

Net-Zero America - Oregon data

October 29, 2021 (updated November 17, 2023)

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

E. Larson, C. Greig, J. Jenkins, E. Mayfield, A. Pascale, C. Zhang, J. Drossman, R. Williams, S. Pacala, R. Socolow, EJ Baik, R. Birdsey, R. Duke, R. Jones, B. Haley, E. Leslie, K. Paustian, and A. Swan, Net-Zero America: Potential Pathways, Infrastructure, and Impacts, Final Report, Princeton University, Princeton, NJ, 29 October 2021. Report available at https://net-zeroamerica.princeton.edu.

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Table 1: E+ scenario - IMPACTS - Health

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Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.12	0.005	0.005	0.003	0.002	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		4.36	2.52	2.1	1.94	1.57	1.18
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		46.6	43.5	33.1	19.1	8.76	3.52
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		3.25	2.99	2.26	1.34	0.669	0.333
Stations (deaths)							
Premature deaths from air pollution -		4.99	3.84	2.42	1.22	0.511	0.171
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.791	0.611	0.415	0.252	0.135	0.061
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		0.443	0.377	0.287	0.202	0.132	0.089
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.062	0.059	0.056	0.053	0.049	0.046
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		3.93	3.51	2.58	1.62	0.942	0.486
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.717	0.568	0.444	0.336	0.239	0.153
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.293	0.242	0.195	0.151	0.109	0.071
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.068	0.009	0.008	0.007	0.006	0.006
Industrial Processes - Coal Mining							
(deaths)		10		0.10	. 51		2.05
Premature deaths from air pollution -		10	9.33	8.42	6.51	4.8	2.95
Industrial Processes - Oil & Gas							
Production (deaths)		0.7.5	0.010	0.010	0.007	0.017	
Monetary damages from air pollution -		36.5	0.043	0.043	0.027	0.016	0
Fuel Comb - Electric Generation - Coal							
(million \$2019)		00.4	00.4	10.7	17.0	4.4	10.5
Monetary damages from air pollution -		38.6	22.4	18.6	17.2	14	10.5
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)		/1/	207	007	170	770	01.0
Monetary damages from air pollution -		414	387	294	170	77.9	31.3
Mobile - On-Road (million \$2019)		00.0	07.5	00	11.0	F 00	0.05
Monetary damages from air pollution -		28.8	26.5	20	11.9	5.92	2.95
Gas Stations (million \$2019)			0.4	01./	10.0	/ 50	1 50
Monetary damages from air pollution -		44.2	34	21.4	10.8	4.53	1.52
Fuel Comb - Residential - Natural Gas							
(million \$2019)		7.01	F / 1	0.77	0.07	110	0.5/5
Monetary damages from air pollution -		7.01	5.41	3.67	2.24	1.19	0.545
Fuel Comb - Residential - Oil (million							
\$2019)		2.00	2.27	0.57	170	117	0.700
Monetary damages from air pollution -		3.92	3.34	2.54	1.79	1.17	0.789
Fuel Comb - Residential - Other (million							
\$2019)		0.551	0.507	0.404	0.77	0 / 07	0 / 0 /
Monetary damages from air pollution -		0.551	0.524	0.496	0.467	0.437	0.406
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)		0/.0	31.1	00.0	1/. /	0.07	4.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural		34.8	ا.ا ک	22.8	14.4	8.34	4.3
Gas (million \$2019)							
uas (1111111011 42017)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		6.35	5.02	3.93	2.97	2.11	1.36
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		2.59	2.14	1.73	1.34	0.966	0.625
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		0.596	0.076	0.069	0.061	0.055	0.053
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		88.8	82.8	74.7	57.8	42.6	26.2
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 2: E+ scenario - IMPACTS - Jobs

Table 2: E+ Scendrio - IMPAGIS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		183	298	156	105	256	520
By economic sector - Construction (jobs)		11,000	12,548	16,224	18,354	20,626	32,388
By economic sector - Manufacturing		1,545	1,973	2,297	2,402	2,542	4,082
(jobs)		1100				110	
By economic sector - Mining (jobs)		1,109	788	503	297	160	80.2
By economic sector - Other (jobs)		1,607	1,842	2,397	2,993	3,590	6,343
By economic sector - Pipeline (jobs)		259	218	358	124	109	129
By economic sector - Professional (jobs)		5,114	6,754	9,041	11,555	14,129	21,422
By economic sector - Trade (jobs)		3,230	3,950	5,205	6,632	8,133	12,915
By economic sector - Utilities (jobs)		4,708	6,323	9,757	11,344	13,342	23,004
By resource sector - Biomass (jobs)		647	788	400	290	936	2,234
By resource sector - CO2 (jobs)		0	0	1,544	0	250	659
By resource sector - Coal (jobs)		86.9	0	0	0	0	0
By resource sector - Grid (jobs)		7,011	10,266	15,244	19,726	23,628	43,041
By resource sector - Natural Gas (jobs)		2,131	1,792	1,840	1,654	1,259	1,113
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		2,619	2,054	1,431	922	562	300
By resource sector - Solar (jobs)		10,881	10,280	11,623	12,847	14,013	25,967
By resource sector - Wind (jobs)		5,381	9,515	13,856	18,367	22,241	27,570
By education level - All sectors - High		12,235	14,554	19,033	21,954	25,449	41,206
school diploma or less (jobs)							
By education level - All sectors -		9,095	11,028	14,825	17,370	20,279	32,601
Associates degree or some college (jobs)							
By education level - All sectors -		5,724	6,991	9,258	11,046	13,054	20,641
Bachelors degree (jobs)							
By education level - All sectors - Masters		1,460	1,816	2,422	2,940	3,509	5,525
or professional degree (jobs)							
By education level - All sectors - Doctoral		243	304	400	495	596	911
degree (jobs)							
Related work experience - All sectors -		4,156	5,005	6,641	7,744	9,052	14,636
None (jobs)							
Related work experience - All sectors - Up		5,919	7,078	9,220	10,740	12,510	20,146
to 1 year (jobs)							
Related work experience - All sectors - 1		10,268	12,419	16,472	19,350	22,660	36,330
to 4 years (jobs)							
Related work experience - All sectors - 4		6,715	8,134	10,865	12,756	14,913	23,781
to 10 years (jobs)							
Related work experience - All sectors -		1,698	2,058	2,739	3,215	3,753	5,992
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,627	1,940	2,536	2,985	3,494	5,588
(jobs)							
On-the-Job Training - All sectors - Up to 1		18,537	22,406	29,503	34,633	40,578	65,174
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)		6,152	7,422	9,962	11,617	13,517	21,669
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,150	2,584	3,494	4,062	4,716	7,535
On-the-Job Training - All sectors - Over 10 years (jobs)		291	342	444	509	582	916
On-Site or In-Plant Training - All sectors - None (jobs)		4,747	5,735	7,562	8,896	10,421	16,601
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,855	20,347	26,826	31,460	36,825	59,209
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,751	5,722	7,650	8,916	10,373	16,663
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,150	2,582	3,480	4,045	4,697	7,492
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		253	309	420	490	571	919
Wage income - All (million \$2019)		1,675	2,054	2,769	3,292	3,905	6,341

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		58.9	50.4	38	26.4	17.2	9.78
Oil consumption - Cumulative (million							1,173
bbls)							
Oil production - Annual (million bbls)		0	0	0	0	0	0
Natural gas consumption - Annual (tcf)		198	167	134	101	63.4	44
Natural gas consumption - Cumulative							4,030
(tcf)							
Natural gas production - Annual (tcf)		0.609	0.576	0.502	0.424	0.336	0.261

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	334	313	278	236	197	173	163
Final energy use - Residential (PJ)	151	140	123	104	88.4	78.3	72.2
Final energy use - Commercial (PJ)	93.8	95	93.3	89	85.5	84.8	85.9
Final energy use - Industry (PJ)	209	215	214	219	226	230	236

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.38	2.48	3.93	4.2	3.62	3.78
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)	136	450	764	1,864	2,963	3,842	4,720
Vehicle stocks - LDV – All others (1000 units)	3,936	3,748	3,560	2,594	1,628	921	214
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		737	1,953	3,062	4,679	5,048	4,837
Public EV charging plugs - DC Fast (1000 units)	0.347		1.51		5.84		9.31
Public EV charging plugs - L2 (1000 units)	1.3		36.3		141		224

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	12.4	24.5	48.3	57.6	58.8	58.8	58.7
Heat Pump (%)							
Sales of space heating units - Electric	31	37.4	34.1	31.4	31	31.2	31.3
Resistance (%)							
Sales of space heating units - Gas (%)	48.3	24.7	7.17	1.4	0.846	0.812	0.816
Sales of space heating units - Fossil (%)	8.35	13.5	10.5	9.63	9.42	9.21	9.21
Sales of water heating units - Electric	0	7.68	41.4	51	51.8	51.8	51.8
Heat Pump (%)							
Sales of water heating units - Electric	40.2	54.8	44.8	43.1	43.1	43.1	43.1
Resistance (%)							
Sales of water heating units - Gas Furnace	53.4	32.3	8.69	0.78	0.033	0	0
(%)							
Sales of water heating units - Other (%)	6.41	5.3	5.09	5.09	5.1	5.11	5.12
Sales of cooking units - Electric	65.6	73	95.4	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	34.4	27	4.63	0.233	0	0	0
Residential HVAC investment in 2020s vs.		2.54	2.66				
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	2.5	16.7	41.2	54.8	56.6	56.7	56.7
Heat Pump (%)							
Sales of space heating units - Electric	16.7	17.5	36.3	42	42.6	42.6	42.6
Resistance (%)							
Sales of space heating units - Gas (%)	80.8	65.8	22.5	3.25	0.79	0.695	0.695
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric	1	10.3	52.2	64.9	66	66	66
Heat Pump (%)							
Sales of water heating units - Electric	3.08	6.46	25	32.5	33.3	33.3	33.3
Resistance (%)							
Sales of water heating units - Gas (%)	95.1	82.6	22.2	1.99	0.085	0	0
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629
Sales of cooking units - Electric	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Commercial HVAC investment in 2020s -		13,358	14,518				
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)	642	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	2,857	2,832	2,832	3,764	4,078	4,320	5,770
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	2,443	3,766	5,029	6,555	8,366	10,477	12,977
Installed renewables - Solar - Base land use assumptions (MW)	837	837	837	837	837	837	837
Installed renewables - Wind - Base land use assumptions (MW)	4,154	4,154	5,605	6,394	7,175	7,762	7,889
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	109	109	109	197	197	9,353
Installed renewables - Solar - Constrained land use assumptions (MW)	728	728	728	728	728	728	728
Installed renewables - Wind - Constrained land use assumptions (MW)	4,154	4,154	5,500	7,117	11,811	16,223	16,552
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	120	120	120	120	261	10,816

