

Net-Zero America - West Virginia 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:

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Table 1: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		49.9	0.05	0.05	0.046	0.033	0.003
Fuel Comb - Electric Generation - Coal			0.00	0.00	0.0.0	0.000	0.000
(deaths)							
Premature deaths from air nollution -		677	4 84	2 81	22	1 21	0 446
Fuel Comb - Electric Generation - Natural		0.11	4.04	2.01	2.2	1.21	0.440
Gas (deaths)							
Dremature deaths from air pollution -		30.8	35.2	25 /	12.0	6.0/	2.78
Mobile On Road (doaths)		37.0	55.2	25.4	13.7	0.04	2.20
Dromoture doothe from air pollution Coo		6.01	2.47	0.40	1 / 0	0 6 9 9	0.204
Stationa (doctor)		4.21	3.07	2.63	1.48	0.082	0.306
			F 10	0.11	1.00	0.000	0.011
Premature deaths from air pollution -		6.5	5.18	3.41	1.83	0.833	0.311
Fuel Comb - Residential - Natural Gas							
[deaths]							
Premature deaths from air pollution -		2.01	1.55	1	0.548	0.227	0.071
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.22	1.06	0.795	0.509	0.268	0.125
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		1.16	1.05	0.946	0.846	0.755	0.667
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		8.23	6.89	4.87	2.89	1.58	0.845
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air nollution -		1 04	0.803	0.569	0.369	0.236	0 148
Fuel Comb - Comm/Institutional - Oil			0.000	0.007	0.007	0.200	0.140
(depthe)							
Dromature deaths from air pollution		0 202	0 212	0.2/.2	0.10	0 125	0.079
Fieldaule deaths if off all polition -		0.372	0.313	0.243	0.10	0.125	0.078
(dootho)							
Dremeture deethe frem air collution		0.07	F 0.0	F F1	F 10	(00	/
Premature deaths from air poliution -		9.94	5.88	5.51	5.12	4.88	4.55
Industrial Processes - Coal Mining							
[deaths]							
Premature deaths from air pollution -		119	101	81.3	59.4	38.8	21.5
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		442	0.447	0.442	0.404	0.296	0.027
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		60	42.9	24.9	19.5	10.8	3.95
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		354	313	226	124	53.7	20.3
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		37.3	32.5	23.3	13.1	6.04	2.71
Gas Stations (million \$2019)							
Monetary damages from air nollution -		57.6	45.9	30.2	16.2	7.38	2.76
Fuel Comb - Residential - Natural Gas		0.110		0012			
(million \$2019)							
Monetary damages from air pollution -		17.8	13.7	8 8 8	/, 85	2 01	0.626
Fuel Comb - Pesidential - Oil (million		11.0	10.1	0.00	4.00	2.01	0.020
Manatany damagaa from air pollution		10.0	0.40	705	/. E1	0.00	1 11
Monetary uanages if on all pointion -		٥.UI	9.42	1.05	4.51	2.38	1.11
ruer Comb - Kesidentiai - Other (Million #0010)							
\$2019]							
Monetary damages from air pollution -		10.3	9.3	8.38	7.49	6.68	5.91
Fuel Comb - Comm/Institutional - Coal							
[million \$2019]					-		
Monetary damages from air pollution -		72.8	61	43.1	25.6	14	7.48
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		9.17	7.11	5.04	3.26	2.09	1.31
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		3.47	2.77	2.15	1.59	1.11	0.691
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		87.7	51.9	48.6	45.2	43.1	40.1
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		1,053	896	722	527	345	191
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 2: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	20/.0	20/5	2050
By economic sector - Aariculture (jobs)	2020	2023	2030	2035	2040	2045	195
By economic sector - Construction (jobs)		3.321	3.415	5,493	8.369	9.062	9,914
By economic sector - Manufacturing		5.890	6.329	7.587	7,259	6.011	6.897
(iobs)		0,070	0,017	.,	.,_0,	0,011	0,071
By economic sector - Mining (jobs)		9,227	6,030	4,762	3,441	2,534	1,768
By economic sector - Other (jobs)		128	158	603	1,317	1,721	1,904
By economic sector - Pipeline (jobs)		576	498	405	305	202	170
By economic sector - Professional (jobs)		2,983	2,574	3,540	4,951	5,477	6,388
By economic sector - Trade (jobs)		3,192	2,410	2,830	3,567	3,872	4,229
By economic sector - Utilities (jobs)		4,014	3,142	4,110	5,804	5,854	7,330
By resource sector - Biomass (jobs)		0	0	0	0	0	835
By resource sector - CO2 (jobs)		0	0	0	0	0	414
By resource sector - Coal (jobs)		9,540	4,431	3,660	3,187	2,872	2,545
By resource sector - Grid (jobs)		2,090	2,376	5,190	9,051	10,168	13,343
By resource sector - Natural Gas (jobs)		7,105	5,936	4,650	3,639	2,141	1,247
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		6,960	6,170	5,397	3,868	2,839	1,735
By resource sector - Solar (jobs)		901	1,155	4,256	8,169	9,900	9,995
By resource sector - Wind (jobs)		2,733	4,488	6,176	7,098	6,814	8,680
By education level - All sectors - High		12,828	10,517	12,551	14,930	14,744	16,211
school diploma or less (jobs)							
By education level - All sectors -		8,713	7,375	9,002	10,986	10,974	12,284
Associates degree or some college (jobs)							
By education level - All sectors -		6,159	5,278	6,139	7,127	7,022	7,798
Bachelors degree (jobs)							
By education level - All sectors - Masters		1,435	1,220	1,435	1,717	1,731	1,939
or professional degree (jobs)							
By education level - All sectors - Doctoral		194	166	201	251	262	294
degree (jobs)						(
Related work experience - All sectors -		3,977	3,355	4,063	4,935	4,928	5,485
None (jobs)		5.0 (0	(015	5.000	7400	7.005	
Related work experience - All sectors - Up		5,963	4,915	5,939	7,129	7,095	7,840
to I year (Jobs)		10.050	0.000	10 701	10 701	10 57/	10.011
te (veene (iebe)		10,959	9,092	10,731	12,701	12,574	13,911
Deleted work experience. All easters ((500	E (0 9	(700	0.070	0.00F	0.01/
te 10 years (jobs)		6,590	5,608	6,722	8,063	8,005	8,916
Deleted work experience. All sectors		1 0/1	1 5 0 4	1 075	0.107	0 10 0	0.07/.
Neialeu wurk experience - An Seclurs - Nyer 10 years (jobs)		1,041	1,000	1,013	2,104	2,133	2,314
On-the-loh Training - All sectors - Nono		1504	1 077	1 5/.0	1 9 4 7	1 077	2 075
(inhe)		1,000	1,211	1,042	1,001	1,017	2,010
On-the-Joh Training - All sectors - Un to 1		20 106	16 755	19 818	23.316	23 003	25 477
vear (inbs)		20,100	10,100	17,010	20,010	20,000	20,711
, ()000)						l	

Table 2: E+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4		5,869	4,953	5,991	7,282	7,253	8,075
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,585	1,333	1,688	2,203	2,265	2,529
years (jobs)							
On-the-Job Training - All sectors - Over 10		263	237	291	344	337	370
years (jobs)							
On-Site or In-Plant Training - All sectors -		4,450	3,827	4,648	5,611	5,600	6,240
None (jobs)							
On-Site or In-Plant Training - All sectors -		18,350	15,221	17,980	21,170	20,892	23,120
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		4,639	3,902	4,704	5,687	5,653	6,280
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,686	1,426	1,769	2,257	2,298	2,557
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		204	180	228	288	291	329
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,522	1,287	1,532	1,832	1,831	2,056

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		31	26.8	20.4	14.4	9.6	5.68
Oil consumption - Cumulative (million							627
bbls)							
Oil production - Annual (million bbls)		15.1	15.1	15.1	12	9.71	6.46
Natural gas consumption - Annual (tcf)		158	133	107	80.5	50.6	35.1
Natural gas consumption - Cumulative							3,220
(tcf)							
Natural gas production - Annual (tcf)		2,002	1,893	1,648	1,394	1,105	859

