
Annual - NGCC (MMT)		0	0	1.86	1.57	4.69	4.06
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	5.99	11.7	28.9	45.4
Cumulative - BECCS (MMT)		0	0	4.13	8.26	20.7	33.2
Cumulative - NGCC (MMT)		0	0	1.86	3.43	8.12	12.2
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	181	362	362	362	362
Spur (km)		0	0	470	727	1,511	1,301
All (km)		0	181	832	1,089	1,872	1,662
Cumulative investment - Trunk (million \$2018)		0	1,110	2,221	2,221	2,221	2,221
Cumulative investment - Spur (million \$2018)		0	0	464	763	1,435	1,271
Cumulative investment - All (million \$2018)		0	1,110	2,685	2,984	3,656	3,492

### 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	2.58	3.73
Injection wells (wells)		0	1	2	4	7	8
Resource characterization, appraisal, permitting costs (million \$2020)		25.4	71.2	91.5	91.5	91.5	91.5
Wells and facilities construction costs (million \$2020)		0	16.9	66	118	197	244

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-57.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-363
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,221
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-301
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-2,278
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-325
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-763
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-726
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,289
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-8,323
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-86.8
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,271
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,002
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-441
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-4,556
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-626
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-1,144
cropland (1000 tCO2e/y)							•
Carbon sink potential - Mid - Reforest							-5,156
pasture (1000 tC02e/y)							2,.20

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

Item Corbon sink notantial Mid Bostons	2020	2025	2030	2035	2040	2045	205
Carbon sink potential - Mid - Restore							-2,55
productivity (1000 tC02e/y)							10.00
Carbon sink potential - Mid - All (not							-19,83
counting overlap) (1000 tC02e/y)							-11
Carbon sink potential - High - Accelerate							-11
regeneration (1000 tC02e/y)							0.17
Carbon sink potential - High - Avoid							-2,17
deforestation (1000 tC02e/y)							F 70
Carbon sink potential - High - Extend							-5,78
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-59
plantations (1000 tC02e/y)							/ 00
Carbon sink potential - High - Increase							-6,83
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-92
trees outside forests (1000 tC02e/y)							
Carbon sink potential - High - Reforest							-1,52
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-9,58
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-31,36
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,82
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							9.4
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							27
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,13
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							10
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							46.
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							50.
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							47.
Low - Reforest pasture (1000 hectares)							•••
Land impacted for carbon sink potential -							76
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,43
Low - Total impacted (over 30 years)							2,70
(1000 hectares)							
Land impacted for carbon sink potential -							14.
Mid - Accelerate regeneration (1000							14.
hectares)							
Land impacted for carbon sink potential -					-		28
							28
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							0.00
Land impacted for carbon sink potential -							2,03
Mid - Extend rotation length (1000	[						

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							164
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							67.3
Mid - Increase trees outside forests (1000							
hectares) Land impacted for carbon sink potential -							75.6
Mid - Reforest cropland (1000 hectares)							13.0
Land impacted for carbon sink potential -							341
Mid - Reforest pasture (1000 hectares)							0
Land impacted for carbon sink potential -							1,544
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,532
Mid - Total impacted (over 30 years) (1000							
hectares)							10.0
Land impacted for carbon sink potential -							18.9
High - Accelerate regeneration (1000 hectares)							
Land impacted for carbon sink potential -						+	295
High - Avoid deforestation (over 30 years)							270
(1000 hectares)							
Land impacted for carbon sink potential -							2,949
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							218
High - Improve plantations (1000							
hectares) Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							88.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							101
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							272
High - Reforest pasture (1000 hectares)							1.0/7
Land impacted for carbon sink potential - High - Restore productivity (1000							1,267
hectares)							
Land impacted for carbon sink potential -							5,209
High - Total impacted (over 30 years)							5,207
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-274
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,769
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-54
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,097
deployment - Total (1000 tCO2e/y)							

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tC02e/y)							-274
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,35
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-10
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,73
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							11
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							96
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							98.
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,17
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							11
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,83
and impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							19
Land impacted for carbon sink - Aggressive deployment - Total (1000 nectares)							2,14
able 17: E- scenario - IMPACTS - Health							
Item	2020	2025	2030	2035	2040	2045	205
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		76.6	0.101	0.098	0.072	0.049	0.00
Premature deaths from air pollution -		19.8	12.3	5.08	2.09	0.743	0.47

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		76.6	0.101	0.098	0.072	0.049	0.004
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		19.8	12.3	5.08	2.09	0.743	0.475
Premature deaths from air pollution - Mobile - On-Road (deaths)		176	178	173	156	124	85.5
Premature deaths from air pollution - Gas Stations (deaths)		19.1	19.2	18.4	16.4	13	8.96
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		17.4	15.6	13.6	11.1	8.23	5.5
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.55	1.44	1.33	1.14	0.861	0.572
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.5	3.47	3.39	3.06	2.41	1.7
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		3.38	3.21	3.03	2.84	2.65	2.45
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		15.2	15	14.3	12.6	10.2	7.68

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil		2.34	2.16	1.98	1.72	1.41	1.12
(deaths)							
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.01	0.906	0.807	0.709	0.615	0.527
Premature deaths from air pollution - Industrial Processes - Coal Mining		1.67	0.876	0.867	0.85	0.84	0.797
(deaths)  Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		62.1	56	48.3	42	36.9	25.9
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		678	0.891	0.866	0.635	0.43	0.035
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		175	109	45	18.5	6.58	4.21
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,565	1,579	1,538	1,387	1,106	761
Monetary damages from air pollution - Gas Stations (million \$2019)		169	170	163	145	115	79.4
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		154	139	121	98.2	73	48.7
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		13.8	12.8	11.8	10.1	7.63	5.07
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		31	30.8	30.1	27.2	21.4	15.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		29.9	28.4	26.8	25.1	23.4	21.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		134	133	127	112	90.4	68
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		20.7	19.1	17.5	15.2	12.5	9.95
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		8.93	8.02	7.14	6.27	5.44	4.66
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		14.7	7.73	7.65	7.5	7.41	7.03
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		551	497	429	373	328	230

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		460	481	1,281	907	1,064	586
By economic sector - Construction (jobs)		4,178	5,019	6,267	7,021	11,226	14,881
By economic sector - Manufacturing		2,717	2,875	3,363	3,337	3,814	3,997
(jobs)							
By economic sector - Mining (jobs)		2,261	1,689	1,278	942	691	434
By economic sector - Other (jobs)		284	358	532	878	1,961	3,211
By economic sector - Pipeline (jobs)		455	612	644	406	424	407
By economic sector - Professional (jobs)		2,302	2,155	3,526	4,049	6,339	7,346

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

Table 10. E- Scellul 10 - IMPAG 13 - Jubs (Cul	шиеиј						
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		2,146	1,933	2,230	2,491	3,766	4,876
By economic sector - Utilities (jobs)		6,261	6,829	8,181	8,277	10,767	12,951
By resource sector - Biomass (jobs)		1,186	1,135	3,846	3,438	4,529	2,481
By resource sector - CO2 (jobs)		13.7	1,934	2,777	1,270	1,906	2,343
By resource sector - Coal (jobs)		528	25.1	17.9	15.7	14.1	12.4
By resource sector - Grid (jobs)		5,663	6,190	7,808	10,196	15,000	19,182
By resource sector - Natural Gas (jobs)		3,608	2,774	2,894	2,210	1,901	1,877
By resource sector - Nuclear (jobs)		2,514	2,474	2,435	2,397	2,359	2,323
By resource sector - Oil (jobs)		5,614	4,681	3,916	3,111	2,329	1,373
By resource sector - Solar (jobs)		1,402	1,970	2,735	4,735	10,929	17,540
By resource sector - Wind (jobs)		534	768	873	937	1,084	1,558
By education level - All sectors - High		8,838	9,377	11,828	12,128	17,130	20,727
school diploma or less (jobs)				-	-		
By education level - All sectors -		6,281	6,684	8,240	8,653	12,463	15,565
Associates degree or some college (jobs)				-	-		•
By education level - All sectors -		4,663	4,634	5,644	5,852	8,090	9,595
Bachelors degree (jobs)			.			,	•
By education level - All sectors - Masters		1,125	1,108	1,391	1,461	2,056	2,439
or professional degree (jobs)		, -	,	,-	, -	,	, -
By education level - All sectors - Doctoral		155	148	199	215	312	363
degree (jobs)							
Related work experience - All sectors -		3,035	3,196	4,020	4,141	5,880	7,167
None (jobs)			-,	,,,,,	.,	7,555	.,
Related work experience - All sectors - Up		4,193	4,403	5,619	5,811	8,252	9,940
to 1 year (jobs)		, -	,	-,-	-,-	-, -	,
Related work experience - All sectors - 1		7,637	7,907	9,792	10,157	14,345	17,435
to 4 years (jobs)		,	, -	,	-, -	,	,
Related work experience - All sectors - 4		4,873	5,077	6,222	6,483	9,184	11,246
to 10 years (jobs)							•
Related work experience - All sectors -		1,325	1,368	1,649	1,717	2,390	2,901
Over 10 years (jobs)					-		•
On-the-Job Training - All sectors - None		1,184	1,206	1,486	1,559	2,219	2,697
(jobs)							•
On-the-Job Training - All sectors - Up to 1		14,138	14,586	18,261	18,842	26,420	31,702
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		4,261	4,539	5,553	5,801	8,311	10,357
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,284	1,410	1,752	1,846	2,731	3,477
years (jobs)							
On-the-Job Training - All sectors - Over 10		197	209	250	261	370	457
years (jobs)							
On-Site or In-Plant Training - All sectors -		3,389	3,509	4,411	4,584	6,525	7,918
None (jobs)							
On-Site or In-Plant Training - All sectors -		12,823	13,257	16,522	17,072	23,958	28,843
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		3,328	3,535	4,332	4,521	6,462	8,022
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,356	1,468	1,809	1,894	2,763	3,476
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		167	182	227	238	344	430
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,121	1,171	1,458	1,525	2,156	2,632