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Wind - Base (billion \$2018)		0	2.51	1.27	1.2	0.855	0.175
Capital invested - Offshore Wind - Base (billion \$2018)		0.417	0	0	0.179	0	12.3
Capital invested - Solar PV - Constrained (billion \$2018)		1.68	0	0	0	0	0
Capital invested - Wind - Constrained (billion \$2018)		0	2.32	2.86	7.4	6.28	0.499
Capital invested - Offshore Wind - Constrained (billion \$2018)		0.46	0	0	0	0.231	14.1
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	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	2,011	2,011	2,011	2,011	2,011	2,011	2,011
Wind - Base land use assumptions (GWh)	14,129	14,129	19,419	22,163	24,777	26,676	27,057
OffshoreWind - Base land use assumptions (GWh)	0	522	522	522	945	945	39,327
Solar - Constrained land use assumptions (GWh)	1,737	1,737	1,737	1,737	1,737	1,737	1,737
Wind - Constrained land use assumptions (GWh)	14,129	14,129	18,888	23,821	37,206	49,139	50,021
OffshoreWind - Constrained land use assumptions (GWh)	0	522	522	522	945	945	39,327
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
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	0	0
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	4	11
(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	0	0	2,271	5,019
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	0	0	124	398

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	2.92	9.37
Annual - BECCS (MMT)		0	0	0	0	2.92	9.37
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	2.92	12.3
Cumulative - BECCS (MMT)		0	0	0	0	2.92	12.3
Cumulative - NGCC (MMT)		0	0	0	0	0	0
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	0	497	497	497	497
Spur (km)		0	0	0	0	373	926
All (km)		0	0	497	497	871	1,423
Cumulative investment - Trunk (million \$2018)		0	0	1,561	1,561	1,561	1,561
Cumulative investment - Spur (million \$2018)		0	0	0	0	234	583
Cumulative investment - All (million \$2018)		0	0	1,561	1,561	1,794	2,143

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-1,538
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-211
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-4,235
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,923
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-6,699
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-231
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,282
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-286
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-2,705
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-22,111
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-2,304
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-739
deforestation (1000 tCO2e/y)							

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

Item Caphon sink potential Mid. Extend	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,630
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,284
Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)							-13,398
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-446
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,923
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,033
Carbon sink potential - Mid - Restore productivity (1000 tC02e/y)							-5,365
Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)							-41,121
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-3,070
Carbon sink potential - High - Avoid deforestation (1000 tC02e/y)							-1,267
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,025
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,746
Carbon sink potential - High - Increase retention of HWP (1000 tC02e/y)							-20,097
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-660
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,564
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,779
Carbon sink potential - High - All (not counting overlap) (1000 tC02e/y)							-60,233
Carbon sink potential - High - Restore productivity (1000 tC02e/y)							-8,025
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							251
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							161
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,154
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,058
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							33
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							217
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,609

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							5,503
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							377
Mid - Accelerate regeneration (1000							
hectares)							1//
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years)							166
(1000 hectares)							
Land impacted for carbon sink potential -							3,888
Mid - Extend rotation length (1000							3,000
hectares)							
Land impacted for carbon sink potential -	+	+					1,593
Mid - Improve plantations (1000 hectares)							1,070
Land impacted for carbon sink potential -	+	+					0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							47.9
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							325
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							135
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							3,241
Mid - Restore productivity (1000							
hectares)							0.770
Land impacted for carbon sink potential -							9,773
Mid - Total impacted (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							502
High - Accelerate regeneration (1000							302
hectares)							
Land impacted for carbon sink potential -							172
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,622
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							2,117
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							(0.7
Land impacted for carbon sink potential -							62.7
High - Increase trees outside forests (1000 hectares)							
Land impacted for carbon sink potential -	+	+					434
High - Reforest cropland (1000 hectares)							434
Land impacted for carbon sink potential -	+	+			+		107
High - Reforest pasture (1000 hectares)							101
Land impacted for carbon sink potential -							2,660
High - Restore productivity (1000							2,000
hectares)							
Land impacted for carbon sink potential -					+		11,677
High - Total impacted (over 30 years)							.,
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-558
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-37
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-595
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,084
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-74.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,158
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							926
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							988
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,788
Aggressive deployment - Cropland							.,
measures (1000 hectares)							
Land impacted for carbon sink -							126
Aggressive deployment - Permanent							.20
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,914
Aggressive deployment - Total (1000							1,717
hectares)							
nootal ooj							

Table 17: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.12	0.005	0.005	0.003	0.002	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		4.58	2.37	1.55	1.12	0.854	0.853
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		47.3	47.8	46.5	41.9	33.3	22.9
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		3.32	3.33	3.21	2.87	2.28	1.58
Stations (deaths)							

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

Table 17: E- scenario - IMPACTS - Health (c							
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas		5.03	4.34	3.61	2.78	1.94	1.2
(deaths) Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.806	0.718	0.649	0.548	0.409	0.268
Premature deaths from air pollution -		0.448	0.426	0.405	0.363	0.294	0.225
Fuel Comb - Residential - Other (deaths) Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.062	0.059	0.056	0.053	0.049	0.046
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.97	4.07	3.97	3.55	2.86	2.09
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.717	0.609	0.522	0.444	0.375	0.312
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.26	0.229	0.199	0.171	0.144
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.064	0.009	0.008	0.008	0.006	0.004
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		9.98	8.98	7.74	6.73	5.91	4.11
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		36.5	0.043	0.043	0.027	0.016	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		40.6	21	13.7	9.96	7.56	7.55
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		421	425	414	372	296	204
Monetary damages from air pollution - Gas Stations (million \$2019)		29.4	29.5	28.4	25.4	20.2	14
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		44.6	38.4	32	24.6	17.2	10.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		7.14	6.36	5.75	4.86	3.62	2.37
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		3.97	3.78	3.59	3.21	2.61	1.99
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.551	0.524	0.496	0.467	0.437	0.406
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		35.1	36	35.1	31.4	25.3	18.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		6.35	5.39	4.62	3.93	3.32	2.76
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.59	2.3	2.03	1.77	1.51	1.27
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.562	0.078	0.074	0.069	0.056	0.037

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		88.6	79.8	68.8	59.7	52.5	36.5
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 18: E- scenario - IMPACTS - Jobs

Table 18: E- scenario - IMPACTS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		208	246	136	80.2	326	521
By economic sector - Construction (jobs)		10,990	12,604	15,900	17,714	22,054	36,973
By economic sector - Manufacturing		1,550	1,989	2,106	2,335	3,025	4,889
(jobs)							
By economic sector - Mining (jobs)		1,120	821	600	427	287	160
By economic sector - Other (jobs)		1,609	1,853	2,334	2,932	3,720	6,790
By economic sector - Pipeline (jobs)		260	215	499	149	172	220
By economic sector - Professional (jobs)		5,139	6,778	8,648	11,201	15,331	24,626
By economic sector - Trade (jobs)		3,242	4,016	5,081	6,537	8,801	14,711
By economic sector - Utilities (jobs)		4,570	6,177	9,006	10,356	14,419	27,546
By resource sector - Biomass (jobs)		683	632	375	267	1,390	2,160
By resource sector - CO2 (jobs)		0	0	2,647	0	429	1,130
By resource sector - Coal (jobs)		86.9	0	0	0	0	0
By resource sector - Grid (jobs)		6,698	9,879	13,118	17,757	25,431	51,533
By resource sector - Natural Gas (jobs)		2,131	1,781	1,330	1,591	1,324	1,152
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		2,650	2,214	1,857	1,481	1,111	670
By resource sector - Solar (jobs)		10,905	10,307	11,544	12,775	14,051	25,975
By resource sector - Wind (jobs)		5,535	9,886	13,440	17,860	24,401	33,815
By education level - All sectors - High		12,209	14,534	18,387	21,091	27,567	47,465
school diploma or less (jobs)							
By education level - All sectors -		9,062	11,033	14,288	16,656	21,910	37,650
Associates degree or some college (jobs)							
By education level - All sectors -		5,716	7,008	8,922	10,666	14,201	23,887
Bachelors degree (jobs)							
By education level - All sectors - Masters		1,458	1,819	2,327	2,837	3,811	6,387
or professional degree (jobs)							
By education level - All sectors - Doctoral		244	306	386	481	647	1,046
degree (jobs)							
Related work experience - All sectors -		4,144	5,000	6,409	7,437	9,801	16,872
None (jobs)							
Related work experience - All sectors - Up		5,913	7,074	8,899	10,337	13,552	23,142
to 1 year (jobs)							
Related work experience - All sectors - 1		10,243	12,422	15,882	18,608	24,557	41,966
to 4 years (jobs)							
Related work experience - All sectors - 4		6,695	8,143	10,483	12,259	16,153	27,512
to 10 years (jobs)		4 (00	0.010	0.407	2 2 2 2		
Related work experience - All sectors -		1,693	2,060	2,637	3,090	4,073	6,943
Over 10 years (jobs)		4 (05	10/5	0.151	0.007	0.707	, , , , ,
On-the-Job Training - All sectors - None		1,625	1,945	2,454	2,886	3,784	6,411
(jobs)		10.500	00 / 00	00.400	00.007		75.001
On-the-Job Training - All sectors - Up to 1		18,502	22,400	28,430	33,327	44,041	75,201
year (jobs)		(100	7.405	0.710	11.10./	1/ /0/	05.075
On-the-Job Training - All sectors - 1 to 4		6,129	7,425	9,612	11,136	14,604	25,065
years (jobs)		0.1/1	0.505	0.000	0.000	F 077	0.705
On-the-Job Training - All sectors - 4 to 10		2,141	2,585	3,382	3,890	5,077	8,705
years (jobs)		001	0/0	/ 00	/ 00	(00	1.050
On-the-Job Training - All sectors - Over 10		291	343	432	492	630	1,053
years (jobs) On-Site or In-Plant Training - All sectors -		1, 71,0	E 7/.1	7200	0.5/0	11 007	19,114
_		4,742	5,741	7,302	8,569	11,286	19,114
None (jobs) On-Site or In-Plant Training - All sectors -		14 010	20.27.2	0E 0E0	20.072	20.0E/	68,331
Up to 1 year (jobs)		16,818	20,343	25,853	30,263	39,954	00,331
טף נט ו אפמו. (זממפ)							