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

Item	2020	2025	2030	2035	2040	2045	2050			
Final energy use - Transportation (PJ)	151	141	123	101	81	68.6	63.6			
Final energy use - Residential (PJ)	38.4	36.1	33.5	30.6	27.6	25.7	24.7			
Final energy use - Commercial (PJ)	48.6	48.7	47.1	44.5	42	41	41.4			
Final energy use - Industry (PJ)	185	197	201	206	212	214	218			

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.954	0.978	1.95	2.08	1.75	1.83
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)	2	141	280	765	1,251	1,639	2,028
Vehicle stocks - LDV – All others (1000	1,691	1,610	1,529	1,114	700	396	92
units)							
Light-duty vehicle capital costs vs. REF -		326	832	1,355	2,050	2,233	2,128
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.06		0.708		3.17		5.13
units)							
Public EV charging plugs - L2 (1000 units)	0.164		17		76.1		123

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	20.6	34.6	64.3	82.8	85.4	85.5	85.5
Sales of space heating units - Electric Resistance (%)	18.3	20.1	12	6.25	5.33	5.36	5.42
Sales of space heating units - Gas (%)	50.2	29.6	14.6	4.64	3.25	3.16	3.14
Sales of space heating units - Fossil (%)	10.8	15.7	9.07	6.34	6.05	5.96	5.93
Sales of water heating units - Electric Heat Pump (%)	0	5.29	30.4	43.3	45	45.1	45.2
Sales of water heating units - Electric Resistance (%)	45	59.7	53.2	53.1	53.2	53.3	53.2
Sales of water heating units - Gas Furnace (%)	52.2	33	14.7	1.99	0.11	0	0
Sales of water heating units - Other (%)	2.8	2.02	1.66	1.59	1.61	1.62	1.64
Sales of cooking units - Electric Resistance (%)	62.6	70.5	95	99.7	100	100	100
Sales of cooking units - Gas (%)	37.4	29.5	5.04	0.254	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.682	0.676				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3.31	21.4	54	79.9	84	84.2	84.2
Heat Pump (%)							
Sales of space heating units - Electric	3.22	8.3	10.8	13.4	13.9	13.9	13.9
Resistance (%)							
Sales of space heating units - Gas (%)	89.4	66.3	34.4	6.61	2.15	1.91	1.9
Sales of space heating units - Fossil (%)	4.12	4.08	0.778	0.033	0	0	0
Sales of water heating units - Electric	0.114	6.44	36.5	54	56.3	56.5	56.5
Heat Pump (%)							
Sales of water heating units - Electric	2.92	9.46	24.7	38.5	40.7	40.8	40.8
Resistance (%)							
Sales of water heating units - Gas (%)	94.5	80.1	35.8	4.81	0.265	0	0
Sales of water heating units - Other (%)	2.43	4.02	2.96	2.7	2.7	2.7	2.7
Sales of cooking units - Electric	32	46	79.9	86.5	86.9	86.9	86.9
Resistance (%)							
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s -		5,826	6,488				
Cumulative 5-yr (million \$2018)							

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Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	11,355	1,656	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,216	1,339	1,108	1,280	537	537	537
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	10	15	19.9	26.4	34.1	42.9	53.1
Installed renewables - Solar - Base land	0	0	0	2,219	7,427	13,921	18,879
use assumptions (MW)							
Installed renewables - Wind - Base land	684	740	7,019	13,807	26,216	26,977	29,033
use assumptions (MW)							
Installed renewables - Solar -	0	0	278	2,315	4,976	8,272	10,798
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	740	740	19,923	47,759	47,868	47,868	47,868
land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		0	0	2.45	5.41	6.37	4.59
\$2018)							
Capital invested - Wind - Base (billion		0	8.36	8.42	14.7	0.853	2.18
\$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion \$2018)		0	0	1.91	3.94	5.57	3.3
Capital invested - Wind - Constrained (billion \$2018)		0	26.5	33.7	0.092	0	2.31
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)	0	0	0	3,967	13,256	24,607	33,274
Wind - Base land use assumptions (GWh)	3,100	3,100	25,019	46,938	84,242	86,377	91,821
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Constrained land use assumptions	0	0	507	4,116	8,819	14,584	18,996
(GWh)							
Wind - Constrained land use assumptions	3,100	3,100	64,947	135,343	135,594	135,594	135,594
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	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	0	4
(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	0	2,949
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	0	0	0	136

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	7.32
Annual - BECCS (MMT)		0	0	0	0	0	3.79
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	3.53
Cumulative - All (MMT)		0	0	0	0	0	7.32
Cumulative - BECCS (MMT)		0	0	0	0	0	3.79
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	3.53

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	0	0	0	0
Spur (km)		0	0	0	0	0	316
All (km)		0	0	0	0	0	316
Cumulative investment - Trunk (million \$2018)		0	0	0	0	0	0
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	223
Cumulative investment - All (million \$2018)		0	0	0	0	0	223

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,		0	0	0	0	0	0
permitting costs (million \$2020)							
Wells and facilities construction costs		0	0	0	0	0	0
(million \$2020)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-53.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-121
deforestation (1000 tC02e/y)							
Carbon sink potential - Low - Extend							-2,454
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-30.8
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,480
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-69.1
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-236
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-927
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,372
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-422
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,421
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-45.2
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,961
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-133
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest							-1,675
pasture (1000 tCO2e/v)							,
Carbon sink notential - Mid - Restore							-1 839
productivity (1000 tC02e/y)							1,007
Carbon sink notantial Mid All (not							11 577
cal boll sink potential - Mid - All (not							-11,511
							100
Carbon Sink potential - High - Accelerate							-108
regeneration (1000 tC02e/y)							
Carbon sink potential - High - Avoid							-724
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-6,389
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-60.6
plantations (1000 tCO2e/y)							
Carbon sink notential - High - Increase							-4 441
retention of HWP (1000 tC02e/v)							.,
Carbon sink notential - High - Increase							_197
troos outsido forosts (1000 tC020/v)							-171
Combon cink notontial Uich Defenset							
							U
Carbon sink potential - High - Reforest							-3,114
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-17,784
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,750
productivity (1000 tCO2e/y)							
Land impacted for carbon sink notential -							8.8
Low - Accelerate regeneration (1000							0.0
hertares)							
Land impacted for carbon sink notantial							021
Land impacted for carbon Sink potential -							72.1
(1000 hastanas)							
							10/0
Land impacted for carbon sink potential -							1,248
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							11.2
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares							
Land impacted for carbon sink notential -							9.87
Low - Increase trees outside forests							7.01
(1000 bectares)							
Lond imposted for earbon sink notantial							0
Lanu Impacteu for Carbon Sink potential -							U
							45.0
Land impacted for carbon sink potential -							15.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							552
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,937
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink notential -	<u> </u>						13.2
Mid - Accelerate regeneration (1000							1012
hectares)							
Land impacted for carbon sink notantial							0F 1
Mid Avoid defenestation (over 20 vers)							70.1
(1000 hostonos)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							2.253
Mid - Extend rotation length (1000							_,
hectares)							
Land impacted for carbon sink potential -							16.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							-
hectares)							
Land impacted for carbon sink notential -							14.3
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink notential -							0
Mid - Reforest cronland (1000 hectares)							U
Land impacted for carbon sink notential -							111
Mid - Reforest nasture (1000 hectares)							
Land impacted for carbon sink notential -							1 111
Mid - Restore productivity (1000							,,
hectares)							
Land impacted for carbon sink notential -							3 61/1
Mid - Total impacted (over 30 years) (1000							0,014
hectares)							
Land impacted for carbon sink notential -							17.6
High - Accelerate regeneration (1000							11.0
hertares)							
Land impacted for carbon sink notential -							981
High - Avoid deforestation (over 30 years)							70.1
(1000 hectares)							
Land impacted for carbon sink notential -							3 258
High - Extend rotation length (1000							0,200
hectares)							
Land impacted for carbon sink notential -							22.3
High - Improve plantations (1000							22.0
hectares)							
Land impacted for carbon sink notential -							0
High - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink notential -							18.7
High - Increase trees outside forests							10.1
(1000 hectares)							
Land impacted for carbon sink notential -							0
High - Reforest cronland (1000 bectares)							U
Land impacted for carbon sink notential -							88.5
High - Reforest nasture (1000 hectares)							50.0
Land impacted for carbon sink notential -							912
High - Restore productivity (1000							/12
hectares)							
Land impacted for carbon sink notential -							4 415
High - Total impacted (over 30 years)							-,-TU
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-273
deployment - Cropland measures (1000							
tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-10.5
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-284
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-518
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-21.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-539
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							182
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							19.2
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							201
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							345
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							38.3
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							384
Aggressive deployment - Total (1000							
hectares)							