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	680	628	570	525	490	449	400
Final energy use - Residential (PJ)	260	244	232	219	204	187	173
Final energy use - Commercial (PJ)	171	171	169	166	161	156	153
Final energy use - Industry (PJ)	755	838	889	910	921	912	909

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

			-				
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.14	4.18	4.77	4.88	5.83	6.04
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)	32.8	171	309	950	1,590	3,008	4,425
Vehicle stocks - LDV – All others (1000 units)	5,784	5,784	5,784	5,487	5,189	3,999	2,808
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	180	376	1,271	3,991	5,817
Public EV charging plugs - DC Fast (1000 units)	0.165		0.677		3.48		9.69
Public EV charging plugs - L2 (1000 units)	0.888		16.3		83.7		233

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	32.2	41.6	45.3	56	72.3	82.8	86.5
Heat Pump (%)							
Sales of space heating units - Electric	31.3	33.1	31	25.2	16.6	11.1	9.21
Resistance (%)							
Sales of space heating units - Gas (%)	32.4	20.3	18.9	14.9	8.67	4.49	3.04
Sales of space heating units - Fossil (%)	4.13	5	4.74	3.81	2.44	1.57	1.28
Sales of water heating units - Electric	0	1.56	6	18.8	38.4	51.1	55.6
Heat Pump (%)							
Sales of water heating units - Electric	68.9	78.9	75.9	67	53.3	44.5	41.4
Resistance (%)							
Sales of water heating units - Gas Furnace	27.4	17	15.5	11.7	5.76	1.83	0.477
(%)							
Sales of water heating units - Other (%)	3.71	2.57	2.54	2.55	2.56	2.54	2.54
Sales of cooking units - Electric	83.1	83.5	85.1	89.2	94.8	98.3	99.6
Resistance (%)							
Sales of cooking units - Gas (%)	16.9	16.5	14.9	10.8	5.17	1.67	0.449
Residential HVAC investment in 2020s vs.		5.17	5.41				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.56	21.7	26.9	42.4	66.6	83.3	89.7
Heat Pump (%)							
Sales of space heating units - Electric	4.81	4.61	4.65	4.78	5.23	5.91	6.33
Resistance (%)							
Sales of space heating units - Gas (%)	85.6	70.4	65.3	50.5	27	10.4	3.89
Sales of space heating units - Fossil (%)	0	3.27	3.09	2.34	1.17	0.379	0.099
Sales of water heating units - Electric	0.155	1.96	7.08	21.8	44.4	59.2	64.3
Heat Pump (%)							
Sales of water heating units - Electric	5.74	6.48	8.39	14.4	23.5	29.5	31.6
Resistance (%)							
Sales of water heating units - Gas (%)	92.5	90	83	62.2	30.4	9.74	2.53
Sales of water heating units - Other (%)	1.59	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	47.1	51.3	61.6	76.1	85	88
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Commercial HVAC investment in 2020s -		19,401	22,003				
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)	3,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,082	5,587	5,479	4,742	6,313	7,284	5,683
Installed thermal - Nuclear (MW)	4,981	4,981	4,981	4,981	4,981	4,981	4,981

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-57.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-363
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,221
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-301
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-2,278
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-325
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Low - Reforest							-763
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-726
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,289
productivity (1000 tCO2e/y)							.,_0,
Carbon sink potential - Low - All (not		+				+	-8,323
counting overlap) (1000 tCO2e/y)							0,020
Carbon sink potential - Mid - Accelerate		+				+	-86.8
regeneration (1000 tC02e/y)							00.0
Carbon sink potential - Mid - Avoid							-1,271
deforestation (1000 tCO2e/y)							-1,211
Carbon sink potential - Mid - Extend							-4,002
							-4,002
rotation length (1000 tC02e/y)							-441
Carbon sink potential - Mid - Improve							-441
plantations (1000 tCO2e/y)							/ 55/
Carbon sink potential - Mid - Increase							-4,556
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-626
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-1,144
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-5,156
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-2,556
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-19,839
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-116
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-2,178
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-5,783
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-591
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-6,834
retention of HWP (1000 tCO2e/y)							-,
Carbon sink potential - High - Increase		+				+	-928
trees outside forests (1000 tCO2e/y)							,20
Carbon sink potential - High - Reforest							-1,525
cropland (1000 tCO2e/y)							1,020
or opiana (1000 t0026/ y)							

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

Item Carbon sink potential - High - Reforest	2020	2025	2030	2035	2040	2045	2050 -9,58 <i>6</i>
pasture (1000 tCO2e/y)							-9,566
Carbon sink potential - High - All (not							-31,364
counting overlap) (1000 tC02e/y)							-31,364
Carbon sink potential - High - Restore							-3,823
productivity (1000 tCO2e/y)							-3,020
Land impacted for carbon sink potential -							9.46
Low - Accelerate regeneration (1000							7.40
hectares)							
Land impacted for carbon sink potential -							27
Low - Avoid deforestation (over 30 years)							21
(1000 hectares)							
Land impacted for carbon sink potential -							1,130
Low - Extend rotation length (1000							1,130
hectares)							
Land impacted for carbon sink potential -							109
Low - Improve plantations (1000							10
hectares)							
Land impacted for carbon sink potential -							(
							(
Low - Increase retention of HWP (1000							
hectares) Land impacted for carbon sink potential -							46.4
-							40.4
Low - Increase trees outside forests (1000 hectares)							
Land impacted for carbon sink potential -							50.4
Low - Reforest cropland (1000 hectares)							50.4
Land impacted for carbon sink potential -							47.
·							47.
Low - Reforest pasture (1000 hectares)							7/
Land impacted for carbon sink potential -							76
Low - Restore productivity (1000							
hectares)							0.70
Land impacted for carbon sink potential -							2,43
Low - Total impacted (over 30 years)							
(1000 hectares)							11
Land impacted for carbon sink potential -							14.
Mid - Accelerate regeneration (1000							
hectares)							00
Land impacted for carbon sink potential -							28
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							0.00
Land impacted for carbon sink potential -							2,03
Mid - Extend rotation length (1000							
hectares)							1.1
Land impacted for carbon sink potential -							164
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							67.
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							75.
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							34
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,54
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,53
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							18.9
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							295
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,949
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							218
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 -							88.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							101
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							272
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,267
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,209
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							-274
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,769
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-54
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,097
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-274
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-3,357
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-108
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-3,739
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							112
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							965
deployment - Cropland measures (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							98.3
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,176
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							112
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,832
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							197
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,141
Aggressive deployment - Total (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		76.6	0.101	0.098	0.072	0.049	0.004
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		21.2	15.1	7.9	4.95	1.39	0.523
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		173	161	123	71.1	32.7	13.3
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		18.7	17.1	12.9	7.58	3.67	1.72
Stations (deaths)							
Premature deaths from air pollution -		17.3	14.1	9.41	5.22	2.55	1.18
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		1.52	1.21	0.813	0.47	0.211	0.075
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		3.46	3.07	2.32	1.49	0.767	0.335
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		3.38	3.21	3.03	2.84	2.65	2.45
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		15.1	13.2	9.74	6.29	4.07	2.91
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		2.33	1.95	1.53	1.11	0.759	0.483
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		1.01	0.845	0.688	0.536	0.393	0.259
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		1.86	0.874	0.858	0.836	0.837	0.766
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		61.2	57.4	49.2	35.3	21.4	3.11
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		678	0.891	0.866	0.635	0.43	0.035
Fuel Comb - Electric Generation - Coal							
(million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		188	134	70	43.8	12.3	4.63
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,540	1,435	1,091	632	291	118
Monetary damages from air pollution - Gas Stations (million \$2019)		166	152	114	67.1	32.5	15.3
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		153	125	83.4	46.3	22.6	10.5
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		13.5	10.7	7.2	4.16	1.87	0.668
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		30.6	27.2	20.6	13.2	6.79	2.97
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		29.9	28.4	26.8	25.1	23.4	21.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		133	117	86.3	55.7	36	25.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		20.7	17.3	13.6	9.86	6.72	4.27
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		8.93	7.48	6.09	4.75	3.48	2.29
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		16.4	7.71	7.57	7.37	7.39	6.76
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		543	510	437	314	190	27.6