Table 18: E- scenario - IMPACTS - Jobs (continu	Table 18: <i>F</i> -	scenario	- IMPACTS	- Johs	<i>(continued</i>
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Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors -		4,734	5,723	7,382	8,552	11,213	19,263
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		2,142	2,584	3,370	3,878	5,066	8,663
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		252	308	404	468	617	1,065
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,670	2,053	2,668	3,161	4,233	7,340

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	334	315	290	270	254	235	213
Final energy use - Residential (PJ)	151	140	128	117	105	92.8	81.8
Final energy use - Commercial (PJ)	93.8	95.2	96.6	96.8	95.9	94.4	93.4
Final energy use - Industry (PJ)	209	215	215	222	230	234	240

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

Electricity distribution capital invested - 1.88 1.92 2.22 2.29 3.56		
Cumulative 5-yr (billion \$2018)	•	3.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	105	197	289	715	1,140	2,082	3,023
Vehicle stocks - LDV – All others (1000 units)	3,952	3,952	3,952	3,749	3,545	2,732	1,919
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	130	249	865	2,649	3,885
Public EV charging plugs - DC Fast (1000 units)	0.347		0.57		2.25		5.96
Public EV charging plugs - L2 (1000 units)	1.3		13.7		54.1		144

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	12.4	20.2	22.9	30.9	43.8	53.4	57.2
Heat Pump (%)							
Sales of space heating units - Electric	31	37.9	37.5	36.3	34.2	32.4	31.5
Resistance (%)							
Sales of space heating units - Gas (%)	48.3	27.9	25.9	20.1	10.9	4.35	1.81
Sales of space heating units - Fossil (%)	8.35	14	13.7	12.7	11	9.88	9.53
Sales of water heating units - Electric	0	1.35	5.19	16.3	33.7	45.7	50.1
Heat Pump (%)							
Sales of water heating units - Electric	40.2	56.7	55.5	52.2	47.4	44.4	43.4
Resistance (%)							
Sales of water heating units - Gas Furnace	53.4	36.6	34	26.2	13.7	4.82	1.35
(%)							
Sales of water heating units - Other (%)	6.41	5.35	5.33	5.3	5.21	5.14	5.13
Sales of cooking units - Electric	65.5	66.4	69.6	77.9	89.5	96.6	99.1
Resistance (%)							
Sales of cooking units - Gas (%)	34.5	33.6	30.4	22.1	10.5	3.4	0.915
Residential HVAC investment in 2020s vs.		2.53	2.65				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.5	12.5	15.3	23.6	37.7	49.3	54.5
Heat Pump (%)							
Sales of space heating units - Electric	16.7	13.9	16.1	22.4	32.2	39	41.6
Resistance (%)							
Sales of space heating units - Gas (%)	80.8	73.6	68.6	54	30.1	11.7	3.87
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric	1	2.5	7.27	21.1	42.9	58.1	63.8
Heat Pump (%)							
Sales of water heating units - Electric	3.08	3.16	5.27	11.4	21.5	29	32.1
Resistance (%)							
Sales of water heating units - Gas (%)	95.1	93.7	86.8	66.8	35	12.3	3.44
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629
Sales of cooking units - Electric	27.5	31	36.1	49.7	68.6	80.2	84.3
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	69	63.9	50.3	31.4	19.8	15.7
Commercial HVAC investment in 2020s -		13,324	14,288				
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)	642	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	2,857	2,832	2,331	2,557	3,436	3,678	4,918
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-1,538
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-211
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-4,235
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,923
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-6,699
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-231
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,282
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-286
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-2,705
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-22,111
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-2,304
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-739
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-7,630
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-4,284
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-13,398
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-446
trees outside forests (1000 tCO2e/y)							

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

Item Carbon sink potential - Mid - Reforest	2020	2025	2030	2035	2040	2045	2050 -4,923
cropland (1000 tCO2e/y)							-4,923
							-2,033
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,033
Carbon sink potential - Mid - Restore							-5,365
productivity (1000 tC02e/y)							-5,565
Carbon sink potential - Mid - All (not							-41,121
counting overlap) (1000 tCO2e/y)							-41,121
Carbon sink potential - High - Accelerate							-3,070
regeneration (1000 tC02e/y)							-3,010
Carbon sink potential - High - Avoid							-1,267
deforestation (1000 tCO2e/y)							-1,201
Carbon sink potential - High - Extend							-11,025
rotation length (1000 tCO2e/y)							-11,023
							-5,746
Carbon sink potential - High - Improve							-5,746
plantations (1000 tC02e/y)							20.007
Carbon sink potential - High - Increase							-20,097
retention of HWP (1000 tCO2e/y)							//0
Carbon sink potential - High - Increase							-660
trees outside forests (1000 tC02e/y)							/ [//
Carbon sink potential - High - Reforest							-6,564
cropland (1000 tC02e/y)							0.770
Carbon sink potential - High - Reforest							-3,779
pasture (1000 tC02e/y)							(0.000
Carbon sink potential - High - All (not							-60,233
counting overlap) (1000 tC02e/y)							0.005
Carbon sink potential - High - Restore							-8,025
productivity (1000 tCO2e/y)							0.51
Land impacted for carbon sink potential -							251
Low - Accelerate regeneration (1000							
hectares)							1/1
Land impacted for carbon sink potential -							161
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							0.157
Land impacted for carbon sink potential -							2,154
Low - Extend rotation length (1000							
hectares)							1.050
Land impacted for carbon sink potential -							1,058
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 -							33
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							217
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							18.6
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,609
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,503
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							377
Mid - Accelerate regeneration (1000 hectares)							
	1	1	1				

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							166
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,888
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,593
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							47.9
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							325
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							135
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							3,241
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							9,773
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							502
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							172
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,622
High - Extend rotation length (1000							
hectares)							0.447
Land impacted for carbon sink potential -							2,117
High - Improve plantations (1000							
hectares)							
							0
-							
							62.7
							02.1
							434
							434
							107
							101
							2,660
							۷,000
							11,677
							11,011
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares) Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares) Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - High - Restore productivity (1000 hectares) Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-558
deployment - Cropland measures (1000							
tCO2e/y)							07
Carbon sink potential - Moderate							-37
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-595
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-1,084
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-74.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,158
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							926
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							988
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,788
Aggressive deployment - Cropland							,
measures (1000 hectares)							
Land impacted for carbon sink -							126
Aggressive deployment - Permanent							0
conservation cover (1000 hectares)							
Land impacted for carbon sink -	+						1,914
Aggressive deployment - Total (1000							1,717
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.12	0.005	0.005	0.003	0.002	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		4.02	1.85	1.11	0.958	0.786	0.143
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		46.6	43.5	33.1	19.1	8.76	3.52
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		3.25	2.99	2.26	1.34	0.669	0.333
Stations (deaths)							
Premature deaths from air pollution -		4.99	3.84	2.42	1.22	0.511	0.171
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.791	0.611	0.415	0.252	0.135	0.061
Fuel Comb - Residential - Oil (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		0.443	0.377	0.287	0.202	0.132	0.089
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.062	0.059	0.056	0.053	0.049	0.046
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.93	3.51	2.58	1.62	0.942	0.486
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.717	0.568	0.444	0.336	0.239	0.153
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.242	0.195	0.151	0.109	0.071
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.077	0.009	0.008	0.007	0.006	0.002
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		9.83	9.19	7.87	5.63	3.42	0.505
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		36.5	0.043	0.043	0.027	0.016	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		35.6	16.4	9.85	8.49	6.96	1.27
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		414	387	294	170	77.9	31.3
Monetary damages from air pollution - Gas Stations (million \$2019)		28.8	26.5	20	11.9	5.92	2.95
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		44.2	34	21.4	10.8	4.53	1.52
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		7.01	5.41	3.67	2.24	1.19	0.545
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		3.92	3.34	2.54	1.79	1.17	0.789
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.551	0.524	0.496	0.467	0.437	0.406
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		34.8	31.1	22.8	14.4	8.34	4.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		6.35	5.02	3.93	2.97	2.11	1.36
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.59	2.14	1.73	1.34	0.966	0.625
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.683	0.076	0.069	0.06	0.055	0.018
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		87.3	81.6	69.9	50	30.4	4.49