Table 17: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		49.9	0.05	0.05	0.046	0.033	0.003
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		6.19	3.89	1.51	0.589	0.182	0.101
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		40.4	38.6	35.7	30.5	23.1	15.1
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		4.3	4.1	3.75	3.19	2.41	1.58
Stations (deaths)							
Premature deaths from air pollution -		6.54	5.64	4.75	3.76	2.71	1.72
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		2.05	1.86	1.68	1.4	0.99	0.597
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.23	1.18	1.11	0.979	0.753	0.518
Fuel Comb - Residential - Other (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		1.16	1.05	0.946	0.846	0.755	0.667
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		8.27	7.63	6.88	5.8	4.46	3.13
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		1.04	0.889	0.752	0.605	0.473	0.359
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.392	0.335	0.284	0.238	0.196	0.159
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		9.71	5.89	5.54	5.16	4.89	4.47
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		118	94.7	69.8	52.1	40.3	27.8
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		442	0.447	0.442	0.404	0.296	0.027
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		54.9	34.5	13.4	5.22	1.61	0.892
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		359	343	317	271	205	134
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		38.1	36.3	33.2	28.2	21.3	14
Gas Stations (million \$2019)							
Monetary damages from air pollution -		58	50	42.1	33.3	24	15.3
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		18.1	16.5	14.9	12.4	8.77	5.29
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		10.9	10.4	9.87	8.67	6.67	4.59
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		10.3	9.3	8.38	7.49	6.68	5.91
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		73.2	67.5	60.9	51.3	39.5	27.7
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		9.21	7.87	6.66	5.35	4.19	3.18
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		3.47	2.97	2.52	2.1	1.73	1.41
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		85.7	52	48.9	45.6	43.1	39.4
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		1,049	841	619	462	358	247
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	195
By economic sector - Construction (jobs)		3,550	3,386	4,772	7,429	9,805	10,978

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing		6,092	6,486	6,800	7,078	7,733	9,034
(jobs)							
By economic sector - Mining (jobs)		9,236	5,970	4,692	3,690	2,928	2,033
By economic sector - Other (jobs)		145	164	514	1,151	1,871	2,006
By economic sector - Pipeline (jobs)		575	470	359	281	225	250
By economic sector - Professional (jobs)		3,142	2,649	3,269	4,644	6,014	7,147
By economic sector - Trade (jobs)		3,347	2,436	2,689	3,433	4,288	4,711
By economic sector - Utilities (jobs)		4,478	3,149	3,373	4,883	6,053	8,136
By resource sector - Biomass (jobs)		0	0	0	0	0	806
By resource sector - CO2 (jobs)		0	0	0	0	0	710
By resource sector - Coal (jobs)		9,893	4,700	3,679	3,214	2,875	2,502
By resource sector - Grid (jobs)		2,823	2,398	4,075	7,623	10,591	14,455
By resource sector - Natural Gas (jobs)		7,063	5,457	3,945	2,939	2,030	1,509
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		6,976	6,254	5,621	4,939	4,248	2,701
By resource sector - Solar (jobs)		956	1,216	3,428	6,968	10,918	10,170
By resource sector - Wind (jobs)		2,855	4,684	5,723	6,905	8,255	11,638
By education level - All sectors - High		13,339	10,568	11,328	13,868	16,486	18,563
school diploma or less (jobs)							
By education level - All sectors -		9,113	7,420	8,055	10,121	12,234	14,074
Associates degree or some college (jobs)							
By education level - All sectors -		6,416	5,323	5,593	6,742	7,960	9,029
Bachelors degree (jobs)							
By education level - All sectors - Masters		1,496	1,231	1,308	1,619	1,944	2,223
or professional degree (jobs)							
By education level - All sectors - Doctoral		201	168	186	239	293	334
degree (jobs)							
Related work experience - All sectors -		4,155	3,373	3,648	4,564	5,503	6,281
None (jobs)							
Related work experience - All sectors - Up		6,201	4,951	5,364	6,623	7,941	8,972
to 1 year (jobs)							
Related work experience - All sectors - 1		11,409	9,147	9,715	11,865	14,095	15,967
to 4 years (jobs)							
Related work experience - All sectors - 4		6,882	5,642	6,052	7,494	8,965	10,249
to 10 years (jobs)							
Related work experience - All sectors -		1,917	1,597	1,690	2,043	2,412	2,754
Over 10 years (jobs)				1.001			
Un-the-Job Training - All sectors - None		1,570	1,286	1,396	1,742	2,107	2,375
			14.074	17.05.0	01.01/	05.000	
Un-the-Job Training - All sectors - Up to 1		20,926	16,876	17,950	21,814	25,882	29,326
year (jobs)		(100	1.07/	F 0/7	/ 717	0.075	
Un-the-Job Training - All Sectors - 1 to 4		6,129	4,974	5,367	6,717	8,075	9,244
Veal's (JUDS)		1///	1 0 0 0	1/0/	1005	0 / 70	0.0/7
Un-the-Job Training - All Sectors - 4 to 10		1,666	1,333	1,496	1,995	2,470	2,847
Vedrs (JUDS)		07/.	220	041	201	202	/.91
Voars (jobs)		214	239	201	521	303	431
On Site on In Dight Training All costons		1. 61.E	2 0 5 0	/, 10/	E 017	6 202	7177
Nono (johe)		4,045	3,000	4,100	5,217	0,292	(,) ((
On-Site on In-Diant Training - All sectors -		10 005	15 32/	16 283	10 702	23 / 75	26 583
lin to 1 year (inhs)		17,070	10,024	10,203	17,172	20,410	20,000
On-Site or In-Plant Training - All sectors -		L Q/.1	3 920	4 222	5 252	6 305	710/,
1 to 4 years (inhs)		4,041	5,720	7,222	0,200	0,000	1,174
On-Site or In-Plant Training - All sectors -		1769	1 4 9 7	1.576	2 በ6በ	2 522	2 893
4 to 10 years (iobs)		1,107	"""""""""""""""""""""""""""""""""""""""	.,010	2,000	2,022	2,070
On-Site or In-Plant Training - All sectors -		215	181	201	262	322	376
Over 10 years (jobs)		2.0		201	202	022	0.0
Wage income - All (million \$2019)		1.586	1.294	1,384	1.710	2.051	2.362
		.,	· /= / ·	.,	.,	-,	_,

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	151	143	129	118	110	100	89.1
Final energy use - Residential (PJ)	38.4	36.2	35	33.8	32.2	30.3	28.1
Final energy use - Commercial (PJ)	48.6	48.8	48.2	47.6	46.4	45.3	44.7
Final energy use - Industry (PJ)	185	197	202	207	214	216	219

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.829	0.837	1.16	1.2	1.73	1.83
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	1.55	42.4	83.2	272	461	880	1,299
Vehicle stocks - LDV – All others (1000	1,698	1,698	1,698	1,610	1,523	1,174	824
units)							
Light-duty vehicle capital costs vs. REF -		0	52.1	111	373	1,179	1,716
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.06		0.211		1.17		3.29
units)							
Public EV charging plugs - L2 (1000 units)	0.164		5.06		28.1		79