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		447	514	848	577	668	586
By economic sector - Construction (jobs)		4,204	5,186	8,130	15,159	19,620	32,779
By economic sector - Manufacturing		2,839	3,115	3,927	4,109	4,953	6,374
(jobs)							
By economic sector - Mining (jobs)		2,214	1,548	937	487	198	28.4
By economic sector - Other (jobs)		253	530	1,211	3,208	4,557	8,505
By economic sector - Pipeline (jobs)		443	368	258	162	83.4	30.5
By economic sector - Professional (jobs)		2,349	2,556	4,009	6,972	9,460	15,837
By economic sector - Trade (jobs)		2,138	2,086	2,645	4,678	6,266	11,119
By economic sector - Utilities (jobs)		6,837	6,625	8,420	10,596	13,461	21,822
By resource sector - Biomass (jobs)		1,142	1,241	2,108	1,698	2,497	2,641
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		520	20.5	17.8	15.6	14.1	12.3
By resource sector - Grid (jobs)		6,667	7,342	11,527	16,616	24,301	41,572
By resource sector - Natural Gas (jobs)		3,784	3,049	2,337	2,154	1,433	2,085
By resource sector - Nuclear (jobs)		2,514	2,474	2,435	1,914	1,203	698
By resource sector - Oil (jobs)		5,547	4,282	2,893	1,651	702	4.64
By resource sector - Solar (jobs)		973	3,268	7,713	20,410	27,391	47,703
By resource sector - Wind (jobs)		575	852	1,351	1,489	1,725	2,365
By education level - All sectors - High		9,094	9,607	13,124	19,760	25,433	41,441
school diploma or less (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
	2020	I		9,387			
By education level - All sectors -		6,521	6,832	9,361	14,625	19,017	31,484
Associates degree or some college (jobs)		/ 70/	/ 770	/ 10 /	0.057	11 / / 7	10 /05
By education level - All sectors -		4,794	4,772	6,136	8,954	11,447	18,625
Bachelors degree (jobs)				1 = 10	2211	2.222	. ===
By education level - All sectors - Masters		1,158	1,157	1,519	2,264	2,923	4,798
or professional degree (jobs)							
By education level - All sectors - Doctoral		157	160	218	345	447	733
degree (jobs)							
Related work experience - All sectors -		3,134	3,264	4,436	6,738	8,724	14,352
None (jobs)							
Related work experience - All sectors - Up		4,299	4,575	6,295	9,545	12,293	20,030
to 1 year (jobs)							
Related work experience - All sectors - 1		7,881	8,107	10,864	16,380	21,145	34,669
to 4 years (jobs)							
Related work experience - All sectors - 4		5,039	5,182	6,943	10,559	13,615	22,356
to 10 years (jobs)		, , , ,	-, -	-,	,	-,	,
Related work experience - All sectors -		1,369	1,401	1,845	2,725	3,489	5,673
Over 10 years (jobs)		.,	,,	,,,,,,,	_,	5, 151	-,
On-the-Job Training - All sectors - None		1,209	1,251	1,671	2,574	3,308	5,437
(jobs)		1,207	.,20.	1,011	2,011	0,000	0, 101
On-the-Job Training - All sectors - Up to 1		14,559	15,033	20,130	29,912	38,525	62,795
year (jobs)		14,007	10,000	20,100	27,712	00,020	02,170
On-the-Job Training - All sectors - 1 to 4		4,420	4,611	6,289	9,739	12,598	20,790
years (jobs)		4,420	4,011	0,207	2,137	12,370	20,190
On-the-Job Training - All sectors - 4 to 10		1,334	1,419	2,003	3,277	4,270	7,145
years (jobs)		1,334	1,417	2,003	3,211	4,210	1,145
On-the-Job Training - All sectors - Over 10		201	214	289	448	565	913
		201	214	209	446	363	913
years (jobs)		0 / 00	0.407	/ 00/	7.517	0.400	15.070
On-Site or In-Plant Training - All sectors -		3,483	3,627	4,924	7,516	9,690	15,849
None (jobs)		10.011	12 ( )	10.010		27.011	
On-Site or In-Plant Training - All sectors -		13,211	13,644	18,263	27,204	35,041	57,194
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		3,448	3,599	4,900	7,555	9,772	16,105
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,406	1,476	2,040	3,270	4,240	7,060
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		174	184	256	402	525	873
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,158	1,194	1,595	2,388	3,105	5,140

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	679	622	545	451	367	315	293
Final energy use - Residential (PJ)	260	243	223	197	176	163	157
Final energy use - Commercial (PJ)	171	171	165	155	148	145	145
Final energy use - Industry (PJ)	755	838	888	904	913	905	904

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.81	4.94	6.83	7.17	5.85	5.99
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)	42.4	513	983	2,630	4,277	5,593	6,909
Vehicle stocks - LDV – All others (1000 units)	5,761	5,485	5,210	3,797	2,383	1,348	313

### Table 31: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs vs. REF -		1,105	2,839	4,591	6,958	7,569	7,219
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.165		2.15		9.36		15.1
units)							
Public EV charging plugs - L2 (1000 units)	0.888		51.7		225		363

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	32.2	47.8	80.2	87.5	87.8	87.7	87.7
Heat Pump (%)							
Sales of space heating units - Electric	31.3	29.8	12.5	8.63	8.46	8.57	8.59
Resistance (%)							
Sales of space heating units - Gas (%)	32.4	17.9	5.43	2.67	2.55	2.52	2.52
Sales of space heating units - Fossil (%)	4.13	4.49	1.84	1.23	1.19	1.17	1.17
Sales of water heating units - Electric	0	9.08	48.1	56.8	57.1	57.2	57.2
Heat Pump (%)							
Sales of water heating units - Electric	68.9	73.7	46.7	40.6	40.3	40.3	40.3
Resistance (%)							
Sales of water heating units - Gas Furnace	27.4	14.7	2.75	0.116	0	0	0
(%)							
Sales of water heating units - Other (%)	3.71	2.57	2.53	2.53	2.54	2.54	2.54
Sales of cooking units - Electric	83.2	86.7	97.7	99.9	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	16.8	13.3	2.27	0.114	0	0	0
Residential HVAC investment in 2020s vs.		5.23	5.68				
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	9.56	30.6	77.3	90.8	91.9	92	92
Heat Pump (%)							
Sales of space heating units - Electric	4.81	4.61	4.92	6.26	6.57	6.58	6.55
Resistance (%)							
Sales of space heating units - Gas (%)	85.6	62	17.3	2.94	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.83	0.549	0.023	0	0	0
Sales of water heating units - Electric	0.155	10.6	55.7	65.7	66.1	66.2	66.1
Heat Pump (%)							
Sales of water heating units - Electric	5.74	9.97	28	32.1	32.3	32.3	32.3
Resistance (%)							
Sales of water heating units - Gas (%)	92.5	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.59	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s -		19,412	22,037				
Cumulative 5-yr (million \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	3,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,130	7,005	6,550	6,592	5,665	7,266	9,402
Installed thermal - Nuclear (MW)	4,981	4,981	4,981	4,981	2,540	2,540	0
Installed renewables - Rooftop PV (MW)	127	205	290	412	585	809	1,096
Installed renewables - Solar - Base land use assumptions (MW)	163	163	1,681	6,524	20,916	37,604	77,802
Installed renewables - Wind - Base land use assumptions (MW)	29	75.6	115	115	115	115	115