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

Table 28: E+RE+ scenario - IMPACTS - Jobs	S						
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		184	305	155	92.3	221	518
By economic sector - Construction (jobs)		11,225	13,079	17,702	22,465	27,896	60,131
By economic sector - Manufacturing (jobs)		1,671	2,118	2,742	3,166	3,642	8,626
By economic sector - Mining (jobs)		1,099	770	463	241	93.9	14.1
By economic sector - Other (jobs)		1,629	1,894	2,609	3,436	4,426	11,029
By economic sector - Pipeline (jobs)		252	210	146	92.4	47.7	19.9
By economic sector - Professional (jobs)		5,258	7,194	10,712	14,965	20,368	38,878
By economic sector - Trade (jobs)		3,293	4,142	6,008	8,332	11,364	23,339
By economic sector - Utilities (jobs)		4,827	6,646	10,434	14,297	18,923	46,925
By resource sector - Biomass (jobs)		604	820	386	266	823	2,292
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		86.9	0	0	0	0	0
By resource sector - Grid (jobs)		7,250	10,866	17,850	25,162	34,124	91,553
By resource sector - Natural Gas (jobs)		2,061	1,711	1,617	1,388	1,068	819
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		2,619	2,027	1,374	791	321	0.052
By resource sector - Solar (jobs)		10,960	10,375	11,676	12,991	14,218	42,480
By resource sector - Wind (jobs)		5,855	10,556	18,069	26,487	36,426	52,335
By education level - All sectors - High		12,513	15,208	20,935	27,141	34,803	77,481
school diploma or less (jobs)		,	-,	,		, , , , , ,	, -
By education level - All sectors -		9,316	11,560	16,392	21,659	28,072	61,454
Associates degree or some college (jobs)					-		
By education level - All sectors -		5,863	7,352	10,427	13,927	18,308	38,600
Bachelors degree (jobs)					•	,	•
By education level - All sectors - Masters		1,496	1,914	2,754	3,727	4,952	10,288
or professional degree (jobs)					-		
By education level - All sectors - Doctoral		249	322	464	633	847	1,657
degree (jobs)							
Related work experience - All sectors -		4,250	5,237	7,322	9,613	12,449	27,476
None (jobs)							
Related work experience - All sectors - Up		6,057	7,408	10,231	13,325	17,163	37,653
to 1 year (jobs)							
Related work experience - All sectors - 1		10,512	13,018	18,299	24,153	31,396	68,275
to 4 years (jobs)							
Related work experience - All sectors - 4		6,877	8,533	12,068	15,963	20,741	44,751
to 10 years (jobs)							
Related work experience - All sectors -		1,741	2,160	3,052	4,031	5,232	11,325
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,663	2,032	2,826	3,712	4,811	10,382
(jobs)							
On-the-Job Training - All sectors - Up to 1		18,978	23,485	32,833	43,210	56,133	122,291
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		6,299	7,777	10,990	14,481	18,721	40,919
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		2,198	2,705	3,832	5,051	6,517	14,180
years (jobs)							
On-the-Job Training - All sectors - Over 10		299	358	490	631	800	1,708
years (jobs)							
On-Site or In-Plant Training - All sectors -		4,861	6,016	8,429	11,112	14,432	30,983
None (jobs)							
On-Site or In-Plant Training - All sectors -		17,254	21,321	29,819	39,225	50,914	111,209
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		4,864	5,993	8,441	11,103	14,343	31,455
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		2,198	2,703	3,821	5,034	6,499	14,094
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		259	324	462	612	793	1,739
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,714	2,154	3,074	4,115	5,426	11,946
•							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	334	313	278	236	197	173	163
Final energy use - Residential (PJ)	151	140	123	104	88.4	78.3	72.2
Final energy use - Commercial (PJ)	93.8	95	93.3	89	85.5	84.8	85.9
Final energy use - Industry (PJ)	209	215	214	219	226	230	236

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.38	2.48	3.93	4.2	3.62	3.78
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)	136	450	764	1,864	2,963	3,842	4,720
Vehicle stocks - LDV – All others (1000 units)	3,936	3,748	3,560	2,594	1,628	921	214
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		737	1,953	3,062	4,679	5,048	4,837
Public EV charging plugs - DC Fast (1000 units)	0.347		1.51		5.84		9.31
Public EV charging plugs - L2 (1000 units)	1.3		36.3		141		224

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	12.4	24.5	48.3	57.6	58.8	58.8	58.7
Heat Pump (%)							
Sales of space heating units - Electric	31	37.4	34.1	31.4	31	31.2	31.3
Resistance (%)							
Sales of space heating units - Gas (%)	48.3	24.7	7.17	1.4	0.846	0.812	0.816
Sales of space heating units - Fossil (%)	8.35	13.5	10.5	9.63	9.42	9.21	9.21
Sales of water heating units - Electric	0	7.68	41.4	51	51.8	51.8	51.8
Heat Pump (%)							
Sales of water heating units - Electric	40.2	54.8	44.8	43.1	43.1	43.1	43.1
Resistance (%)							
Sales of water heating units - Gas Furnace	53.4	32.3	8.69	0.78	0.033	0	0
(%)							
Sales of water heating units - Other (%)	6.41	5.3	5.09	5.09	5.1	5.11	5.12
Sales of cooking units - Electric	65.6	73	95.4	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	34.4	27	4.63	0.233	0	0	0
Residential HVAC investment in 2020s vs.		2.54	2.66				
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	2.5	16.7	41.2	54.8	56.6	56.7	56.7
Heat Pump (%)							
Sales of space heating units - Electric	16.7	17.5	36.3	42	42.6	42.6	42.6
Resistance (%)							
Sales of space heating units - Gas (%)	80.8	65.8	22.5	3.25	0.79	0.695	0.695
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric	1	10.3	52.2	64.9	66	66	66
Heat Pump (%)							
Sales of water heating units - Electric	3.08	6.46	25	32.5	33.3	33.3	33.3
Resistance (%)							
Sales of water heating units - Gas (%)	95.1	82.6	22.2	1.99	0.085	0	0
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Commercial HVAC investment in 2020s -		13,358	14,518				
Cumulative 5-yr (million \$2018)							

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

There	0000	, ,	0000	, ,	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	642	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	2,857	2,832	2,832	3,789	4,078	4,320	4,918
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	2,443	3,766	5,029	6,555	8,366	10,477	12,977
Installed renewables - Solar - Base land use assumptions (MW)	837	837	837	837	837	837	19,062
Installed renewables - Wind - Base land use assumptions (MW)	4,188	4,188	5,678	7,051	9,692	13,427	17,751
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	109	109	109	197	330	20,274
Installed renewables - Solar - Constrained land use assumptions (MW)	838	838	838	838	838	838	20,578
Installed renewables - Wind - Constrained land use assumptions (MW)	4,629	4,629	6,085	11,190	22,983	32,823	57,406
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	120	120	120	157	1,593	20,347
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	16.9
Capital invested - Wind - Base (billion \$2018)		0	2.58	2.21	4.06	5.44	5.95
Capital invested - Offshore Wind - Base (billion \$2018)		0.417	0	0	0.179	0.218	26.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	2,011	2,011	2,011	2,011	2,011	2,011	38,275
Wind - Base land use assumptions (GWh)	14,258	14,258	19,673	24,363	32,645	43,716	56,058
OffshoreWind - Base land use assumptions (GWh)	0	522	522	522	945	1,574	90,985
Solar - Constrained land use assumptions (GWh)	4,022	4,022	4,022	4,022	4,022	4,022	83,079
Wind - Constrained land use assumptions (GWh)	28,258	28,258	38,434	68,294	130,933	179,695	279,622
OffshoreWind - Constrained land use assumptions (GWh)	0	1,136	1,136	1,136	1,446	14,844	179,881

Table 36: 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)							-1,538
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-211
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,235
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,923
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-6,699

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

Item	2020	2025	2030	2035	2040	2045	205
Carbon sink potential - Low - Increase							-23
trees outside forests (1000 tC02e/y)							0.00
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,28
Carbon sink potential - Low - Reforest pasture (1000 tC02e/y)							-28
Carbon sink potential - Low - Restore productivity (1000 tC02e/y)							-2,70
Carbon sink potential - Low - All (not							-22,11
counting overlap) (1000 tC02e/y) Carbon sink potential - Mid - Accelerate							-2,30
regeneration (1000 tCO2e/y) Carbon sink potential - Mid - Avoid							-73
deforestation (1000 tC02e/y) Carbon sink potential - Mid - Extend							-7,63
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,28
Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)							-13,39
Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y)							-44
Carbon sink potential - Mid - Reforest							-4,92
cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							-2,03
pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore							-5,36
productivity (1000 tCO2e/y) Carbon sink potential - Mid - All (not							-41,12
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-3,07
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,26
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,02
Carbon sink potential - High - Improve							-5,74
plantations (1000 tCO2e/y) Carbon sink potential - High - Increase							-20,09
retention of HWP (1000 tCO2e/y) Carbon sink potential - High - Increase							-66
trees outside forests (1000 tCO2e/y) Carbon sink potential - High - Reforest							-6,56
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,77
Carbon sink potential - High - All (not counting overlap) (1000 tC02e/y)							-60,23
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-8,02
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000							2
hectares) Land impacted for carbon sink potential -							10
Low - Avoid deforestation (over 30 years)							10
(1000 hectares) Land impacted for carbon sink potential -							2,15
Low - Extend rotation length (1000 hectares)							

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

Item Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050 1,058
Low - Improve plantations (1000 hectares)							1,056
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000							0
hectares) Land impacted for carbon sink potential -							33
Low - Increase trees outside forests (1000 hectares)							33
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							217
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,609
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,503
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							377
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,888
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,593
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							47.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							325
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							135
Land impacted for carbon sink potential - Mid - Restore productivity (1000							3,241
hectares) Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000							9,773
hectares) Land impacted for carbon sink potential - High - Accelerate regeneration (1000							502
hectares) Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							172
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,622
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,117
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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 -							62.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							434
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							107
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,660
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							11,677
High - Total impacted (over 30 years)							
(1000 hectares)							

Table 37: E+RE+ scenario - PILLAR 6: Land			0000	0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-558
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-37
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-595
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,084
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-74.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,158
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							926
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							988
deployment - Total (1000 hectares)							700
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							O
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,788
Aggressive deployment - Cropland							1,100
measures (1000 hectares)							
Land impacted for carbon sink -							126
Aggressive deployment - Permanent							120
conservation cover (1000 hectares)							

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

	5		,				
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,914

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.12	0.005	0.005	0.003	0.002	0
Fuel Comb - Electric Generation - Coal (deaths)							
Premature deaths from air pollution -		4.29	1.96	2.25	2.57	1.64	0.748
Fuel Comb - Electric Generation - Natural Gas (deaths)							
Premature deaths from air pollution - Mobile - On-Road (deaths)		46.6	43.5	33.1	19.1	8.76	3.52
Premature deaths from air pollution - Gas Stations (deaths)		3.25	2.99	2.26	1.34	0.669	0.333
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.99	3.84	2.42	1.22	0.511	0.171
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.791	0.611	0.415	0.252	0.135	0.061
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.443	0.377	0.287	0.202	0.132	0.089
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.062	0.059	0.056	0.053	0.049	0.046
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.93	3.51	2.58	1.62	0.942	0.486
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.717	0.568	0.444	0.336	0.239	0.153
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.242	0.195	0.151	0.109	0.071
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.058	0.009	0.008	0.007	0.006	0.002
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		10.1	9.72	9.44	7.92	6.56	4.84
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		36.5	0.043	0.043	0.027	0.016	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		38	17.4	20	22.8	14.5	6.62
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		414	387	294	170	77.9	31.3
Monetary damages from air pollution - Gas Stations (million \$2019)		28.8	26.5	20	11.9	5.92	2.95
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		44.2	34	21.4	10.8	4.53	1.52
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		7.01	5.41	3.67	2.24	1.19	0.545
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		3.92	3.34	2.54	1.79	1.17	0.789