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	20.6	29.9	33.3	43.4	60.9	75.7	82.6
Heat Pump (%)							
Sales of space heating units - Electric	18.3	21.3	20.5	17.4	12.3	8.13	6.18
Resistance (%)							
Sales of space heating units - Gas (%)	50.2	31.9	30	25.2	16.5	8.57	4.78
Sales of space heating units - Fossil (%)	10.8	16.9	16.2	14	10.4	7.61	6.49
Sales of water heating units - Electric	0	1.02	3.88	12.4	26.6	38	43.1
Heat Pump (%)							
Sales of water heating units - Electric	45	61.1	60.3	58	54.9	53.5	53.2
Resistance (%)							
Sales of water heating units - Gas Furnace	52.2	35.8	33.7	27.7	16.7	6.76	2.07
(%)							
Sales of water heating units - Other (%)	2.8	2.09	2.06	1.96	1.8	1.69	1.66
Sales of cooking units - Electric	62.4	63.4	66.8	75.9	88.5	96.3	99
Resistance (%)							
Sales of cooking units - Gas (%)	37.6	36.6	33.2	24.1	11.5	3.71	0.997
Residential HVAC investment in 2020s vs.		0.678	0.66				
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	3.31	16.5	20.2	31.4	51.9	70.8	80
Heat Pump (%)							
Sales of space heating units - Electric	3.22	7.96	8.26	9.15	10.8	12.6	13.5
Resistance (%)							
Sales of space heating units - Gas (%)	89.4	70.9	67.2	56.1	35.6	16.1	6.3
Sales of space heating units - Fossil (%)	4.12	4.72	4.38	3.31	1.62	0.515	0.135
Sales of water heating units - Electric	0.114	1.49	4.92	15.1	32.6	47.1	53.7
Heat Pump (%)							
Sales of water heating units - Electric	2.92	7.34	9.03	14.3	24.3	33.8	38.6
Resistance (%)							
Sales of water heating units - Gas (%)	94.5	86.9	81.8	66.8	39.9	16.2	4.96
Sales of water heating units - Other (%)	2.43	4.23	4.21	3.78	3.24	2.87	2.74

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

	,,						
Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric	32	36.2	40.9	53.4	71	81.7	85.5
Resistance (%)							
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Commercial HVAC investment in 2020s -		5,823	6,480				
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)	11,355	2,956	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,216	1,224	1,224	815	7.5	7.5	15
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							-53.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-121
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,454
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-30.8
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,480
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-69.1
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-236
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-927
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,372
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-422
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,421
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-45.2
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,961
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-133
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,675
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-1,839
productivity (1000 tC02e/y)							
Carbon sink potential - Mid - All (not							-11,577
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-108
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-724
detorestation (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - High - Extend							-6 389
rotation length (1000 tC02e/v)							0,007
Carbon sink notantial High Improve							<u> </u>
plantationa (1000 ±002a/v)							-00.0
Control of the second s							1.1.1
Carbon Sink polential - High - Increase							-4,441
retention of HWP (1000 tC02e/y)							
Carbon sink potential - High - Increase							-197
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-3,114
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-17,784
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2.750
productivity (1000 tCO2e/y)							,
Land impacted for carbon sink notential -							8.8
Low - Accelerate regeneration (1000							0.0
hertares)							
Land impacted for carbon sink notantial							021
Lanu impacteu for carbon Sink potential -							92.1
(1000 hostores)							
Land impacted for carbon sink potential -							1,248
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							11.2
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 -							9.87
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink notential							0
$L_{\rm and}$ impacted for carbon sink potential -							0
Lond imposted for earbon sink notantial							15.0
Lanu inipacteu ior carbon sink potential -							15.3
Low - Reforest pasture (1000 nectares)							
Land impacted for carbon sink potential -							552
Low - Restore productivity (1000							
hectaresj							
Land impacted for carbon sink potential -							1,937
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							13.2
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							95.1
Mid - Avoid deforestation (over 30 vears)							
(1000 hectares)							
Land impacted for carbon sink notential -							2 253
Mid - Extend rotation length (1000							2,200
hartaree)							
Land imported for earther sink retertial							1/ 0
							10.0
Milu - Improve plantations (IUUU nectares)							
Land impacted for carbon sink potential -							U
Mid - Increase retention of HWP (1000							
nectaresj							
Land impacted for carbon sink potential -							14.3
Mid - Increase trees outside forests (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							0
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							111
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,111
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,614
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							17.6
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							98.1
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,258
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							22.3
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 -							18.7
High - Increase trees outside forests							
[1000 hectares]							
Land impacted for carbon sink potential -							U
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							88.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							912
High - Restore productivity (1000							
hectares							
Land impacted for carbon sink potential -							4,415
Hign - Total Impacted (over 30 years)							
(IUUU nectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-273
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-10.5
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-284
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-518
deployment - Cropland measures (1000							
tCO2e/y)							

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

Carbon sink potential - Aggressive	-21.1
deployment - Permanent conservation	
cover (1000 tC02e/y)	
Carbon sink potential - Aggressive	-539
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	182
deployment - Cropland measures (1000	
hectares)	
Land impacted for carbon sink - Moderate	19.2
deployment - Permanent conservation	
cover (1000 hectares)	
Land impacted for carbon sink - Moderate	201
deployment - Total (1000 hectares)	
Land impacted for carbon sink -	0
Aggressive deployment - Corn-ethanol to	
energy grasses (1000 hectares)	
Land impacted for carbon sink -	345
Aggressive deployment - Cropland	
measures (1000 hectares)	
Land impacted for carbon sink -	38.3
Aggressive deployment - Permanent	
conservation cover (1000 hectares)	
Land impacted for carbon sink -	384
Aggressive deployment - Total (1000	
hectares)	

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		49.9	0.05	0.05	0.046	0.033	0.003
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		5.93	4.17	2.2	1.31	0.382	0.095
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		39.8	35.2	25.4	13.9	6.04	2.28
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		4.21	3.67	2.63	1.48	0.682	0.306
Stations (deaths)							
Premature deaths from air pollution -		6.5	5.18	3.41	1.83	0.833	0.311
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		2.01	1.55	1	0.548	0.227	0.071
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.22	1.06	0.795	0.509	0.268	0.125
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		1.16	1.05	0.946	0.846	0.755	0.667
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		8.23	6.89	4.87	2.89	1.58	0.845
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		1.04	0.803	0.569	0.369	0.236	0.148
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.392	0.313	0.243	0.18	0.125	0.078
Fuel Comb - Comm/Institutional - Other							
(deaths)							

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

Itom	2020	2025	2020	2025	204.0	2075	2050
Descriptions desthe from sin pollution	2020	2025	2030	2035	2040	2045	2030
Premature deaths from air poliution -		10.5	5.88	5.5	5.11	4.88	4.37
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		115	98.5	73.5	48.7	24.9	1.64
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		442	0.447	0.442	0.404	0.296	0.027
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		52.6	36.9	19.5	11.6	3.39	0.845
Fuel Comb - Electric Generation - Natural		02.0	0017	1710	11.0	0.07	0.010
Cas (million \$2019)							
Monotony domagoo from ain pollution		257	212	004	107	E27	20.2
Mohile On Deed (million #0010)		554	313	220	124	55.0	20.5
Mobile - Oll-Road (IIIIII011 \$2019)					10.1		0.74
Monetary damages from air pollution -		37.3	32.5	23.3	13.1	6.04	2.71
Gas Stations (million \$2019)							
Monetary damages from air pollution -		57.6	45.9	30.2	16.2	7.38	2.76
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		17.8	13.7	8.88	4.85	2.01	0.626
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		10.8	9.42	7.05	4,51	2.38	1.11
Fuel Comb - Residential - Other (million		10.0	<i>/</i> _			2.00	
¢2019)							
Monotony domagoe from air pollution		10.2	0.2	0.20	7/.0	6 6 9	<u> </u>
Fuel Comb. Comm/Institutional. Cool		10.5	7.5	0.30	1.47	0.00	5.71
			(1)	(0.1	05 (
Monetary damages from air pollution -		72.8	61	43.1	25.6	14	7.48
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		9.17	7.11	5.04	3.26	2.09	1.31
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		3.47	2.77	2.15	1.59	1.11	0.691
Fuel Comb - Comm/Institutional - Other		-		_			
(million \$2019)							
Monetary damages from air pollution -		92.8	51.9	48.6	<u>45</u> 1	<u>4</u> 2	38.5
Industrial Processos Coal Mining		72.0	01.7	40.0	40.1		00.0
(million ¢2010)							
(IIIIIIUII #2017) Monotony domogoo from air pollution		1.005		/ 50	(00	0.01	1/ /
Monetary damages from air polition -		1,025	814	653	432	221	14.6
Industrial Processes - Ull & Gas							
Production (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	196
By economic sector - Construction (jobs)		3,629	3,793	9,425	11,695	19,089	12,165
By economic sector - Manufacturing		6,383	7,311	9,960	10,505	12,367	12,875
(jobs)							
By economic sector - Mining (jobs)		9,537	5,987	4,608	3,217	2,226	1,244
By economic sector - Other (jobs)		164	216	1,426	1,894	4,086	2,032
By economic sector - Pipeline (jobs)		559	482	356	240	125	19.6
By economic sector - Professional (jobs)		3,244	2,838	5,321	6,733	10,522	8,395
By economic sector - Trade (jobs)		3,472	2,528	3,932	4,575	7,180	5,127
By economic sector - Utilities (jobs)		4,499	3,492	5,953	8,409	11,674	10,203
By resource sector - Biomass (jobs)		0	0	0	0	0	864
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		10,488	4,695	3,658	3,184	2,870	2,449
By resource sector - Grid (jobs)		2,981	2,932	9,143	14,803	22,370	19,941