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Solar -	240	240	1,087	5,808	17,731	34,337	66,337
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	33.2	33.2	33.2	33.2	33.2	33.2	119
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		0	1.82	5.34	15	16.4	37.2
\$2018)							
Capital invested - Wind - Base (billion		0.069	0.052	0	0	0	0
\$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)	355	355	3,227	12,251	39,100	70,108	144,501
Wind - Base land use assumptions (GWh)	106	245	361	361	361	361	361
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Constrained land use assumptions	1,002	1,002	4,184	21,860	66,347	127,856	246,439
(GWh)							
Wind - Constrained land use assumptions	212	212	212	212	212	212	721
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-57.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-363
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,221
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-301
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-2,278
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-325
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-763
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-726
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,289
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-8,323
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-86.8
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,271
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,002
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-441
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-4,556
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-626
trees outside forests (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest							-1,144
cropland (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-5,156
pasture (1000 tC02e/y)							0.55/
Carbon sink potential - Mid - Restore productivity (1000 tC02e/y)							-2,556
Carbon sink potential - Mid - All (not							-19,839
counting overlap) (1000 tCO2e/y)							-17,037
Carbon sink potential - High - Accelerate							-116
regeneration (1000 tC02e/y)							-110
Carbon sink potential - High - Avoid							-2,178
deforestation (1000 tC02e/y)							2,110
Carbon sink potential - High - Extend							-5,783
rotation length (1000 tCO2e/y)							-7
Carbon sink potential - High - Improve							-591
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-6,834
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-928
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,525
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-9,586
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-31,364
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,823
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							9.46
Low - Accelerate regeneration (1000							
hectares)							077
Land impacted for carbon sink potential -							277
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							1 10 0
Land impacted for carbon sink potential -							1,130
Low - Extend rotation length (1000 hectares)							
Land impacted for carbon sink potential -							109
Low - Improve plantations (1000							109
hectares)							
Land impacted for carbon sink potential -				+			0
Low - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							46.4
Low - Increase trees outside forests							10. 1
(1000 hectares)							
Land impacted for carbon sink potential -							50.4
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							47.2
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							767
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,436
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							14.2
Mid - Accelerate regeneration (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 -		2020	2000	2000	20.0	20.10	286
Mid - Avoid deforestation (over 30 years)							200
(1000 hectares)							
Land impacted for carbon sink potential -		+					2,039
Mid - Extend rotation length (1000							2,007
hectares)							
Land impacted for carbon sink potential -							164
Mid - Improve plantations (1000 hectares)							104
							0
Land impacted for carbon sink potential -							U
Mid - Increase retention of HWP (1000							
hectares)							/7.0
Land impacted for carbon sink potential -							67.3
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							75.6
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							341
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,544
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,532
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							18.9
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							295
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,949
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							218
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 -							88.2
High - Increase trees outside forests							00.2
(1000 hectares)							
Land impacted for carbon sink potential -							101
High - Reforest cropland (1000 hectares)							101
Land impacted for carbon sink potential -							272
							212
High - Reforest pasture (1000 hectares)							10/7
Land impacted for carbon sink potential -							1,267
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,209
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-274

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,769
Carbon sink potential - Moderate							-54
deployment - Permanent conservation cover (1000 tC02e/y)							-
Carbon sink potential - Moderate deployment - Total (1000 tC02e/y)							-2,097
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-274
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,357
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tC02e/y)							-108
Carbon sink potential - Aggressive deployment - Total (1000 tC02e/y)							-3,739
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							112
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							965
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							98.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,176
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							112
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,832
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							197
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,141

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)		76.6	0.101	0.098	0.072	0.049	0.004
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		24.1	17	17.6	13.5	4.64	1.51
Premature deaths from air pollution - Mobile - On-Road (deaths)		173	161	123	71.1	32.7	13.3
Premature deaths from air pollution - Gas Stations (deaths)		18.7	17.1	12.9	7.58	3.67	1.72
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		17.3	14.1	9.41	5.22	2.55	1.18
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.52	1.21	0.813	0.47	0.211	0.075

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

Table 38: E+RE- scenario - IMPACTS - Healt	.n (continu	•					
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		3.46	3.07	2.32	1.49	0.767	0.335
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		3.38	3.21	3.03	2.84	2.65	2.45
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		15.1	13.2	9.74	6.29	4.07	2.91
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil		2.33	1.95	1.53	1.11	0.759	0.483
(deaths)  Premature deaths from air pollution -		1.01	0.845	0.688	0.536	0.393	0.259
Fuel Comb - Comm/Institutional - Other (deaths)		1.50	0.070	0.050	0.007	0.000	07//
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.59	0.873	0.859	0.836	0.839	0.766
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		63	60.8	59.4	50.2	41.8	31
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		678	0.891	0.866	0.635	0.43	0.035
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		214	151	156	120	41.1	13.4
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,540	1,435	1,091	632	291	118
Monetary damages from air pollution - Gas Stations (million \$2019)		166	152	114	67.1	32.5	15.3
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		153	125	83.4	46.3	22.6	10.5
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		13.5	10.7	7.2	4.16	1.87	0.668
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		30.6	27.2	20.6	13.2	6.79	2.97
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		29.9	28.4	26.8	25.1	23.4	21.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		133	117	86.3	55.7	36	25.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		20.7	17.3	13.6	9.86	6.72	4.27
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		8.93	7.48	6.09	4.75	3.48	2.29
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		14	7.7	7.58	7.38	7.4	6.76
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		560	540	527	446	371	275

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

Table 39: E+RE- scenario - IMPACTS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		455	486	1,291	776	867	586
By economic sector - Construction (jobs)		4,245	4,939	6,265	6,956	7,294	7,986
By economic sector - Manufacturing (jobs)		2,580	2,328	2,573	2,543	2,453	2,397
By economic sector - Mining (jobs)		2,253	1,646	1,138	748	523	384
By economic sector - Other (jobs)		255	268	372	609	693	778
By economic sector - Pipeline (jobs)		462	661	715	441	453	462
By economic sector - Professional (jobs)		2,327	2,121	3,406	3,601	4,365	4,898
By economic sector - Trade (jobs)		2,131	1,829	1,975	2,058	2,171	2,384
By economic sector - Utilities (jobs)		6,778	7,634	9,363	10,538	12,806	18,342
By resource sector - Biomass (jobs)		1,148	1,135	3,979	2,618	3,406	2,498
By resource sector - CO2 (jobs)		13.8	2,191	3,144	1,429	2,146	2,644
By resource sector - Coal (jobs)		518	20.5	17.8	15.6	14.1	12.3
By resource sector - Grid (jobs)		6,638	6,562	9,886	13,342	13,277	14,165
By resource sector - Natural Gas (jobs)		3,768	3,900	3,224	3,910	3,091	3,168
By resource sector - Nuclear (jobs)		2,514	2,474	2,435	2,397	5,469	11,794
By resource sector - Oil (jobs)		5,545	4,342	3,023	1,949	1,253	835
By resource sector - Solar (jobs)		943	964	1,137	2,218	2,625	2,826
By resource sector - Wind (jobs)		398	323	254	390	343	275
By education level - All sectors - High		9,001	9,303	11,732	12,050	13,215	15,467
school diploma or less (jobs)							
By education level - All sectors - Associates degree or some college (jobs)		6,440	6,736	8,259	8,858	9,778	11,751
By education level - All sectors -		4,740	4,614	5,539	5,731	6,682	8,499
Bachelors degree (jobs)		4,140	4,014	0,007	3,131	0,002	0,477
By education level - All sectors - Masters		1,148	1,112	1,378	1,435	1,706	2,187
or professional degree (jobs)		1,140	1,112	1,510	1,400	1,100	2,101
By education level - All sectors - Doctoral		156	146	191	196	244	314
degree (jobs)  Related work experience - All sectors -		3,103	3,209	4,015	4,167	4,599	5,446
None (jobs)		3,103	0,207	4,010	4,101	4,077	0,440
Related work experience - All sectors - Up		4,250	4,324	5,513	5,640	6,285	7,436
to 1 year (jobs)		4,200	7,027	0,010	5,040	0,200	1,400
Related work experience - All sectors - 1		7,798	7,910	9,728	10,172	11,417	13,872
to 4 years (jobs)		.,. 70	1,710	7,120	10,112	,	10,012
Related work experience - All sectors - 4		4,985	5,107	6,212	6,566	7,364	9,008
to 10 years (jobs)		.,, 00	57.5	0,2.2	3,555	.,00 .	7,000
Related work experience - All sectors -		1,351	1,363	1,632	1,724	1,959	2,456
Over 10 years (jobs)		.,	.,	,,,,,	.,	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	_,
On-the-Job Training - All sectors - None		1,197	1,187	1,447	1,497	1,723	2,147
(jobs)		.,.,.	.,	.,	.,	.,	_,
On-the-Job Training - All sectors - Up to 1		14,386	14,471	18,005	18,571	20,855	25,157
year (jobs)			,	,			,
On-the-Job Training - All sectors - 1 to 4		4,375	4,593	5,600	5,990	6,633	8,043
years (jobs)		, -	, -		-,	-,	-,-
On-the-Job Training - All sectors - 4 to 10		1,330	1,457	1,808	1,960	2,131	2,517
years (jobs)							
On-the-Job Training - All sectors - Over 10		198	203	240	250	283	354
years (jobs)							
On-Site or In-Plant Training - All sectors -		3,442	3,480	4,332	4,496	5,114	6,252
None (jobs)						-	-
On-Site or In-Plant Training - All sectors -		13,058	13,171	16,325	16,894	18,938	22,873
Up to 1 year (jobs)		•	,	'	•	-	•
On-Site or In-Plant Training - All sectors -		3,413	3,563	4,352	4,635	5,125	6,187
1 to 4 years (jobs)		•		'	•	-	•
On-Site or In-Plant Training - All sectors -		1,401	1,512	1,858	1,994	2,181	2,598
4 to 10 years (jobs)		•	,		•		•
On-Site or In-Plant Training - All sectors -		172	186	232	250	268	308
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,147	1,179	1,459	1,543	1,779	2,251