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		0.551	0.524	0.496	0.467	0.437	0.406
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		34.8	31.1	22.8	14.4	8.34	4.3
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		6.35	5.02	3.93	2.97	2.11	1.36
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		2.59	2.14	1.73	1.34	0.966	0.625
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		0.51	0.075	0.069	0.06	0.056	0.018
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		89.9	86.3	83.8	70.4	58.2	43
Industrial Processes - Oil & Gas							
Production (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)	2020	199	254	130	87.8	278	522
By economic sector - Construction (jobs)		12,264	11,819	14,211	14,459	16,290	22,533
By economic sector - Manufacturing		1,664	1,696	1,893	1,891	1,898	2,375
(jobs)		1,001	1,070	1,070	1,071	1,070	2,010
By economic sector - Mining (jobs)		1,120	805	541	342	209	132
By economic sector - Other (jobs)		1,868	1,860	2,207	2,681	3,302	5,567
By economic sector - Pipeline (jobs)		265	230	566	169	189	256
By economic sector - Professional (jobs)		5,427	5,801	6,604	7,867	9,590	13,427
By economic sector - Trade (jobs)		3,462	3,584	4,083	4,857	5,908	8,748
By economic sector - Utilities (jobs)		5,068	5,739	8,780	8,466	9,852	12,251
By resource sector - Biomass (jobs)		615	632	363	276	1,091	2,183
By resource sector - CO2 (jobs)		0	0	2,990	0	484	1,276
By resource sector - Coal (jobs)		86.9	0	0	0	0	0
By resource sector - Grid (jobs)		7,716	9,222	12,367	14,601	17,077	21,274
By resource sector - Natural Gas (jobs)		2,202	1,998	2,147	1,992	1,723	1,464
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		2,618	2,054	1,431	922	590	394
By resource sector - Solar (jobs)		13,193	11,418	12,456	14,038	16,301	28,464
By resource sector - Wind (jobs)		4,908	6,465	7,261	8,993	10,252	10,755
By education level - All sectors - High		13,417	13,478	16,479	17,000	19,692	27,348
school diploma or less (jobs)							
By education level - All sectors -		9,936	10,120	12,670	13,201	15,337	21,221
Associates degree or some college (jobs)							
By education level - All sectors -		6,159	6,301	7,610	8,139	9,544	13,157
Bachelors degree (jobs)							
By education level - All sectors - Masters		1,566	1,622	1,950	2,132	2,527	3,499
or professional degree (jobs)							
By education level - All sectors - Doctoral		259	268	307	349	418	585
degree (jobs)							
Related work experience - All sectors -		4,539	4,610	5,708	5,933	6,922	9,639
None (jobs)							
Related work experience - All sectors - Up		6,483	6,522	7,864	8,249	9,603	13,435
to 1 year (jobs)							
Related work experience - All sectors - 1		11,172	11,360	13,949	14,631	17,052	23,588
to 4 years (jobs)							
Related work experience - All sectors - 4	\exists	7,300	7,423	9,187	9,592	11,144	15,321
to 10 years (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors -		1,844	1,874	2,309	2,416	2,797	3,828
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,773	1,783	2,140	2,275	2,657	3,740
(jobs)							
On-the-Job Training - All sectors - Up to 1 year (jobs)		20,168	20,491	24,947	26,238	30,627	42,511
On-the-Job Training - All sectors - 1 to 4		6,720	6,816	8,534	8,824	10,211	14,029
years (jobs)		0.057	0.000	2.012	2.002	2 577	/. O1/.
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,357	2,383	3,013	3,092	3,577	4,914
On-the-Job Training - All sectors - Over 10 years (jobs)		320	315	381	391	446	617
On-Site or In-Plant Training - All sectors -		5,170	5,238	6,365	6,715	7,838	10,915
None (jobs)		0,110	0,200	0,000	0,110	1,000	10,710
On-Site or In-Plant Training - All sectors -		18,348	18,631	22,737	23,873	27,836	38,614
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		5,192	5,260	6,560	6,792	7,862	10,823
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		2,351	2,377	2,994	3,071	3,551	4,868
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		276	283	360	371	431	590
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,820	1,876	2,344	2,478	2,924	4,073

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	334	313	278	236	197	173	163
Final energy use - Residential (PJ)	151	140	123	104	88.4	78.3	72.2
Final energy use - Commercial (PJ)	93.8	95	93.3	89	85.5	84.8	85.9
Final energy use - Industry (PJ)	209	215	214	219	226	230	236

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.38	2.48	3.93	4.2	3.62	3.78
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)	136	450	764	1,864	2,963	3,842	4,720
Vehicle stocks - LDV – All others (1000 units)	3,936	3,748	3,560	2,594	1,628	921	214
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		737	1,953	3,062	4,679	5,048	4,837
Public EV charging plugs - DC Fast (1000 units)	0.347		1.51		5.84		9.31
Public EV charging plugs - L2 (1000 units)	1.3		36.3		141		224

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	12.4	24.5	48.3	57.6	58.8	58.8	58.7
Heat Pump (%)							
Sales of space heating units - Electric	31	37.4	34.1	31.4	31	31.2	31.3
Resistance (%)							
Sales of space heating units - Gas (%)	48.3	24.7	7.17	1.4	0.846	0.812	0.816
Sales of space heating units - Fossil (%)	8.35	13.5	10.5	9.63	9.42	9.21	9.21

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric	0	7.68	41.4	51	51.8	51.8	51.8
Heat Pump (%)							
Sales of water heating units - Electric	40.2	54.8	44.8	43.1	43.1	43.1	43.1
Resistance (%)							
Sales of water heating units - Gas Furnace	53.4	32.3	8.69	0.78	0.033	0	0
(%)							
Sales of water heating units - Other (%)	6.41	5.3	5.09	5.09	5.1	5.11	5.12
Sales of cooking units - Electric	65.6	73	95.4	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	34.4	27	4.63	0.233	0	0	0
Residential HVAC investment in 2020s vs.		2.54	2.66				
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	2.5	16.7	41.2	54.8	56.6	56.7	56.7
Heat Pump (%)							
Sales of space heating units - Electric	16.7	17.5	36.3	42	42.6	42.6	42.6
Resistance (%)							
Sales of space heating units - Gas (%)	80.8	65.8	22.5	3.25	0.79	0.695	0.695
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric	1	10.3	52.2	64.9	66	66	66
Heat Pump (%)							
Sales of water heating units - Electric	3.08	6.46	25	32.5	33.3	33.3	33.3
Resistance (%)							
Sales of water heating units - Gas (%)	95.1	82.6	22.2	1.99	0.085	0	0
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629
Sales of cooking units - Electric	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Commercial HVAC investment in 2020s -		13,358	14,518				
Cumulative 5-yr (million \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	642	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	2,857	2,832	2,561	4,176	3,483	3,724	4,725
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	2,443	3,766	5,029	6,555	8,366	10,477	12,977
Installed renewables - Solar - Base land	2,047	3,815	4,305	4,497	5,179	7,255	8,850
use assumptions (MW)							
Installed renewables - Wind - Base land	4,188	4,223	5,042	5,605	6,554	6,911	6,911
use assumptions (MW)							
Installed renewables - Offshore Wind -	0	109	109	109	109	109	895
Base land use assumptions (MW)							
Installed renewables - Solar -	1,616	2,607	3,866	5,088	6,116	9,059	10,972
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	4,154	4,198	5,392	5,500	7,353	9,465	9,465
land use assumptions (MW)							
Installed renewables - Offshore Wind -	0	120	120	120	120	120	959
Constrained land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		2.37	0.587	0.212	0.709	2.04	1.48
\$2018)							
Capital invested - Wind - Base (billion		0.067	1.42	0.908	1.46	0.52	0
\$2018)							
Capital invested - Offshore Wind - Base		0.417	0	0	0	0	1.04
(billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion \$2018)		1.33	1.51	1.35	1.07	2.88	1.77
Capital invested - Wind - Constrained (billion \$2018)		0.084	2.07	0.174	2.85	3.08	0
Capital invested - Offshore Wind - Constrained (billion \$2018)		0.46	0	0	0	0	1.11

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	4,444	7,991	8,949	9,331	10,695	14,809	17,995
Wind - Base land use assumptions (GWh)	14,258	14,389	17,413	19,419	22,707	23,920	23,920
OffshoreWind - Base land use assumptions (GWh)	0	522	522	522	522	522	4,290
Solar - Constrained land use assumptions (GWh)	3,569	5,552	8,076	10,473	12,506	18,343	22,220
Wind - Constrained land use assumptions (GWh)	14,129	14,288	18,527	18,888	24,515	30,552	30,552
OffshoreWind - Constrained land use assumptions (GWh)	0	568	568	568	568	568	3,822

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-1,538
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-211
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-4,235
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,923
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-6,699
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-231
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,282
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-286
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-2,705
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-22,111
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-2,304
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-739
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-7,630
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-4,284
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-13,398
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-446
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,923
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-2,033
pasture (1000 tCO2e/y)							

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

Item Conhon sink potential Mid Bostons	2020	2025	2030	2035	2040	2045	-5,36
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,36
							-41,12
Carbon sink potential - Mid - All (not							-41,12
counting overlap) (1000 tC02e/y)							0.07
Carbon sink potential - High - Accelerate							-3,07
regeneration (1000 tCO2e/y)							1.07
Carbon sink potential - High - Avoid							-1,26
deforestation (1000 tCO2e/y)							11 00
Carbon sink potential - High - Extend							-11,02
rotation length (1000 tC02e/y)							F 7/
Carbon sink potential - High - Improve							-5,74
plantations (1000 tC02e/y)							00.00
Carbon sink potential - High - Increase							-20,09
retention of HWP (1000 tC02e/y)							
Carbon sink potential - High - Increase							-660
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-6,56
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-3,77
pasture (1000 tC02e/y)							
Carbon sink potential - High - All (not							-60,23
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-8,02
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							25
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							16
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,15
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,058
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							21
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							18.0
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,60
Low - Restore productivity (1000							.,
hectares)							
Land impacted for carbon sink potential -					+		5,50
Low - Total impacted (over 30 years)							-,
(1000 hectares)							
Land impacted for carbon sink potential -				+			37
Mid - Accelerate regeneration (1000							01
hectares)							
Land impacted for carbon sink potential -				+		+	16
Mid - Avoid deforestation (over 30 years)							10
(1000 hectares)							
,							2.00
Land impacted for carbon sink potential -							3,888
Mid - Extend rotation length (1000				, i			