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Natural Gas (jobs)		6,851	5,700	4,091	2,824	1,256	253
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		6,960	6,158	5,253	3,536	2,182	408
By resource sector - Solar (jobs)		1,151	2,000	10,387	12,214	25,677	10,763
By resource sector - Wind (jobs)		3,056	5,163	8,450	10,706	12,913	17,579
By education level - All sectors - High		13.813	11,400	17.583	20,152	28,618	21,797
school diploma or less (jobs)							
By education level - All sectors -		9,381	8,052	12,780	14,972	21,558	16,678
Associates degree or some college (jobs)					-	-	
By education level - All sectors -		6,560	5,702	8,359	9,517	13,315	10,552
Bachelors degree (jobs)					-	-	
By education level - All sectors - Masters		1,527	1,315	1,976	2,293	3,283	2,581
or professional degree (jobs)							
By education level - All sectors - Doctoral		205	179	284	333	495	380
degree (jobs)							
Related work experience - All sectors -		4,274	3,648	5,745	6,692	9,641	7,362
None (jobs)							
Related work experience - All sectors - Up		6,433	5,354	8,412	9,683	13,905	10,648
to 1 year (jobs)							
Related work experience - All sectors - 1		11,749	9,830	14,844	17,043	24,111	18,655
to 4 years (jobs)							
Related work experience - All sectors - 4		7,062	6,089	9,397	10,892	15,492	12,042
to 10 years (jobs)							
Related work experience - All sectors -		1,969	1,726	2,585	2,956	4,119	3,281
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,614	1,387	2,189	2,523	3,678	2,770
(jobs)							
On-the-Job Training - All sectors - Up to 1		21,589	18,174	27,436	31,411	44,313	34,593
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		6,298	5,381	8,460	9,871	14,142	10,853
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,704	1,444	2,481	2,991	4,465	3,258
years (jobs)							
On-the-Job Training - All sectors - Over 10		281	261	415	471	671	515
years (jobs)							
On-Site or In-Plant Training - All sectors -		4,775	4,178	6,584	7,626	10,986	8,494
None (jobs)							
On-Site or In-Plant Training - All sectors -		19,704	16,495	24,888	28,500	40,217	31,309
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		4,980	4,237	6,623	7,698	11,003	8,441
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,807	1,540	2,557	3,046	4,486	3,300
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		220	197	330	396	576	445
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,629	1,390	2,110	2,456	3,496	2,756

Item	2020	2025	2030	2035	2040	2045	2050	
Final energy use - Transportation (PJ)	151	141	123	101	81	68.6	63.6	
Final energy use - Residential (PJ)	38.4	36.1	33.5	30.6	27.6	25.7	24.7	
Final energy use - Commercial (PJ)	48.6	48.7	47.1	44.5	42	41	41.4	
Final energy use - Industry (PJ)	185	197	201	206	212	214	218	

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

	/		/				
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.954	0.978	1.95	2.08	1.75	1.83
Cumulative 5-yr (billion \$2018)							

	,, =						
Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2	141	280	765	1,251	1,639	2,028
Vehicle stocks - LDV – All others (1000	1,691	1,610	1,529	1,114	700	396	92
units)							
Light-duty vehicle capital costs vs. REF -		326	832	1,355	2,050	2,233	2,128
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.06		0.708		3.17		5.13
units)							
Public EV charging plugs - L2 (1000 units)	0.164		17		76.1		123

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	20.6	34.6	64.3	82.8	85.4	85.5	85.5
Heat Pump (%)							
Sales of space heating units - Electric	18.3	20.1	12	6.25	5.33	5.36	5.42
Resistance (%)							
Sales of space heating units - Gas (%)	50.2	29.6	14.6	4.64	3.25	3.16	3.14
Sales of space heating units - Fossil (%)	10.8	15.7	9.07	6.34	6.05	5.96	5.93
Sales of water heating units - Electric	0	5.29	30.4	43.3	45	45.1	45.2
Heat Pump (%)							
Sales of water heating units - Electric	45	59.7	53.2	53.1	53.2	53.3	53.2
Resistance (%)							
Sales of water heating units - Gas Furnace	52.2	33	14.7	1.99	0.11	0	0
(%)							
Sales of water heating units - Other (%)	2.8	2.02	1.66	1.59	1.61	1.62	1.64
Sales of cooking units - Electric	62.6	70.5	95	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	37.4	29.5	5.04	0.254	0	0	0
Residential HVAC investment in 2020s vs.		0.682	0.676				
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	3.31	21.4	54	79.9	84	84.2	84.2
Heat Pump (%)							
Sales of space heating units - Electric	3.22	8.3	10.8	13.4	13.9	13.9	13.9
Resistance (%)							
Sales of space heating units - Gas (%)	89.4	66.3	34.4	6.61	2.15	1.91	1.9
Sales of space heating units - Fossil (%)	4.12	4.08	0.778	0.033	0	0	0
Sales of water heating units - Electric	0.114	6.44	36.5	54	56.3	56.5	56.5
Heat Pump (%)							
Sales of water heating units - Electric	2.92	9.46	24.7	38.5	40.7	40.8	40.8
Resistance (%)							
Sales of water heating units - Gas (%)	94.5	80.1	35.8	4.81	0.265	0	0
Sales of water heating units - Other (%)	2.43	4.02	2.96	2.7	2.7	2.7	2.7
Sales of cooking units - Electric	32	46	79.9	86.5	86.9	86.9	86.9
Resistance (%)							
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s -		5,826	6,488				
Cumulative 5-yr (million \$2018)							

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

		.,		-)			
Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	11,355	3,640	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,216	1,224	1,339	1,056	130	130	537

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

Item	2020	2025	2030	2035	2040	2045	2050	
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0	
Installed renewables - Rooftop PV (MW)	10	15	19.9	26.4	34.1	42.9	53.1	
Installed renewables - Solar - Base land	0	79.1	262	6,872	13,078	28,498	28,498	
use assumptions (MW)								
Installed renewables - Wind - Base land	740	740	8,957	21,914	44,905	54,159	54,198	
use assumptions (MW)								
Installed renewables - Solar -	0	377	916	4,435	10,762	14,839	15,021	
Constrained land use assumptions (MW)								
Installed renewables - Wind - Constrained	840	840	27,586	47,968	47,968	47,968	63,329	
land use assumptions (MW)								
Installed renewables - Offshore Wind -	0	0	0	0	0	0	0	
Constrained land use assumptions (MW)								
Capital invested - Solar PV - Base (billion		0.106	0.219	7.29	6.45	15.1	0	
\$2018)								
Capital invested - Wind - Base (billion		0	10.9	16.1	27.2	10.4	0.041	
\$2018)								