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	679	622	545	451	367	315	293
Final energy use - Residential (PJ)	260	243	223	197	176	163	157
Final energy use - Commercial (PJ)	171	171	165	155	148	145	145
Final energy use - Industry (PJ)	755	838	888	904	913	905	904

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.81	4.94	6.83	7.17	5.85	5.99
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)	42.4	513	983	2,630	4,277	5,593	6,909
Vehicle stocks - LDV – All others (1000 units)	5,761	5,485	5,210	3,797	2,383	1,348	313
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,105	2,839	4,591	6,958	7,569	7,219
Public EV charging plugs - DC Fast (1000 units)	0.165		2.15		9.36		15.1
Public EV charging plugs - L2 (1000 units)	0.888		51.7		225		363

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	32.2	47.8	80.2	87.5	87.8	87.7	87.7
Heat Pump (%)							
Sales of space heating units - Electric	31.3	29.8	12.5	8.63	8.46	8.57	8.59
Resistance (%)							
Sales of space heating units - Gas (%)	32.4	17.9	5.43	2.67	2.55	2.52	2.52
Sales of space heating units - Fossil (%)	4.13	4.49	1.84	1.23	1.19	1.17	1.17
Sales of water heating units - Electric	0	9.08	48.1	56.8	57.1	57.2	57.2
Heat Pump (%)							
Sales of water heating units - Electric	68.9	73.7	46.7	40.6	40.3	40.3	40.3
Resistance (%)							
Sales of water heating units - Gas Furnace	27.4	14.7	2.75	0.116	0	0	0
(%)							
Sales of water heating units - Other (%)	3.71	2.57	2.53	2.53	2.54	2.54	2.54
Sales of cooking units - Electric	83.2	86.7	97.7	99.9	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	16.8	13.3	2.27	0.114	0	0	0
Residential HVAC investment in 2020s vs.		5.23	5.68				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.56	30.6	77.3	90.8	91.9	92	92
Heat Pump (%)							
Sales of space heating units - Electric	4.81	4.61	4.92	6.26	6.57	6.58	6.55
Resistance (%)							
Sales of space heating units - Gas (%)	85.6	62	17.3	2.94	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.83	0.549	0.023	0	0	0
Sales of water heating units - Electric	0.155	10.6	55.7	65.7	66.1	66.2	66.1
Heat Pump (%)							
Sales of water heating units - Electric	5.74	9.97	28	32.1	32.3	32.3	32.3
Resistance (%)							
Sales of water heating units - Gas (%)	92.5	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.59	1.58	1.58	1.58	1.58	1.57	1.56

### Table 44: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s -		19,412	22,037				
Cumulative 5-yr (million \$2018)							

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

		,	J 1	,			
Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	3,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,078	5,849	5,100	6,979	12,236	12,657	10,150
Installed thermal - Nuclear (MW)	4,981	4,981	4,981	4,981	4,981	6,329	10,221
Installed renewables - Rooftop PV (MW)	127	205	290	412	585	809	1,096
Installed renewables - Solar - Base land	519	519	519	519	1,509	2,585	2,700
use assumptions (MW)							
Installed renewables - Wind - Base land	29	75.6	75.6	75.6	115	162	162
use assumptions (MW)							
Installed renewables - Solar -	240	240	240	452	1,067	2,808	2,808
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	29	29	29	29	29	29	29
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		0	0	0	1.03	1.06	0.107
\$2018)							
Capital invested - Wind - Base (billion		0.069	0	0	0.046	0	0
\$2018)							
Capital invested - Solar PV - Constrained		0	0	0.233	0.639	1.71	0
(billion \$2018)							
Capital invested - Wind - Constrained		0	0	0	0	0	0
(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)	1,029	1,029	1,029	1,029	2,901	4,915	5,134
Wind - Base land use assumptions (GWh)	106	245	245	245	361	361	361
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	501	501	501	902	2,052	5,309	5,309
Wind - Constrained land use assumptions (GWh)	106	106	106	106	106	106	106
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-57.9
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-363
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,221
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-301
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-2,278

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

Item Conhon sink notantial Law Inches	2020	2025	2030	2035	2040	2045	205
Carbon sink potential - Low - Increase							-32
trees outside forests (1000 tC02e/y)							7.
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-76
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-72
Carbon sink potential - Low - Restore productivity (1000 tC02e/y)							-1,28
Carbon sink potential - Low - All (not							-8,32
counting overlap) (1000 tCO2e/y) Carbon sink potential - Mid - Accelerate							-86.
regeneration (1000 tC02e/y) Carbon sink potential - Mid - Avoid							-1,2
deforestation (1000 tCO2e/y) Carbon sink potential - Mid - Extend							-4,00
rotation length (1000 tC02e/y)							-4,00
Carbon sink potential - Mid - Improve							-44
plantations (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-4,55
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-62
trees outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest							-1,14
cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							-5,15
pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore							-2,55
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-19,83
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1
Carbon sink potential - High - Avoid							-2,17
deforestation (1000 tCO2e/y) Carbon sink potential - High - Extend							-5,78
rotation length (1000 tCO2e/y) Carbon sink potential - High - Improve							-5
plantations (1000 tCO2e/y)							J
Carbon sink potential - High - Increase							-6,83
retention of HWP (1000 tCO2e/y) Carbon sink potential - High - Increase							-92
trees outside forests (1000 tC02e/y)							- / 2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,52
Carbon sink potential - High - Reforest							-9,58
pasture (1000 tCO2e/y) Carbon sink potential - High - All (not							-31,36
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,82
Land impacted for carbon sink potential -							9.4
Low - Accelerate regeneration (1000 hectares)							
Land impacted for carbon sink potential -							2
Low - Avoid deforestation (over 30 years)							_
(1000 hectares)							
Land impacted for carbon sink potential -							1,13
Low - Extend rotation length (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 -							109
Low - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -	+						0
Low - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							46.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							50.4
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							47.2
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							767
Low - Restore productivity (1000							
hectares)  Land impacted for carbon sink potential -							2,436
Low - Total impacted (over 30 years)							2,430
(1000 hectares)							
Land impacted for carbon sink potential -							14.2
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							286
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,039
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							164
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000							0
hectares)							
Land impacted for carbon sink potential -	+						67.3
Mid - Increase trees outside forests (1000							01.0
hectares)							
Land impacted for carbon sink potential -							75.6
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							341
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,544
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,532
Mid - Total impacted (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							18.9
High - Accelerate regeneration (1000							10.7
hectares)							
Land impacted for carbon sink potential -	+						295
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,949
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							218
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							

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 -							88.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							101
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							272
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,267
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,209
High - Total impacted (over 30 years)							
(1000 hectares)							

Table 48: E+RE- scenario - PILLAR 6: Land Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate	2020	2020	2000	2000	2040	2040	-274
deployment - Corn-ethanol to energy							217
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-1,769
deployment - Cropland measures (1000							.,,
tCO2e/y)							
Carbon sink potential - Moderate							-54
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,097
deployment - Total (1000 tCO2e/y)							_,
Carbon sink potential - Aggressive							-274
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-3,357
deployment - Cropland measures (1000							•
tCO2e/y)							
Carbon sink potential - Aggressive							-108
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-3,739
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink - Moderate							112
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							965
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							98.3
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,176
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							112
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,832
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							197
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							