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							1,593
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000							
hectares) Land impacted for carbon sink potential -							47.9
Mid - Increase trees outside forests (1000							46.
hectares)							
Land impacted for carbon sink potential -		+					325
Mid - Reforest cropland (1000 hectares)							020
Land impacted for carbon sink potential -							135
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							3,24
Mid - Restore productivity (1000							•
hectares)							
Land impacted for carbon sink potential -							9,773
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							502
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							172
High - Avoid deforestation (over 30 years)							
(1000 hectares)							5,622
Land impacted for carbon sink potential - High - Extend rotation length (1000							5,622
hectares)							
Land impacted for carbon sink potential -		+					2,11
High - Improve plantations (1000							2,11
hectares)							
Land impacted for carbon sink potential -							C
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							62.
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							434
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							10
High - Reforest pasture (1000 hectares)							0.444
Land impacted for carbon sink potential -							2,660
High - Restore productivity (1000							
hectares)							11 / 7
Land impacted for carbon sink potential - High - Total impacted (over 30 years)							11,67
, ,							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-558
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-37
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-595
deployment - Total (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,084
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-74.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,158
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							926
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							988
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,788
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							126
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,914
Aggressive deployment - Total (1000							•
hectares)							

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

2020	2025	2030	2035	2040	2045	2050
	4.12	0.005	0.005	0.003	0.002	0
			1.0		101	
	4.43	2.27	1.63	1.5	1.24	1
	47.3	47.8	46.5	41.9	33.3	22.9
	3.32	3.33	3.21	2.87	2.28	1.58
	5.03	4.34	3.61	2.78	1.94	1.2
	0.806	0.718	0.649	0.548	0.409	0.268
	0.448	0.426	0.405	0.363	0.294	0.225
	0.062	0.059	0.056	0.053	0.049	0.046
	3.97	4.07	3.97	3.55	2.86	2.09
	2020	4.43 4.43 47.3 3.32 5.03 0.806 0.448 0.062	4.12 0.005 4.43 2.27 47.3 47.8 3.32 3.33 5.03 4.34 0.806 0.718 0.448 0.426 0.062 0.059	4.12 0.005 0.005 4.43 2.27 1.63 47.3 47.8 46.5 3.32 3.33 3.21 5.03 4.34 3.61 0.806 0.718 0.649 0.448 0.426 0.405 0.062 0.059 0.056	4.12 0.005 0.005 0.003 4.43 2.27 1.63 1.5 47.3 47.8 46.5 41.9 3.32 3.33 3.21 2.87 5.03 4.34 3.61 2.78 0.806 0.718 0.649 0.548 0.448 0.426 0.405 0.363 0.062 0.059 0.056 0.053	4.12 0.005 0.005 0.003 0.002 4.43 2.27 1.63 1.5 1.24 47.3 47.8 46.5 41.9 33.3 3.32 3.33 3.21 2.87 2.28 5.03 4.34 3.61 2.78 1.94 0.806 0.718 0.649 0.548 0.409 0.448 0.426 0.405 0.363 0.294 0.062 0.059 0.056 0.053 0.049

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -	2020	0.717	0.609	0.522	0.444	0.375	0.312
Fuel Comb - Comm/Institutional - Oil		0	0.007	0.022	0	0.0.0	0.012
(deaths)							
Premature deaths from air pollution -		0.293	0.26	0.229	0.199	0.171	0.144
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.067	0.009	0.008	0.008	0.007	0.006
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		9.98	8.98	7.74	6.73	5.91	4.11
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		36.5	0.043	0.043	0.027	0.016	0
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		39.2	20.1	14.5	13.3	11	8.87
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		421	425	414	372	296	204
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		29.4	29.5	28.4	25.4	20.2	14
Gas Stations (million \$2019)							
Monetary damages from air pollution -		44.6	38.4	32	24.6	17.2	10.6
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		7.14	6.36	5.75	4.86	3.62	2.37
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		3.97	3.78	3.59	3.21	2.61	1.99
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		0.551	0.524	0.496	0.467	0.437	0.406
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		35.1	36	35.1	31.4	25.3	18.5
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		6.35	5.39	4.62	3.93	3.32	2.76
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		2.59	2.3	2.03	1.77	1.51	1.27
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		0.591	0.077	0.074	0.069	0.064	0.057
(million \$2019)							
Monetary damages from air pollution -		88.6	79.8	68.8	59.7	52.5	36.5
Industrial Processes - Oil & Gas							
Production (million \$2019)							
(million \$2019) Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019) Monetary damages from air pollution - Industrial Processes - Oil & Gas							

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		196	246	134	360	637	601
By economic sector - Construction (jobs)		11,040	12,741	15,701	16,231	19,086	31,116
By economic sector - Manufacturing		1,556	2,012	2,013	2,173	2,750	4,166
(jobs)							
By economic sector - Mining (jobs)		1,116	820	603	445	286	150
By economic sector - Other (jobs)		1,613	1,865	2,308	2,763	3,368	6,132
By economic sector - Pipeline (jobs)		258	215	510	154	171	219
By economic sector - Professional (jobs)		5,174	6,883	8,459	10,325	13,272	20,177

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

Tuble 66. E Bi beenand 1141 Note 6688 (cont						
	2020 2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)	3,260	4,065	4,990	6,005	7,582	12,228
By economic sector - Utilities (jobs)	4,595	6,262	8,950	9,469	12,393	22,273
By resource sector - Biomass (jobs)	662	632	374	1,443	2,947	2,848
By resource sector - CO2 (jobs)	0	0	2,716	0	440	1,159
By resource sector - Coal (jobs)	86.9	0	0	0	0	0
By resource sector - Grid (jobs)	6,753	10,022	12,910	16,149	21,782	41,253
By resource sector - Natural Gas (jobs)	2,105	1,778	1,414	1,692	1,365	1,293
By resource sector - Nuclear (jobs)	0	0	0	0	0	0
By resource sector - Oil (jobs)	2,650	2,214	1,857	1,551	1,119	629
By resource sector - Solar (jobs)	10,898	10,299	11,488	12,655	13,864	25,915
By resource sector - Wind (jobs)	5,652	10,163	12,907	14,435	18,030	23,966
By education level - All sectors - High	12,252	14,695	18,136	19,695	24,327	39,835
school diploma or less (jobs)						
By education level - All sectors -	9,103	11,165	14,087	15,318	19,002	31,322
Associates degree or some college (jobs)						
By education level - All sectors -	5,743	7,096	8,778	9,849	12,348	19,771
Bachelors degree (jobs)						•
By education level - All sectors - Masters	1,466	1,843	2,287	2,617	3,308	5,271
or professional degree (jobs)	,	,	, -	,-	,	-,
By education level - All sectors - Doctoral	245	310	378	445	562	864
degree (jobs)						
Related work experience - All sectors -	4,160	5,058	6,322	6,918	8,606	14,114
None (jobs)	,,,,,,	,,,,,	-,	7, 10	5,555	,
Related work experience - All sectors - Up	5,935	7,155	8,768	9,661	11,978	19,444
to 1 year (jobs)		,,,,,,	2,122	1,001	,	,
Related work experience - All sectors - 1	10,286	12,570	15,650	17,219	21,419	34,923
to 4 years (jobs)		,	,	,	,	-,-
Related work experience - All sectors - 4	6,726	8,242	10,330	11,284	14,011	22,827
to 10 years (jobs)	', '	-,	,	, -	, -	, -
Related work experience - All sectors -	1,701	2,086	2,597	2,842	3,532	5,755
Over 10 years (jobs)	,,,,,,	_,,,,,	_,	_,-,-	5,552	-,
On-the-Job Training - All sectors - None	1,632	1,968	2,417	2,682	3,323	5,377
(jobs)	,	,	,	,	,	-,-
On-the-Job Training - All sectors - Up to 1	18,576	22,665	28,004	30,996	38,654	62,761
year (jobs)	,	,	=5,55		55,55	,
On-the-Job Training - All sectors - 1 to 4	6,156	7,514	9,480	10,229	12,641	20,814
years (jobs)	,	, -	,	-,	, -	-,-
On-the-Job Training - All sectors - 4 to 10	2,151	2,616	3,339	3,565	4,381	7,229
years (jobs)	, -	,	-,	-,	,	,
On-the-Job Training - All sectors - Over 10	293	347	426	452	547	882
years (jobs)						
On-Site or In-Plant Training - All sectors -	4,762	5,810	7,190	7,940	9,863	15,946
None (jobs)	, -		,	,	,	-,
On-Site or In-Plant Training - All sectors -	16,886	20,582	25,471	28,125	35,042	57,024
Up to 1 year (jobs)			-,	-,		
On-Site or In-Plant Training - All sectors -	4,755	5,790	7,280	7,872	9,730	16,019
1 to 4 years (jobs)	,		,	,-	,	.,.
On-Site or In-Plant Training - All sectors -	2,152	2,615	3,327	3,558	4,377	7,191
4 to 10 years (jobs)		_,5.5	-,	-,000	.,	.,
On-Site or In-Plant Training - All sectors -	253	312	399	430	535	883
Over 10 years (jobs)		5				
Wage income - All (million \$2019)	1,677	2,078	2,630	2,922	3,687	6,093
/ (1,011	2,010	2,000	-,, -,	5,551	5,575

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	334	315	290	270	254	235	213
Final energy use - Residential (PJ)	151	140	128	117	105	92.8	81.8
Final energy use - Commercial (PJ)	93.8	95.2	96.6	96.8	95.9	94.4	93.4
Final energy use - Industry (PJ)	209	215	215	222	230	234	240