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	145	476	12,091	22,963	49,928	49,928
Wind - Base land use assumptions (GWh)	3,100	3,100	31,342	71,772	131,323	154,153	154,241
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	1,379	3,378	15,726	37,677	51,985	52,648
Wind - Constrained land use assumptions (GWh)	6,201	6,201	170,493	271,188	271,188	271,188	370,654
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-53.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-121
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,454
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-30.8
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,480
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-69.1
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-236
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-927
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,372
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-422
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,421
rotation length (1000 tCO2e/y)							

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

	0000	0005		0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve							-45.2
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,961
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-133
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							0
cronland (1000 tC02e/v)							-
Carbon sink notential - Mid - Reforest							-1 675
p_{2}							1,010
Carbon cink notantial Mid Destans							1.000
							-1,839
							44 577
Carbon sink potential - Mid - All (not							-11,577
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-108
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-724
deforestation (1000 tCO2e/y)							
Carbon sink notential - High - Extend							-6.389
rotation length (1000 tC02e/v)							0,007
Carbon sink notential - High - Improve							-60.6
plantations (1000 ±000 a/v)							-00.0
							1
Carbon sink potential - High - Increase							-4,441
retention of HWP (1000 tC02e/y)							
Carbon sink potential - High - Increase							-197
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-3,114
pasture (1000 tCO2e/v)							-
Carbon sink notential - High - All (not							-17784
counting overlap) (1000 tC02e/v)							11,104
Carbon sink notantial High Postoro							2750
cal boll slik potential - High - Restore							-2,150
Land impacted for carbon sink potential -							8.8
Low - Accelerate regeneration (1000							
hectaresj							
Land impacted for carbon sink potential -							92.1
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,248
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink notential -							11 2
Low - Improve plantations (1000							11.2
hostopoo)							
Lond imposted for contant ink notantial							0
Land impacted for carbon sink potential -							U
Low - Increase retention of HWP (1000							
hectaresJ							
Land impacted for carbon sink potential -							9.87
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink notential -							15.3
Low - Reforest nasture (1000 hectares)							10.0
Land impacted for carbon sink potential							550
Land impacted for cal building potential -							002
Low - Restore productivity (1000							
nectaresj							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink notential -	2020	2020	2000	2000	2040	2040	1937
Low - Total impacted (over 30 years)							1,701
(1000 hostopos)							
Land imposted for earbor sink notantial							10.0
Lanu impacted for carbon sink potential -							13.2
Mid - Accelerate regeneration (1000							
nectares							
Land impacted for carbon sink potential -							95.1
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,253
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							16.8
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 -							14.3
Mid - Increase trees outside forests (1000							
hartares)							
Land impacted for carbon sink notontial							0
Mid Defenset encelond (1000 bestense)							U
Mid - Reforest cropiand (1000 nectares)							
Land impacted for carbon sink potential -							111
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,111
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,614
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							17.6
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							98.1
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink notential -							3 258
High - Extend rotation length (1000							0,200
hectares)							
Land impacted for carbon sink notantial							
Land impacted for carbon sink potential -							22.3
nectaresj							
Land impacted for carbon sink potential -							U
High - Increase retention of HWP (1000							
hectaresJ							
Land impacted for carbon sink potential -							18.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							88.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							912
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink notential -							4 415
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-273
deployment - Cropland measures (1000							
tCO2e/v)							
Carbon sink potential - Moderate							-10.5
deployment - Permanent conservation							
cover (1000 tCO2e/v)							
Carbon sink potential - Moderate							-284
deployment - Total (1000 tC02e/v)							
Carbon sink notential - Aggressive							0
denloyment - Corn-ethanol to energy							Ū
grasses (1000 tC02e/v)							
Carbon sink notential - Angressive							-518
denlovment - Cronland measures (1000							010
Carbon sink notential - Aggressive							-211
denloyment - Permanent conservation							
cover (1000 t $CO2e/v$)							
Carbon sink notential - Angressive							-539
denlovment - Total (1000 tC02e/v)							007
Land impacted for carbon sink - Moderate							0
denlovment - Corn-ethanol to energy							Ũ
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							182
denlovment - Cronland measures (1000							.01
hectares)							
Land impacted for carbon sink - Moderate							19.2
denloyment - Permanent conservation							17.2
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							201
denlovment - Total (1000 hectares)							201
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							Ũ
energy grasses (1000 hectares)							
Land impacted for carbon sink -							345
Aggressive deployment - Cropland							040
measures (1000 bectares)							
Land impacted for carbon sink -							38.3
Aggressive deployment - Dermanent							50.5
conservation cover (1000 hectares)							
Land impacted for carbon sink -							20/.
Aggressive deployment - Total (1000							504
hectares)							
nootal ooj							

Tahle	38.	F+RF-	scenario	- IMPACTO	S - Health
lable	JO.	C+KC-	SCENUINO	- IMPAUIS	о - <i>пе</i> инн

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		49.9	0.05	0.05	0.046	0.033	0.003
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		6.99	4.83	6.84	4.94	1.73	0.506
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		39.8	35.2	25.4	13.9	6.04	2.28
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		4.21	3.67	2.63	1.48	0.682	0.306
Stations (deaths)							

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

Item	2020	2025	2030	2035	20/.0	20/15	2050
Demoture deaths from air collution	2020	2025	2030 E 10	2035	2040	2045	2030
Freinature deaths from air poliution -		0.0	5.16	3.41	1.65	0.833	0.311
Fuel Comp - Residential - Natural Gas							
[deaths]				-			
Premature deaths from air pollution -		2.01	1.55	1	0.548	0.227	0.071
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.22	1.06	0.795	0.509	0.268	0.125
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		1.16	1.05	0.946	0.846	0.755	0.667
Fuel Comh - Comm/Institutional - Coal		_					
(deaths)							
Dremature deaths from air pollution -		8.73	6 80	/. 87	2.80	158	0.8/15
Fielder Comm/Institutional Natural		0.23	0.07	4.01	2.07	1.50	0.045
Fuel Comp - Comm/Institutional - Natural							
		- 10/					
Premature deaths from air pollution -		1.04	0.803	0.569	0.369	0.236	0.148
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.392	0.313	0.243	0.18	0.125	0.078
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		9.36	5.88	5.51	5.12	4.88	4.37
Industrial Processes - Coal Mining		,100	0.00	0.01	0.12		
(deates)							
Dramatura daatha from air pollution		101	10.0	00.0	00.4	(
Trefinature deaths from an poliution -		121	108	98.8	82.4	05.0	40.7
Industrial Processes - Ull & Gas							
Production (deaths)							
Monetary damages from air pollution -		442	0.447	0.442	0.404	0.296	0.027
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		61.9	42.7	60.6	43.8	15.3	4.49
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		354	313	226	124	537	20.3
Mohile - On-Poad (million \$2019)		004	010	220	124	00.1	20.0
Monotony domagon from ain pollution		07.0	20 E		10.1	(0/	0.71
Monetary damages from air poliution -		31.3	32.5	23.3	13.1	0.04	2.(1
Gas Stations (million \$2019)							
Monetary damages from air pollution -		57.6	45.9	30.2	16.2	7.38	2.76
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		17.8	13.7	8.88	4.85	2.01	0.626
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		10.8	9.42	7.05	4.51	2.38	1.11
Fuel Comh - Residential - Other (million					_		
\$2019)							
Monotony domagoe from air pollution		10.2	0.2	0.20	7/.0	6 6 9	<u> </u>
Fuel Comb. Comm/Institutional. Cool		10.5	7.3	0.30	1.47	0.00	3.71
Monetary damages from air pollution -		72.8	61	43.1	25.6	14	7.48
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		9.17	7.11	5.04	3.26	2.09	1.31
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		3 47	2 77	2 15	1.59	1 11	0 691
Fuel Comh - Comm/Institutional - Other		5		2.10			21071
(million \$2019)							
Monotony domagoo from ain pollution		00 /	E1.0	1.0.1	/ E 1	/ 0.1	00 F
Monetary using US Inon and Pollution -		02.0	91.9	48.6	45.1	43.1	30.5
Industrial Processes - Goal Mining							
(million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas		1,073	958	878	732	582	415
Production (million \$2019)							