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

	•	•	•				
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,141

Tah	le 49·	F-R+	scenario	n – T	MΡΔ	CTS -	Heal	th
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Thom	2020	2025	2020	2035	2040	2045	2050
Item	2020	I	2030			I .	2050 0.004
Premature deaths from air pollution -		76.6	0.101	0.098	0.072	0.049	0.004
Fuel Comb - Electric Generation - Coal							
(deaths)  Premature deaths from air pollution -		22.6	13.3	6.67	4.27	2.16	0.915
Fuel Comb - Electric Generation - Natural		22.0	13.3	0.07	4.21	2.16	0.915
Gas (deaths)		17/	170	170	157	10/	0.5.5
Premature deaths from air pollution - Mobile - On-Road (deaths)		176	178	173	156	124	85.5
		19.1	19.2	18.4	16.4	13	8.96
Premature deaths from air pollution - Gas Stations (deaths)		19.1	19.2	18.4	16.4	13	8.96
		17 /	15 /	10 /	11 1	0.00	5.5
Premature deaths from air pollution -		17.4	15.6	13.6	11.1	8.23	5.5
Fuel Comb - Residential - Natural Gas							
(deaths)		1.55	1//	1.00	11/	0.071	0.570
Premature deaths from air pollution -		1.55	1.44	1.33	1.14	0.861	0.572
Fuel Comb - Residential - Oil (deaths)		0.5	0.77	0.00	0.07	0.11	17
Premature deaths from air pollution -		3.5	3.47	3.39	3.06	2.41	1.7
Fuel Comb - Residential - Other (deaths)		0.00	0.01	0.00		0.75	0.45
Premature deaths from air pollution -		3.38	3.21	3.03	2.84	2.65	2.45
Fuel Comb - Comm/Institutional - Coal							
(deaths)		17.0		11.0	10.1	12.2	
Premature deaths from air pollution -		15.2	15	14.3	12.6	10.2	7.68
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		2.34	2.16	1.98	1.72	1.41	1.12
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		1.01	0.906	0.807	0.709	0.615	0.527
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		1.72	0.876	0.867	0.851	0.852	0.83
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		62.1	56	48.3	42	36.9	25.9
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		678	0.891	0.866	0.635	0.43	0.035
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		200	118	59.1	37.9	19.1	8.1
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		1,565	1,579	1,538	1,387	1,106	761
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		169	170	163	145	115	79.4
Gas Stations (million \$2019)							
Monetary damages from air pollution -		154	139	121	98.2	73	48.7
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		13.8	12.8	11.8	10.1	7.63	5.07
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		31	30.8	30.1	27.2	21.4	15.1
Fuel Comb - Residential - Other (million							
\$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		29.9	28.4	26.8	25.1	23.4	21.7
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		134	133	127	112	90.4	68
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		20.7	19.1	17.5	15.2	12.5	9.95
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		8.93	8.02	7.14	6.27	5.44	4.66
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		15.2	7.73	7.65	7.51	7.52	7.32
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		551	497	429	373	328	230
Industrial Processes - Oil & Gas							
Production (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)	2020	453	798	1,021	1,747	1,554	1,357
		4,373	5,159	5,999	6,753	9,477	14,105
By economic sector - Construction (jobs) By economic sector - Manufacturing		2,786	3,028				
,		2,786	3,028	3,056	3,346	3,561	4,029
(jobs)		0.050	1 / 07	1.007	000	(00	/ 05
By economic sector - Mining (jobs)		2,253	1,687	1,284	990	698	405
By economic sector - Other (jobs)		299	368	487	760	1,450	2,971
By economic sector - Pipeline (jobs)		451	618	656	420	426	404
By economic sector - Professional (jobs)		2,406	2,576	3,077	5,270	6,611	8,514
By economic sector - Trade (jobs)		2,194	2,017	2,089	2,785	3,491	4,972
By economic sector - Utilities (jobs)		6,674	7,137	7,835	8,171	9,970	12,312
By resource sector - Biomass (jobs)		1,175	1,987	3,027	6,960	7,179	6,461
By resource sector - CO2 (jobs)		13.6	1,981	2,849	1,313	1,964	2,387
By resource sector - Coal (jobs)		519	20.5	17.9	15.7	14.2	12.5
By resource sector - Grid (jobs)		6,267	6,261	7,621	10,092	13,547	17,881
By resource sector - Natural Gas (jobs)		3,843	3,237	2,393	1,980	1,617	1,621
By resource sector - Nuclear (jobs)		2,514	2,474	2,435	2,397	2,359	2,323
By resource sector - Oil (jobs)		5,614	4,681	3,916	3,270	2,347	1,278
By resource sector - Solar (jobs)		1,389	1,951	2,478	3,680	7,540	16,067
By resource sector - Wind (jobs)		554	794	768	534	671	1,039
By education level - All sectors - High		9,174	10,023	11,034	13,047	15,932	20,924
school diploma or less (jobs)		·	·	,			,
By education level - All sectors -		6,563	7,064	7,734	8,913	11,293	15,319
Associates degree or some college (jobs)		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	, -	-, -	, -	-,-
By education level - All sectors -		4,826	4,940	5,266	6,389	7,712	9,873
Bachelors degree (jobs)		,	, -		.,	,	,
By education level - All sectors - Masters		1,167	1,195	1,290	1,635	1,987	2,551
or professional degree (jobs)		,,,,,,	,,,,,	1,210	,,,,,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	_,
By education level - All sectors - Doctoral		160	164	181	258	314	401
degree (jobs)							
Related work experience - All sectors -		3,158	3,415	3,751	4,442	5,469	7,227
None (jobs)		,,,,,	,	-,	.,	3,131	.,
Related work experience - All sectors - Up		4,345	4,727	5,219	6,368	7,771	10,202
to 1 year (jobs)		,,,,,,	7,	,	5,555	.,	,
Related work experience - All sectors - 1		7,937	8,426	9,150	10,832	13,325	17,527
to 4 years (jobs)		.,,,,,	5, 125	7,.00	.0,002	.0,020	11,021
Related work experience - All sectors - 4		5,074	5,377	5,836	6,807	8,465	11,219
to 10 years (jobs)		0,01-4	0,011	0,000	0,001	0,400	11,217

Table EO.	C D.	acanania	TMDACTO	loho	(continued)
Table 50.	F-K+	SCPNALIA -	IIVIPALIS -	.inns i	ICONTINUENI

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors -		1,376	1,442	1,549	1,793	2,207	2,893
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,224	1,281	1,389	1,688	2,079	2,751
(jobs)							
On-the-Job Training - All sectors - Up to 1		14,664	15,615	16,999	20,480	24,883	32,345
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		4,449	4,787	5,227	5,941	7,510	10,146
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,349	1,485	1,654	1,867	2,434	3,376
years (jobs)							
On-the-Job Training - All sectors - Over 10		204	219	236	265	332	450
years (jobs)							
On-Site or In-Plant Training - All sectors -		3,517	3,760	4,101	4,950	6,093	8,040
None (jobs)							
On-Site or In-Plant Training - All sectors -		13,305	14,156	15,407	18,454	22,486	29,317
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		3,472	3,732	4,074	4,659	5,860	7,887
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,420	1,546	1,708	1,934	2,486	3,399
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		175	192	213	245	313	424
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,165	1,245	1,366	1,632	2,019	2,659

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	680	628	570	525	490	449	400
Final energy use - Residential (PJ)	260	244	232	219	204	187	173
Final energy use - Commercial (PJ)	171	171	169	166	161	156	153
Final energy use - Industry (PJ)	755	838	889	910	921	912	909

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.14	4.18	4.77	4.88	5.83	6.04
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	32.8	171	309	950	1,590	3,008	4,425
Vehicle stocks - LDV – All others (1000 units)	5,784	5,784	5,784	5,487	5,189	3,999	2,808
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	180	376	1,271	3,991	5,817
Public EV charging plugs - DC Fast (1000 units)	0.165		0.677		3.48		9.69
Public EV charging plugs - L2 (1000 units)	0.888		16.3		83.7		233

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	32.2	41.6	45.3	56	72.3	82.8	86.5
Heat Pump (%)							
Sales of space heating units - Electric	31.3	33.1	31	25.2	16.6	11.1	9.21
Resistance (%)							
Sales of space heating units - Gas (%)	32.4	20.3	18.9	14.9	8.67	4.49	3.04
Sales of space heating units - Fossil (%)	4.13	5	4.74	3.81	2.44	1.57	1.28

Table C/. C D. seesanie	DILLADA Efficience	/Flaataifiaatiaa	Danidantial	(
Table 54: E-B+ scenario -	· PILLAK I: ETICIENC	V/Electrification	- Kesiaentiai	i continuea i

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric	0	1.56	6	18.8	38.4	51.1	55.6
Heat Pump (%)							
Sales of water heating units - Electric	68.9	78.9	75.9	67	53.3	44.5	41.4
Resistance (%)							
Sales of water heating units - Gas Furnace	27.4	17	15.5	11.7	5.76	1.83	0.477
(%)							
Sales of water heating units - Other (%)	3.71	2.57	2.54	2.55	2.56	2.54	2.54
Sales of cooking units - Electric	83.1	83.5	85.1	89.2	94.8	98.3	99.6
Resistance (%)							
Sales of cooking units - Gas (%)	16.9	16.5	14.9	10.8	5.17	1.67	0.449
Residential HVAC investment in 2020s vs.		5.17	5.41				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.56	21.7	26.9	42.4	66.6	83.3	89.7
Heat Pump (%)							
Sales of space heating units - Electric	4.81	4.61	4.65	4.78	5.23	5.91	6.33
Resistance (%)							
Sales of space heating units - Gas (%)	85.6	70.4	65.3	50.5	27	10.4	3.89
Sales of space heating units - Fossil (%)	0	3.27	3.09	2.34	1.17	0.379	0.099
Sales of water heating units - Electric	0.155	1.96	7.08	21.8	44.4	59.2	64.3
Heat Pump (%)							
Sales of water heating units - Electric	5.74	6.48	8.39	14.4	23.5	29.5	31.6
Resistance (%)							
Sales of water heating units - Gas (%)	92.5	90	83	62.2	30.4	9.74	2.53
Sales of water heating units - Other (%)	1.59	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	47.1	51.3	61.6	76.1	85	88
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Commercial HVAC investment in 2020s -		19,401	22,003				
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)	3,610	34.6	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,106	7,000	5,301	5,301	4,778	5,399	3,803
Installed thermal - Nuclear (MW)	4,981	4,981	4,981	4,981	4,981	4,981	4,981
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	0.046	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	2.97	0.004	6.62	0	0