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

•••	•	•	•				
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.88	1.92	2.22	2.29	3.56	3.78
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)	105	197	289	715	1,140	2,082	3,023
Vehicle stocks - LDV – All others (1000 units)	3,952	3,952	3,952	3,749	3,545	2,732	1,919
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	130	249	865	2,649	3,885
Public EV charging plugs - DC Fast (1000 units)	0.347		0.57		2.25		5.96
Public EV charging plugs - L2 (1000 units)	1.3		13.7		54.1		144

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	12.4	20.2	22.9	30.9	43.8	53.4	57.2
Heat Pump (%)							
Sales of space heating units - Electric	31	37.9	37.5	36.3	34.2	32.4	31.5
Resistance (%)							
Sales of space heating units - Gas (%)	48.3	27.9	25.9	20.1	10.9	4.35	1.81
Sales of space heating units - Fossil (%)	8.35	14	13.7	12.7	11	9.88	9.53
Sales of water heating units - Electric	0	1.35	5.19	16.3	33.7	45.7	50.1
Heat Pump (%)							
Sales of water heating units - Electric	40.2	56.7	55.5	52.2	47.4	44.4	43.4
Resistance (%)							
Sales of water heating units - Gas Furnace	53.4	36.6	34	26.2	13.7	4.82	1.35
(%)							
Sales of water heating units - Other (%)	6.41	5.35	5.33	5.3	5.21	5.14	5.13
Sales of cooking units - Electric	65.5	66.4	69.6	77.9	89.5	96.6	99.1
Resistance (%)							
Sales of cooking units - Gas (%)	34.5	33.6	30.4	22.1	10.5	3.4	0.915
Residential HVAC investment in 2020s vs.		2.53	2.65				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.5	12.5	15.3	23.6	37.7	49.3	54.5
Heat Pump (%)							
Sales of space heating units - Electric	16.7	13.9	16.1	22.4	32.2	39	41.6
Resistance (%)							
Sales of space heating units - Gas (%)	80.8	73.6	68.6	54	30.1	11.7	3.87
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric	1	2.5	7.27	21.1	42.9	58.1	63.8
Heat Pump (%)							
Sales of water heating units - Electric	3.08	3.16	5.27	11.4	21.5	29	32.1
Resistance (%)							
Sales of water heating units - Gas (%)	95.1	93.7	86.8	66.8	35	12.3	3.44
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629
Sales of cooking units - Electric	27.5	31	36.1	49.7	68.6	80.2	84.3
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	69	63.9	50.3	31.4	19.8	15.7
Commercial HVAC investment in 2020s -		13,324	14,288				
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)	642	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	2,857	2,832	2,320	2,898	4,031	4,285	6,097
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	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	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	4	9	10
(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	0	3,120	4,937	607
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	0	234	604	650

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	4.01	10.4	11.1
Annual - BECCS (MMT)		0	0	0	4.01	10.4	11.1
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	4.01	14.4	25.5
Cumulative - BECCS (MMT)		0	0	0	4.01	14.4	25.5
Cumulative - NGCC (MMT)		0	0	0	0	0	0
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	0	497	497	497	497
Spur (km)		0	0	0	373	662	737
All (km)		0	0	497	871	1,159	1,234
Cumulative investment - Trunk (million \$2018)		0	0	1,561	1,561	1,561	1,561
Cumulative investment - Spur (million \$2018)		0	0	0	248	460	507

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

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative investment - All (million		0	0	1,561	1,809	2,020	2,068
\$2018)							

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-1,538
regeneration (1000 tCO2e/y)							•
Carbon sink potential - Low - Avoid							-211
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-4,235
rotation length (1000 tCO2e/y)							,
Carbon sink potential - Low - Improve							-2,923
plantations (1000 tC02e/y)							•
Carbon sink potential - Low - Increase							-6,699
retention of HWP (1000 tCO2e/y)							-,-
Carbon sink potential - Low - Increase							-231
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,282
cropland (1000 tCO2e/y)							0,202
Carbon sink potential - Low - Reforest							-286
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-2,705
productivity (1000 tCO2e/y)							_,. 00
Carbon sink potential - Low - All (not							-22,111
counting overlap) (1000 tCO2e/y)							,
Carbon sink potential - Mid - Accelerate							-2,304
regeneration (1000 tCO2e/y)							_,00.
Carbon sink potential - Mid - Avoid							-739
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-7,630
rotation length (1000 tCO2e/y)							,
Carbon sink potential - Mid - Improve							-4,284
plantations (1000 tC02e/y)							•
Carbon sink potential - Mid - Increase							-13,398
retention of HWP (1000 tCO2e/y)							-,-
Carbon sink potential - Mid - Increase							-446
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,923
cropland (1000 tCO2e/v)							•
Carbon sink potential - Mid - Reforest							-2,033
pasture (1000 tC02e/y)							•
Carbon sink potential - Mid - Restore							-5,365
productivity (1000 tCO2e/y)							•
Carbon sink potential - Mid - All (not							-41,121
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - High - Accelerate							-3,070
regeneration (1000 tCO2e/y)							-,
Carbon sink potential - High - Avoid							-1,267
deforestation (1000 tCO2e/y)							, , , ,

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

Item Carbon sink notantial High Extend	2020	2025	2030	2035	2040	2045	2050 -11,025
Carbon sink potential - High - Extend							-11,025
rotation length (1000 tC02e/y)							-5,746
Carbon sink potential - High - Improve							-5,746
plantations (1000 tC02e/y) Carbon sink potential - High - Increase							-20,097
retention of HWP (1000 tCO2e/y)							-20,097
Carbon sink potential - High - Increase							-660
trees outside forests (1000 tC02e/y)							-000
Carbon sink potential - High - Reforest							-6,564
cropland (1000 tC02e/y)							-0,004
Carbon sink potential - High - Reforest							-3,779
pasture (1000 tC02e/y)							0,117
Carbon sink potential - High - All (not							-60,233
counting overlap) (1000 tCO2e/y)							00,200
Carbon sink potential - High - Restore							-8,025
productivity (1000 tC02e/y)							0,020
Land impacted for carbon sink potential -							251
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							161
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,154
Low - Extend rotation length (1000							•
hectares)							
Land impacted for carbon sink potential -							1,058
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 -							33
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							217
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							18.6
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,609
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,503
Low - Total impacted (over 30 years)							
(1000 hectares)							077
Land impacted for carbon sink potential -							377
Mid - Accelerate regeneration (1000							
hectares) Land impacted for carbon sink potential -							166
Mid - Avoid deforestation (over 30 years)							100
(1000 hectares)							
Land impacted for carbon sink potential -							3,888
Mid - Extend rotation length (1000							3,000
= ,							
hectares) Land impacted for carbon sink potential -							1,593
							1,393
Mid - Improve plantations (1000 hectares) Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							U
hectares)							
- I							47.9
Land impacted for carbon sink potential -							41.9
Mid - Increase trees outside forests (1000							

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 -				T			325
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							135
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							3,241
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							9,773
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							502
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							172
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,622
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							2,117
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 -							62.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							434
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							107
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,660
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							11,677
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							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-558
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-37
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Moderate							-595
deployment - Total (1000 tCO2e/y)							

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

Table 63: E-B+ scenario - PILLAR 6: Land : Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive	2020	2020	2000	2000	2040	2040	0
deployment - Corn-ethanol to energy							Ü
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,084
deployment - Cropland measures (1000							.,00.
tCO2e/y)							
Carbon sink potential - Aggressive							-74.1
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							
crops (1000 tC02e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,158
deployment - Total (1000 tCO2e/y)							,
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							926
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							0.006
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							4.06
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							993
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							4,416
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							126
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							0.006
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							4.06
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							4,546
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 (deaths)		11.3	7.2	2.07	1.56	1.42	1.34

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

Table 64: REF scenario - IMPACTS - Health	•	•	0000	0005	00/0	00/5	0050
Item Promoture deaths from air pollution	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural		5.32	5.06	4.75	4	3.72	3.6
Gas (deaths)							
Premature deaths from air pollution - Mobile - On-Road (deaths)		47.3	48.5	49.6	50.9	52.2	53.6
Premature deaths from air pollution - Gas		3.31	3.36	3.4	3.47	3.52	3.57
Stations (deaths)							
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.98	4.36	3.84	3.49	3.3	3.16
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.795	0.66	0.509	0.382	0.288	0.229
Premature deaths from air pollution -		0.444	0.432	0.434	0.442	0.45	0.457
Fuel Comb - Residential - Other (deaths)		0.444	0.432	0.434	0.442	0.43	0.431
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.065	0.065	0.064	0.064	0.063	0.062
Premature deaths from air pollution -		3.99	4.07	3.99	3.98	4.16	4.46
Fuel Comb - Comm/Institutional - Natural		0.77	4.01	0.77	0.70	4.10	4.40
Gas (deaths)							
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.749	0.72	0.707	0.697	0.69	0.684
Premature deaths from air pollution -		0.306	0.308	0.312	0.314	0.316	0.317
Fuel Comb - Comm/Institutional - Other (deaths)		0.000	0.000	0.012	0.011	0.010	0.011
Premature deaths from air pollution -		0.18	0.116	0.087	0.081	0.075	0.068
Industrial Processes - Coal Mining		0.10	0.110	0.001	0.001	0.013	0.000
(deaths)							
Premature deaths from air pollution -		10	10.5	10.7	10.1	9.99	9.28
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		100	63.8	18.3	13.8	12.6	11.8
Fuel Comb - Electric Generation - Coal (million \$2019)							
Monetary damages from air pollution -		47.2	44.8	42	35.4	32.9	31.9
Fuel Comb - Electric Generation - Natural Gas (million \$2019)							
Monetary damages from air pollution -		421	431	441	453	464	476
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution - Gas Stations (million \$2019)		29.3	29.8	30.1	30.7	31.2	31.6
Monetary damages from air pollution -		44.1	38.7	34	30.9	29.3	28
Fuel Comb - Residential - Natural Gas							
(million \$2019) Monetary damages from air pollution -		7.04	5.85	/. E1	3.38	0.55	2.03
Fuel Comb - Residential - Oil (million \$2019)		7.04	5.85	4.51	3.38	2.55	2.03
Monetary damages from air pollution -		3.93	3.83	3.84	3.92	3.98	4.05
Fuel Comb - Residential - Other (million \$2019)			0.00	0.0 .	5.72	0.70	
Monetary damages from air pollution -		0.575	0.573	0.57	0.564	0.556	0.547
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)		05.0	0.4	05.0	05.0	07.0	00.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural		35.3	36	35.3	35.2	36.8	39.5
Gas (million \$2019)							
Monetary damages from air pollution -		6.63	6.38	6.26	6.17	6.11	6.05
Fuel Comb - Comm/Institutional - Oil (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		2.71	2.73	2.76	2.78	2.8	2.81
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		1.59	1.02	0.771	0.711	0.665	0.603
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		89.1	93.2	94.6	90	88.7	82.4
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 65: REF scenario - IMPACTS - Jobs