Table 37. LTRL- Scenario - IMPACIS - JODS	Table 39:	E+RE-	scenario	- IMPACTS	- Jobs
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Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	195
By economic sector - Construction (jobs)		3,371	3,100	3,266	3,696	4,340	5,968
By economic sector - Manufacturing		5,307	4,481	4,058	4,277	4,058	4,000
(jobs)							
By economic sector - Mining (jobs)		8,988	6,138	4,992	3,706	2,821	2,006
By economic sector - Other (jobs)		127	120	142	189	250	354
By economic sector - Pipeline (jobs)		592	536	502	439	361	372
By economic sector - Professional (jobs)		2,934	2,284	2,272	3,030	4,054	5,747
By economic sector - Trade (jobs)		3,082	2,291	2,116	2,158	2,391	2,877
By economic sector - Utilities (jobs)		4,097	2,980	3,284	7,693	13,655	22,732
By resource sector - Biomass (jobs)		0	0	0	0	0	809
By resource sector - CO2 (jobs)		0	0	0	0	0	802
By resource sector - Coal (jobs)		8,937	4,337	3,659	3,185	2,873	2,449
By resource sector - Grid (jobs)		2,094	1,699	2,791	3,998	6,024	9,905
By resource sector - Natural Gas (jobs)		7,455	6,662	6,065	5,326	4,335	3,310
By resource sector - Nuclear (jobs)		0	0	0	5,290	12,239	21,613
By resource sector - Oil (jobs)		6,959	6,170	5,397	3,868	2,910	1,983
By resource sector - Solar (jobs)		731	664	564	548	495	462
By resource sector - Wind (jobs)		2,321	2,397	2,157	2,974	3,055	2,917
By education level - All sectors - High		12,400	9,385	8,809	8,884	9,291	11,064
school diploma or less (jobs)				-		-	
By education level - All sectors -		8,477	6,543	6,221	6,503	7,028	8,670
Associates degree or some college (jobs)							
By education level - All sectors -		6,017	4,741	4,420	4,547	4,912	6,000
Bachelors degree (jobs)							
By education level - All sectors - Masters		1,411	1,109	1,040	1,097	1,227	1,549
or professional degree (jobs)							
By education level - All sectors - Doctoral		192	152	143	160	190	249
degree (jobs)							
Related work experience - All sectors -		3,873	2,999	2,844	2,929	3,132	3,829
None (jobs)							
Related work experience - All sectors - Up		5,748	4,333	4,047	4,158	4,425	5,333
to 1 year (jobs)				-			
Related work experience - All sectors - 1		10,656	8,177	7,679	7,834	8,345	10,101
to 4 years (Jobs)							
Related work experience - All sectors - 4		6,431	5,020	4,748	4,922	5,312	6,534
to IU years (jobs)		1700	1 (01	1.010	10/0	1/0/	170/
Related Work experience - All sectors -		1,789	1,401	1,313	1,348	1,434	1,734
Over 10 years (Jobs)		1//5	1100	10/0	1.00/	1 170	1//0
(iobo)		1,465	1,139	1,062	1,094	1,178	1,440
(JUDS)		10 / 75	1/, 010	12.05.0	1/. 050	15 15 /.	10.07.7
vear (iobs)		17,415	14,710	13,750	14,256	15,154	10,241
On the Joh Training All sectors 1 to (5 720	4.445	1. 225	1. 247	/, 40/,	5 770
veare (inhe)		5,152	4,443	4,225	4,501	4,094	5,117
On-the- Job Training - All sectors - 4 to 10		1 571	1 2 3 3	1 204	1 276	1 416	1 819
vears (inhs)		1,011	1,200	1,204	1,210	1,-10	1,017
On-the-Joh Training - All sectors - Over 10		255	204	191	197	207	246
vears (jobs)		200	20 /	.,,	.,,	20.	2.5
On-Site or In-Plant Training - All sectors -		4,326	3,377	3,174	3,320	3,599	4,428
None (jobs)		,	, -	- ,	,	, -	, ,
On-Site or In-Plant Training - All sectors -		17,779	13,577	12,705	12,952	13,743	16,534
Up to 1 year (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors -		4,522	3,498	3,318	3,412	3,649	4,465
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		1,669	1,318	1,280	1,339	1,471	1,867
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		201	160	157	168	186	237
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,485	1,162	1,108	1,146	1,241	1,530

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	151	141	123	101	81	68.6	63.6
Final energy use - Residential (PJ)	38.4	36.1	33.5	30.6	27.6	25.7	24.7
Final energy use - Commercial (PJ)	48.6	48.7	47.1	44.5	42	41	41.4
Final energy use - Industry (PJ)	185	197	201	206	212	214	218

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.954	0.978	1.95	2.08	1.75	1.83
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)	2	141	280	765	1,251	1,639	2,028
Vehicle stocks - LDV – All others (1000	1,691	1,610	1,529	1,114	700	396	92
units)							
Light-duty vehicle capital costs vs. REF -		326	832	1,355	2,050	2,233	2,128
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.06		0.708		3.17		5.13
units)							
Public EV charging plugs - L2 (1000 units)	0.164		17		76.1		123

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	20.6	34.6	64.3	82.8	85.4	85.5	85.5
Heat Pump (%)							
Sales of space heating units - Electric	18.3	20.1	12	6.25	5.33	5.36	5.42
Resistance (%)							
Sales of space heating units - Gas (%)	50.2	29.6	14.6	4.64	3.25	3.16	3.14
Sales of space heating units - Fossil (%)	10.8	15.7	9.07	6.34	6.05	5.96	5.93
Sales of water heating units - Electric	0	5.29	30.4	43.3	45	45.1	45.2
Heat Pump (%)							
Sales of water heating units - Electric	45	59.7	53.2	53.1	53.2	53.3	53.2
Resistance (%)							
Sales of water heating units - Gas Furnace	52.2	33	14.7	1.99	0.11	0	0
(%)							
Sales of water heating units - Other (%)	2.8	2.02	1.66	1.59	1.61	1.62	1.64
Sales of cooking units - Electric	62.6	70.5	95	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	37.4	29.5	5.04	0.254	0	0	0
Residential HVAC investment in 2020s vs.		0.682	0.676				
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	3.31	21.4	54	79.9	84	84.2	84.2
Heat Pump (%)							
Sales of space heating units - Electric	3.22	8.3	10.8	13.4	13.9	13.9	13.9
Resistance (%)							
Sales of space heating units - Gas (%)	89.4	66.3	34.4	6.61	2.15	1.91	1.9
Sales of space heating units - Fossil (%)	4.12	4.08	0.778	0.033	0	0	0
Sales of water heating units - Electric	0.114	6.44	36.5	54	56.3	56.5	56.5
Heat Pump (%)							
Sales of water heating units - Electric	2.92	9.46	24.7	38.5	40.7	40.8	40.8
Resistance (%)							
Sales of water heating units - Gas (%)	94.5	80.1	35.8	4.81	0.265	0	0
Sales of water heating units - Other (%)	2.43	4.02	2.96	2.7	2.7	2.7	2.7
Sales of cooking units - Electric	32	46	79.9	86.5	86.9	86.9	86.9
Resistance (%)							
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s -		5,826	6,488				
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)	11,355	972	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,216	2,013	1,141	2,178	1,949	2,301	2,301
Installed thermal - Nuclear (MW)	0	0	0	0	2,257	7,099	15,156
Installed renewables - Rooftop PV (MW)	10	15	19.9	26.4	34.1	42.9	53.1
Installed renewables - Wind - Base land	740	1,496	4,313	4,313	4,815	4,855	4,979
use assumptions (MW)							
Installed renewables - Solar -	0	0	0	0	0	0	0
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	740	2,348	8,454	8,454	9,820	10,260	10,930
land use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	0	0	0
Constrained land use assumptions (MW)							
Capital invested - Wind - Base (billion		1.11	3.75	0	0.593	0.045	0.132
\$2018)							
Capital invested - Wind - Constrained		2.36	8.13	0	1.61	0.493	0.71
(billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	3,100	5,923	15,857	15,857	17,577	17,724	18,139
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	3,100	8,876	29,562	29,562	33,982	35,386	37,512
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-53.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-121
deforestation (1000 tCO2e/y)							