## Table 57: E-B+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	3,332	3,337	10,762	10,762	10,762
Biomass w/ccu allam power plant (GWh)	0	0	0	45.5	45.5	45.5	45.5

## 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	2	3	9	9	9
(quantity)							

Table 58: E-B+	scenario -	DTII AR 3.	Clean fuels.	. Rineneray	(continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Allam power w ccu	0	0	0	1	1	1	1
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	4	15	18	18
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1
Conversion capital investment -		0	2,724	4,018	15,288	3,181	0
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	214	575	1,886	2,174	2,174

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	3.3	8.41	27.6	31.7	31.7
Annual - BECCS (MMT)		0	3.3	8.41	27.6	31.7	31.7
Annual - NGCC (MMT)		0	0	0	0	0	0.01
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	3.3	11.7	39.3	71	103
Cumulative - BECCS (MMT)		0	3.3	11.7	39.3	71	103
Cumulative - NGCC (MMT)		0	0	0	0	0	0.01
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	181	362	543	543	543
Spur (km)		0	318	1,029	2,203	1,644	2,401
All (km)		0	499	1,390	2,745	2,186	2,944
Cumulative investment - Trunk (million		0	1,293	2,585	3,878	3,878	3,878
\$2018)							
Cumulative investment - Spur (million \$2018)		0	310	1,287	2,763	2,431	2,976
Cumulative investment - All (million \$2018)		0	1,603	3,872	6,641	6,309	6,854

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

Item	2020	2025	2030	2035	2040	2045	2050		
Annual (MMT)		0	0.92	3.21	7.13	9.85	10		
Injection wells (wells)		0	2	7	12	20	24		
Resource characterization, appraisal, permitting costs (million \$2020)		25.4	112	173	173	173	173		
Wells and facilities construction costs (million \$2020)		0	50.8	198	353	590	732		

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-57.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-363
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,221
rotation length (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	205
Carbon sink potential - Low - Improve							-30
plantations (1000 tCO2e/y)							0.07
Carbon sink potential - Low - Increase							-2,27
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-32
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-76
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-72
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,28
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-8,32
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-86.
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,27
deforestation (1000 tC02e/y)							
Carbon sink potential - Mid - Extend							-4,00
rotation length (1000 tCO2e/y)							,
Carbon sink potential - Mid - Improve							-44
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-4,55
retention of HWP (1000 tCO2e/y)							4,00
Carbon sink potential - Mid - Increase						+	-62
trees outside forests (1000 tCO2e/y)							02
Carbon sink potential - Mid - Reforest						+	-1,14
cropland (1000 tCO2e/y)							-1,14
Carbon sink potential - Mid - Reforest							-5,15
·							-5,15
pasture (1000 tC02e/y)							0.55
Carbon sink potential - Mid - Restore							-2,55
productivity (1000 tCO2e/y)							10.00
Carbon sink potential - Mid - All (not							-19,83
counting overlap) (1000 tC02e/y)							
Carbon sink potential - High - Accelerate							-11
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-2,17
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-5,78
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-59
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-6,83
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-92
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,52
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-9,58
pasture (1000 tCO2e/y)							•
Carbon sink potential - High - All (not							-31,36
counting overlap) (1000 tCO2e/y)							,
Carbon sink potential - High - Restore							-3,82
productivity (1000 tC02e/y)							0,02
Land impacted for carbon sink potential -	-			-	+	+	9.4
Low - Accelerate regeneration (1000							7.4
hectares)							
							27
Land impacted for carbon sink potential -							21
Low - Avoid deforestation (over 30 years)							

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 - Low - Extend rotation length (1000							1,130
hectares)							100
Land impacted for carbon sink potential -							109
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							1/1
Land impacted for carbon sink potential -							46.4
Low - Increase trees outside forests (1000 hectares)							
Land impacted for carbon sink potential -							50.4
Low - Reforest cropland (1000 hectares)							50.4
Land impacted for carbon sink potential -							47.2
Low - Reforest pasture (1000 hectares)							41.2
Land impacted for carbon sink potential -							767
Low - Restore productivity (1000							101
hectares)							
Land impacted for carbon sink potential -							2,436
Low - Total impacted (over 30 years)							2,430
(1000 hectares)							
Land impacted for carbon sink potential -							14.2
Mid - Accelerate regeneration (1000							14.2
hectares)							
Land impacted for carbon sink potential -							286
Mid - Avoid deforestation (over 30 years)							200
(1000 hectares)							
Land impacted for carbon sink potential -							2,039
Mid - Extend rotation length (1000							2,037
hectares)							
Land impacted for carbon sink potential -							164
Mid - Improve plantations (1000 hectares)							104
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							Ū
hectares)							
Land impacted for carbon sink potential -							67.3
Mid - Increase trees outside forests (1000							01.0
hectares)							
Land impacted for carbon sink potential -							75.6
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							341
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,544
Mid - Restore productivity (1000							1,0 1 1
hectares)							
Land impacted for carbon sink potential -							4,532
Mid - Total impacted (over 30 years) (1000							4,002
hectares)							
Land impacted for carbon sink potential -							18.9
High - Accelerate regeneration (1000							10.7
hectares)							
Land impacted for carbon sink potential -							295
High - Avoid deforestation (over 30 years)							2,0
(1000 hectares)							
Land impacted for carbon sink potential -							2,949
High - Extend rotation length (1000							2,747
hectares)							
Land impacted for carbon sink potential -							218
High - Improve plantations (1000							210
g. zp. c.c plantationo (1000					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 -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							88.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							101
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							272
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,267
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,209
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							-652
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,638
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-48.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Moderate							-2,339
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Aggressive							-652
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							0.400
Carbon sink potential - Aggressive							-3,109
deployment - Cropland measures (1000							
tCO2e/y)							07.0
Carbon sink potential - Aggressive							-97.8
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							
crops (1000 tC02e/y)							0
Carbon sink potential - Aggressive							U
deployment - Pasture to energy crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-3,859
deployment - Total (1000 tC02e/y)							-3,639
Land impacted for carbon sink - Moderate							292
deployment - Corn-ethanol to energy							292
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							877
deployment - Cropland measures (1000							011
hectares)							
iieotai eoj							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							89
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							110
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							442
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							1,810
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							292
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							4,110
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							178
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							110
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							442
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							5,132
Aggressive deployment - Total (1000							
hectares)							

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal		273	187	148	127	120	119
(deaths)  Premature deaths from air pollution -		21.5	23.2	25.1	29.4	24.8	23.6
Fuel Comb - Electric Generation - Natural		21.5	23.2	25.1	29.4	24.0	23.0
Gas (deaths)							
Premature deaths from air pollution -		176	180	184	190	195	200
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		19.1	19.3	19.6	19.9	20.2	20.5
Stations (deaths)  Premature deaths from air pollution -		171	15.3	13.7	12.6	12.1	11.7
Fuel Comb - Residential - Natural Gas		17.1	15.5	13.7	12.0	12.1	11.7
(deaths)							
Premature deaths from air pollution -		1.52	1.28	0.933	0.631	0.407	0.277
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		3.3	3.16	3.09	3.06	3.03	2.99
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		3.53	3.51	3.47	3.43	3.37	3.3
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		15.2	14.8	13.6	12.1	11.5	11.7
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		2.42	2.42	2.36	2.23	2.13	2.08
Fuel Comb - Comm/Institutional - Oil							
(deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other		1.05	1.07	1.1	1.12	1.14	1.16
(deaths)		0.00	0.07	107	1.07	1.01	171
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		3.29	2.37	1.97	1.87	1.81	1.71
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		62.5	65.8	67.3	64.3	63.8	59.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		2,416	1,654	1,308	1,128	1,064	1,053
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		191	205	222	261	220	209
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,564	1,601	1,639	1,685	1,732	1,780
Monetary damages from air pollution - Gas Stations (million \$2019)		169	171	173	177	179	182
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		152	136	121	112	107	104
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		13.5	11.3	8.27	5.6	3.6	2.45
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		29.2	28	27.3	27.1	26.9	26.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		31.3	31.1	30.8	30.4	29.9	29.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		135	131	120	107	101	103
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		21.5	21.5	20.9	19.8	18.8	18.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		9.33	9.51	9.71	9.89	10.1	10.3
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		29.1	20.9	17.4	16.5	16	15
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		555	585	598	571	566	530

Table 65: REF scenario - IMPACTS - Jobs

2040 2 431	2045	2050
2 431	/ 04	
	431	435
4 5,379	5,328	5,778
8 2,417	2,269	2,281
3 1,213	1,033	878
6 392	417	568
'3 452	459	460
6 2,477	2,335	2,507
37 1,924	1,825	1,940
7 8,369	7,806	7,959
72 1,029	1,015	1,002
3	5,379 28 2,417 33 1,213 36 392 73 452 06 2,477 37 1,924 07 8,369	34     5,379     5,328       28     2,417     2,269       33     1,213     1,033       36     392     417       73     452     459       36     2,477     2,335       37     1,924     1,825       37     8,369     7,806