Table 65: REF scenario - IMPACTS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		190	177	176	157	157	164
By economic sector - Construction (jobs)		3,653	9,212	9,926	11,165	11,967	17,580
By economic sector - Manufacturing (jobs)		1,080	1,290	1,488	1,583	1,497	1,748
By economic sector - Mining (jobs)		1,135	918	749	611	520	442
By economic sector - Other (jobs)		218	1,510	1,814	2,203	2,573	4,75
By economic sector - Pipeline (jobs)		265	273	276	262	265	264
By economic sector - Professional (jobs)		2,184	4,226	4,768	5,834	6,634	9,909
By economic sector - Trade (jobs)		1,459	2,803	3,161	3,835	4,422	7,02
By economic sector - Utilities (jobs)		3,656	4,153	4,618	5,520	6,160	7,61
By resource sector - Biomass (jobs)		623	589	555	509	514	51
By resource sector - CO2 (jobs)		0	0	0	0	0	(
By resource sector - Coal (jobs)		86.9	0	0	0	0	(
By resource sector - Grid (jobs)		5,456	6,153	6,815	8,642	10,107	12,690
By resource sector - Natural Gas (jobs)		2,177	2,288	2,517	2,351	2,167	2,288
By resource sector - Nuclear (jobs)		0	0	0	0	0	
By resource sector - Oil (jobs)		2,675	2,278	2,005	1,860	1,779	1,72
By resource sector - Solar (jobs)			9,934	11,294	12,507	13,647	25,62
By resource sector - Wind (jobs)		2,821	3,320	3,788	5,301	5,984	6,66
By education level - All sectors - High		5,736	10,477	11,447	13,089	14,261	20,60
school diploma or less (jobs)		.	.		,		,
By education level - All sectors -		4,301	7,785	8,600	9,981	10,975	15,95
Associates degree or some college (jobs)							
By education level - All sectors -		2,952	4,861	5,336	6,220	6,865	9,88
Bachelors degree (jobs)			.				
By education level - All sectors - Masters		741	1,237	1,367	1,613	1,797	2,61
or professional degree (jobs)							
By education level - All sectors - Doctoral		110	203	224	267	298	44
degree (jobs)							
Related work experience - All sectors -		2,001	3,571	3,929	4,539	4,986	7,250
None (jobs)							
Related work experience - All sectors - Up		2,693	5,049	5,533	6,354	6,943	10,13
to 1 year (jobs)							
Related work experience - All sectors - 1		5,031	8,779	9,645	11,166	12,273	17,74
to 4 years (jobs)							
Related work experience - All sectors - 4		3,267	5,719	6,283	7,278	7,989	11,49
to 10 years (jobs)							
Related work experience - All sectors -		847	1,445	1,585	1,833	2,006	2,86
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		747	1,388	1,523	1,760	1,935	2,85
(jobs)							
On-the-Job Training - All sectors - Up to 1		9,081	15,844	17,398	20,107	22,070	31,93
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		2,922	5,252	5,772	6,671	7,311	10,53
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		964	1,833	2,013	2,328	2,553	3,69
years (jobs)							

				_
Tabla 45.	RFF scenario -	IMDMCTC	Inhel	(nontinued)
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Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - Over 10 years (jobs)		125	246	268	304	328	476
On-Site or In-Plant Training - All sectors - None (jobs)		2,221	4,040	4,444	5,143	5,645	8,240
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		8,248	14,413	15,822	18,280	20,062	29,021
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,260	4,060	4,460	5,150	5,642	8,138
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		989	1,833	2,009	2,320	2,542	3,661
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		121	217	239	278	306	439
Wage income - All (million \$2019)		833	1,446	1,605	1,881	2,094	3,043

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	334	316	295	284	286	295	308
Final energy use - Residential (PJ)	151	140	129	121	115	111	107
Final energy use - Commercial (PJ)	93.8	96.3	99.1	101	104	110	118
Final energy use - Industry (PJ)	209	222	230	240	253	268	285

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.31	2.4	2.04	2.08	2.23	2.28
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	10.6	29.2	30	31.3	32.8	34.9	37.8
Heat Pump (%)							
Sales of space heating units - Electric	31.7	33	32.6	31.9	30.8	28.9	25.7
Resistance (%)							
Sales of space heating units - Gas (%)	49.2	24.7	25.6	25.8	25.6	25.6	25.6
Sales of space heating units - Fossil (%)	8.51	13	11.8	11	10.8	10.7	10.8
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	40.2	57.1	57	57	56.9	56.9	56.9
Resistance (%)							
Sales of water heating units - Gas Furnace	53.4	37.5	37.6	37.6	37.6	37.7	37.7
(%)							
Sales of water heating units - Other (%)	6.41	5.36	5.36	5.41	5.42	5.43	5.44
Sales of cooking units - Electric	65.2	65.2	65.2	65.2	65.2	65.2	65.2
Resistance (%)							
Sales of cooking units - Gas (%)	34.8	34.8	34.8	34.8	34.8	34.8	34.8
Residential HVAC investment in 2020s vs.		2.54	2.44				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.5	22.4	55	63.9	64.6	64.7	64.7
Heat Pump (%)							
Sales of space heating units - Electric	16.7	16.3	26	31	34.1	34.6	34.6
Resistance (%)							
Sales of space heating units - Gas (%)	80.8	61.3	19	5.16	1.26	0.741	0.694
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0

Table 40: DEF acanania	- PTLLAR 1: Efficiency/Electrification	Commonaid (continued)
Table 69: KFF scendrin	- PII I AR I' FMICIENCY/FIECTRITICATION	- Commercial Icontiniieai

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric	1	0.818	0.818	0.822	0.828	0.831	0.832
Heat Pump (%)							
Sales of water heating units - Electric	3.08	2.41	2.42	2.43	2.43	2.43	2.43
Resistance (%)							
Sales of water heating units - Gas (%)	95.1	96.1	96.1	96.1	96.1	96.1	96.1
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629
Sales of cooking units - Electric	27.5	29	29	29	29	28.9	28.9
Resistance (%)							
Sales of cooking units - Gas (%)	72.5	71	71	71	71	71.1	71.1
Commercial HVAC investment in 2020s -		13,236	13,602				
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)	642	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	2,857	2,832	2,832	2,830	2,249	1,596	3,623
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	2,443	3,766	5,029	6,555	8,366	10,477	12,977
Installed renewables - Solar - Base land	703	703	703	703	703	703	703
use assumptions (MW)							
Installed renewables - Wind - Base land	4,154	4,154	4,154	4,154	5,001	5,440	5,440
use assumptions (MW)							
Installed renewables - Offshore Wind -	0	109	109	109	109	197	352
Base land use assumptions (MW)							
Installed renewables - Solar -	133	133	133	133	133	133	133
Constrained land 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)	2,011	2,011	2,011	2,011	2,011	2,011	2,011
Wind - Base land use assumptions (GWh)	14,129	14,129	14,129	14,129	17,259	18,842	18,842
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0

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 uptake (Mt CO2e/y)	-34.3		-7.18				-5.98
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-5.47		-9.18				-9.66
Business-as-usual carbon sink - Total (Mt CO2e/y)	-39.7		-16.4				-15.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-1,538
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-211
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-4,235
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,923
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-6,699
retention of HWP (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Increase							-231
trees outside forests (1000 tC02e/y)							0.000
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,282
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-286
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,705
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-22,111
Carbon sink potential - Mid - Accelerate							-2,304
regeneration (1000 tCO2e/y) Carbon sink potential - Mid - Avoid							-739
deforestation (1000 tCO2e/y) Carbon sink potential - Mid - Extend							-7,630
rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve							-4,284
plantations (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-13,398
retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-446
trees outside forests (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							-4,923
cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							-2,033
pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore							-5,365
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,121
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-3,070
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,267
Carbon sink potential - High - Extend rotation length (1000 tC02e/y)							-11,025
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,746
Carbon sink potential - High - Increase retention of HWP (1000 tC02e/y)							-20,097
Carbon sink potential - High - Increase							-660
trees outside forests (1000 tC02e/y) Carbon sink potential - High - Reforest							-6,564
cropland (1000 tCO2e/y) Carbon sink potential - High - Reforest							-3,779
pasture (1000 tCO2e/y) Carbon sink potential - High - All (not							-60,233
counting overlap) (1000 tCO2e/y) Carbon sink potential - High - Restore							-8,025
productivity (1000 tCO2e/y) Land impacted for carbon sink potential -							251
Low - Accelerate regeneration (1000 hectares)							_3.
Land impacted for carbon sink potential -							161
Low - Avoid deforestation (over 30 years) (1000 hectares)							0.1= :
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,154

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

Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050 1,058
Low - Improve plantations (1000							1,058
hectares)							
Land impacted for carbon sink potential -							(
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							33
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							21
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							18.6
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,609
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,503
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							37
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -	+						166
Mid - Avoid deforestation (over 30 years)							100
(1000 hectares)							
Land impacted for carbon sink potential -							3,888
							3,000
Mid - Extend rotation length (1000							
hectares)							4.50
Land impacted for carbon sink potential -							1,593
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							(
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							47.9
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							325
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							135
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							3,24
Mid - Restore productivity (1000							•
hectares)							
Land impacted for carbon sink potential -							9,773
Mid - Total impacted (over 30 years) (1000							2,110
hectares)							
Land impacted for carbon sink potential -							50:
High - Accelerate regeneration (1000							30.
hectares)							17
Land impacted for carbon sink potential -							17
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,62
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							2,11
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							(
High - 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 -							62.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							434
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							107
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,660
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							11,677
High - Total impacted (over 30 years)							
(1000 hectares)							