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

Table 65. KEF Scellul 10 - IMPAG 13 - Jubs (1	continueuj						
Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - CO2 (jobs)		0	0.02	0.025	0.027	0.03	0.032
By resource sector - Coal (jobs)		544	49	42	27.3	18.5	16.1
By resource sector - Grid (jobs)		6,770	6,594	6,949	9,214	9,054	9,064
By resource sector - Natural Gas (jobs)		3,933	3,873	4,110	4,981	4,083	4,351
By resource sector - Nuclear (jobs)		2,514	2,474	2,435	2,397	2,359	2,323
By resource sector - Oil (jobs)		5,666	4,818	4,234	3,926	3,753	3,630
By resource sector - Solar (jobs)			718	963	1,192	1,413	2,255
By resource sector - Wind (jobs)		41.6	126	152	289	208	164
By education level - All sectors - High		8,594	8,348	8,469	9,787	9,372	9,776
school diploma or less (jobs)							
By education level - All sectors -		6,164	5,941	6,064	7,146	6,769	7,086
Associates degree or some college (jobs)							
By education level - All sectors -		4,593	4,292	4,251	4,796	4,515	4,651
Bachelors degree (jobs)				•	-		-
By education level - All sectors - Masters		1,118	1,042	1,034	1,171	1,103	1,140
or professional degree (jobs)				,			·
By education level - All sectors - Doctoral		152	141	139	155	146	152
degree (jobs)							
Related work experience - All sectors -		2,982	2,867	2,908	3,378	3,212	3,354
None (jobs)			.		,		•
Related work experience - All sectors - Up		4,039	3,921	3,965	4,553	4,362	4,554
to 1 year (jobs)		,	-,	-,	,	,	,
Related work experience - All sectors - 1		7,508	7,161	7,214	8,323	7,895	8,210
to 4 years (jobs)			.	•			•
Related work experience - All sectors - 4		4,797	4,579	4,628	5,371	5,081	5,286
to 10 years (jobs)			.		,	,	•
Related work experience - All sectors -		1,295	1,235	1,243	1,430	1,354	1,401
Over 10 years (jobs)		,					·
On-the-Job Training - All sectors - None		1,147	1,094	1,092	1,237	1,177	1,226
(jobs)				•			•
On-the-Job Training - All sectors - Up to 1		13,803	13,184	13,252	15,198	14,444	15,001
year (jobs)		-			-		
On-the-Job Training - All sectors - 1 to 4		4,202	4,051	4,132	4,857	4,605	4,811
years (jobs)		,		,			•
On-the-Job Training - All sectors - 4 to 10		1,284	1,253	1,297	1,554	1,478	1,559
years (jobs)				,		,	•
On-the-Job Training - All sectors - Over 10		185	181	183	210	200	209
years (jobs)							
On-Site or In-Plant Training - All sectors -		3,288	3,145	3,166	3,639	3,450	3,597
None (jobs)			.	•		,	·
On-Site or In-Plant Training - All sectors -		12,537	11,985	12,057	13,846	13,164	13,675
Up to 1 year (jobs)		,	,	,	-,-	, -	-,-
On-Site or In-Plant Training - All sectors -		3,275	3,158	3,216	3,768	3,578	3,736
1 to 4 years (jobs)		-, -	.,	,	-,	-,-	-,
On-Site or In-Plant Training - All sectors -		1,356	1,315	1,351	1,602	1,522	1,600
4 to 10 years (jobs)		1,000	.,5.5	.,00.	.,002	-,	.,000
On-Site or In-Plant Training - All sectors -		166	161	167	200	190	199
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,111	1,071	1,092	1,273	1,225	1,288
. 5 ( +2017)		.,	.,	., -, -	-,=.0	-,	

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	680	628	576	545	545	562	584
Final energy use - Residential (PJ)	260	244	236	230	227	228	229
Final energy use - Commercial (PJ)	171	174	176	176	177	181	190
Final energy use - Industry (PJ)	755	847	903	938	959	961	976

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.86	5	5.95	6.18	5.74	5.89
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 Heat Pump (%)	30.6	53.8	54.6	55.9	57.2	58.9	61.6
Sales of space heating units - Electric Resistance (%)	32	27.2	26.7	25.9	24.9	23.3	20.6
Sales of space heating units - Gas (%)	33.2	15.8	15.4	14.9	14.7	14.6	14.6
Sales of space heating units - Fossil (%)	4.21	3.29	3.32	3.27	3.22	3.18	3.2
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	68.9	80	80.1	80	79.9	79.9	79.9
Sales of water heating units - Gas Furnace (%)	27.4	17.5	17.3	17.5	17.6	17.5	17.6
Sales of water heating units - Other (%)	3.71	2.57	2.54	2.55	2.57	2.56	2.57
Sales of cooking units - Electric Resistance (%)	82.9	82.9	82.9	82.9	82.9	82.9	82.9
Sales of cooking units - Gas (%)	17.1	17.1	17.1	17.1	17.1	17.1	17.1
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		5.15	4.97				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.56	27.5	56.9	76.1	79	79.4	79.4
Heat Pump (%)							
Sales of space heating units - Electric	4.81	5.67	10	15.4	18.7	19.2	19.2
Resistance (%)							
Sales of space heating units - Gas (%)	85.6	63.9	31.8	8.33	2.28	1.48	1.43
Sales of space heating units - Fossil (%)	0	2.93	1.3	0.192	0.019	0	0
Sales of water heating units - Electric	0.155	0.153	0.147	0.149	0.149	0.146	0.148
Heat Pump (%)							
Sales of water heating units - Electric	5.74	5.75	5.58	5.66	5.62	5.56	5.61
Resistance (%)							
Sales of water heating units - Gas (%)	92.5	92.5	92.7	92.6	92.7	92.7	92.7
Sales of water heating units - Other (%)	1.59	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric	43.5	45.6	45.9	45.7	46	45.9	45.7
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	54.4	54.1	54.3	54	54.1	54.3
Commercial HVAC investment in 2020s -		19,056	19,846				
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)	3,610	50	50	50	0	0	0
Installed thermal - Natural gas (MW)	6,030	7,010	6,898	6,110	11,103	11,365	10,382
Installed thermal - Nuclear (MW)	4,981	4,981	4,981	4,981	4,981	4,981	4,981
Installed renewables - Rooftop PV (MW)	127	205	290	412	585	809	1,096
Installed renewables - Solar - Base land	163	163	163	163	163	163	163
use assumptions (MW)							
Installed renewables - Wind - Base land	29	29	29	29	29	75.6	75.6
use assumptions (MW)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	355	355	355	355	355	355	355
Wind - Base land use assumptions (GWh)	106	106	106	106	106	245	245
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	-8.29		-10.7				-8.71
uptake (Mt CO2e/y)							
Business-as-usual carbon sink - Retained	-1.86		-3.1				-3.26
in Hardwood Products (Mt CO2e/y)							
Business-as-usual carbon sink - Total (Mt	-10.1		-13.8				-12
CO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-57.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-363
deforestation (1000 tC02e/y)							
Carbon sink potential - Low - Extend							-2,221
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-301
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-2,278
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-325
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-763
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-726
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,289
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-8,323
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-86.8
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,271
deforestation (1000 tC02e/y)							
Carbon sink potential - Mid - Extend							-4,002
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-441
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-4,556
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-626
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-1,144
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-5,156
pasture (1000 tC02e/y)							•
Carbon sink potential - Mid - Restore							-2,556
productivity (1000 tCO2e/y)							•
Carbon sink potential - Mid - All (not							-19,839
counting overlap) (1000 tCO2e/y)							,
Carbon sink potential - High - Accelerate			+				-116
regeneration (1000 tCO2e/y)							

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

Table 73: REF scenario - PILLAR 6: Land sii				0005	00/0	0015	0050
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Avoid							-2,178
deforestation (1000 tC02e/y)							F 700
Carbon sink potential - High - Extend							-5,783
rotation length (1000 tC02e/y)							F01
Carbon sink potential - High - Improve							-591
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-6,834
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-928
trees outside forests (1000 tC02e/y)							
Carbon sink potential - High - Reforest							-1,525
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-9,586
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-31,364
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,823
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							9.46
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							277
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,130
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							109
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 -							46.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							50.4
Low - Reforest cropland (1000 hectares)							00.⊣
Land impacted for carbon sink potential -							47.2
Low - Reforest pasture (1000 hectares)							41.2
Land impacted for carbon sink potential -							767
Low - Restore productivity (1000							101
hectares)							
Land impacted for carbon sink potential -							2,436
							2,436
Low - Total impacted (over 30 years)							
(1000 hectares)							1/ 0
Land impacted for carbon sink potential -							14.2
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							286
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,039
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							164
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							67.3
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							75.6
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							341
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,544
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,532
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							18.9
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							295
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,949
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							218
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 -							88.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							101
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							272
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,267
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,209
High - Total impacted (over 30 years)							
(1000 hectares)							