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

These	0000	0005	0000	0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Extend							-2,454
rotation length (1000 tCO2e/y)							
Carbon sink notential - Low - Improve							-30.8
plantations (1000 tC02e/v)							00.0
							1/00
Carbon sink potential - Low - Increase							-1,480
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-69.1
trees outside forests (1000 tCO2e/v)							
Carbon sink notential - Low - Reforest							
can boll sink potential - Low - Kerol estapopland (1000 + 000 a / y)							0
Carbon sink potential - Low - Reforest							-236
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-927
productivity (1000 tC02e/y)							
Carbon sink notential - Low - All (not							-5 372
cal boll sink potential - Low - An (not							-3,312
Carbon sink potential - Mid - Accelerate							-80.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-422
deforestation (1000 tC02e/v)							
							(/ 01
Carbon sink potential - Mid - Extend							-4,421
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-45.2
nlantations (1000 tC02e/v)							
Carbon sink notential - Mid - Increase							_2 961
not on the potential - Mid - Incl Case							-2,701
Carbon sink potential - Mid - Increase							-133
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							0
cronland (1000 t $CO2e/v$)							
Canhon sink notantial Mid Defenset							1 475
							-1,070
pasture (1000 tG02e/y)							
Carbon sink potential - Mid - Restore							-1,839
productivity (1000 tCO2e/y)							
Carbon sink notential - Mid - All (not							-11 577
counting overlap) (1000 tC020/y)							11,011
							100
Carbon sink potential - Hign - Accelerate							-108
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-724
deforestation (1000 tC02e/v)							
Carbon sink notential - High - Extend							-6 380
notation longth (1000 to000 (v)							-0,007
rotation length (1000 to02e/y)							
Carbon sink potential - High - Improve							-60.6
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,441
retention of HWP (1000 tC02e/v)							.,
							107
Carbon sink potential - High - Increase							-197
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							0
cropland (1000 tCO2e/v)							
Carbon sink notential - High - Reforest							-3 114
nacture (1000 teopoly)							5,117
							1770/
Carbon Sink potential - High - All (not							-17,784
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,750
productivity (1000 tC02e/v)							,
Land impacted for carbon sink notontial							0.0
							0.0
Low - Accelerate regeneration (1000							
hectaresJ							

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 -							92.1
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,248
Low - Extend rotation length (1000							, -
hectares)							
Land impacted for carbon sink notential -							11 2
Low - Improve plantations (1000							
hertares)							
Land impacted for carbon sink notential -							0
Low Therease retention of HWD (1000							0
hostanos)							
Lond imposted for earbon sink notantial							0.07
Lanu impacteu for carbon sink potential -							9.07
(1000 hostonos)							
Land impacted for carbon sink potential -							U
Low - Reforest cropiand (1000 nectares)							15.0
Land impacted for carbon sink potential -							15.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							552
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,937
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							13.2
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							95.1
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,253
Mid - Extend rotation length (1000							·
hectares)							
Land impacted for carbon sink potential -							16.8
Mid - Improve plantations (1000 hectares)							1010
Land impacted for carbon sink notential -							0
Mid - Increase retention of HWP (1000							Ũ
hertares)							
Land impacted for carbon sink notential -							1/, 3
Mid - Increase trees outside forests (1000							14.0
hertares)							
Lond imposted for earbon sink notantial							0
Mid Defenset exercised (1000 bestares)							0
Hand imposted for earlier sink notantial							111
Mid Defenset posture (1000 besteres)							111
Milu - Reforest pasture (1000 fietdares)							1 111
Land Impacted for carbon sink potential -							1,111
Mid - Restore productivity (1000							
nectares							
Land impacted for carbon sink potential -							3,614
Mid - Total impacted (over 30 years) (1000							
hectaresj							
Land impacted for carbon sink potential -							17.6
High - Accelerate regeneration (1000							
hectaresJ							
Land impacted for carbon sink potential -							98.1
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,258
High - Extend rotation length (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							22.3
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 -							18.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							88.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							912
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,415
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-273
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-10.5
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-284
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-518
deployment - Cropland measures (1000							
tCO2e/yJ							
Carbon sink potential - Aggressive							-21.1
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-539
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 nectares)							100
Land Impacted for carbon SINK - Moderate							182
deployment - Gropiand measures (1000							
Neclares							10.0
Land Impacted for carbon Sink - Moderate							19.2
acyon (1000 besteres)							
Lond imposted for contants							0.01
Lanu impacteu fui carbun sink - Mouerate doploymont - Total (1000 bostance)							201
Land imported for carbon sink							0
Lanu impacteu for carbon Sink - Aggnessive deployment - Conp. ethenel te							U
energy grasses (1000 nectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							345
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							38.3
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							384
Aggressive deployment - Total (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		49.9	0.05	0.05	0.046	0.033	0.003
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		6.4	3.67	1.9	1.15	0.561	0.178
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		40.4	38.6	35.7	30.5	23.1	15.1
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		4.3	4.1	3.75	3.19	2.41	1.58
Stations (deaths)							
Premature deaths from air pollution -		6.54	5.64	4.75	3.76	2.71	1.72
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		2.05	1.86	1.68	1.4	0.99	0.597
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.23	1.18	1.11	0.979	0.753	0.518
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		1.16	1.05	0.946	0.846	0.755	0.667
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		8.27	7.63	6.88	5.8	4.46	3.13
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		1.04	0.889	0.752	0.605	0.473	0.359
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.392	0.335	0.284	0.238	0.196	0.159
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		9.91	5.89	5.54	5.17	4.93	4.57
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		118	94.7	69.8	52.1	40.3	27.8
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		442	0.447	0.442	0.404	0.296	0.027
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		56.7	32.5	16.8	10.2	4.97	1.57
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		359	343	317	271	205	134
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		38.1	36.3	33.2	28.2	21.3	14
Gas Stations (million \$2019)							
Monetary damages from air pollution -		58	50	42.1	33.3	24	15.3
Fuel Comb - Residential - Natural Gas							
(million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		18.1	16.5	14.9	12.4	8.77	5.29
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10.9	10.4	9.87	8.67	6.67	4.59
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		10.3	9.3	8.38	7.49	6.68	5.91
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		73.2	67.5	60.9	51.3	39.5	27.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		9.21	7.87	6.66	5.35	4.19	3.18
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		3.47	2.97	2.52	2.1	1.73	1.41
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		87.4	52	48.9	45.6	43.5	40.3
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		1,049	841	619	462	358	247

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	0
By economic sector - Construction (jobs)		3,455	3,406	4,522	5,859	7,199	8,815
By economic sector - Manufacturing		6,130	6,550	6,217	5,145	5,614	7,034
(jobs)							
By economic sector - Mining (jobs)		9,267	5,964	4,709	3,718	2,947	2,022
By economic sector - Other (jobs)		139	166	462	841	1,275	1,670
By economic sector - Pipeline (jobs)		569	468	366	292	225	244
By economic sector - Professional (jobs)		3,097	2,650	3,138	3,801	4,578	5,440
By economic sector - Trade (jobs)		3,309	2,440	2,613	2,928	3,365	3,816
By economic sector - Utilities (jobs)		4,276	3,115	3,265	3,960	4,676	6,307
By resource sector - Biomass (jobs)		0	0	0	0	0	0
By resource sector - CO2 (jobs)		0	0	0	0	0	728
By resource sector - Coal (jobs)		9,859	4,608	3,679	3,216	2,897	2,557
By resource sector - Grid (jobs)		2,535	2,436	3,815	5,757	7,929	10,919
By resource sector - Natural Gas (jobs)		6,984	5,431	4,037	3,055	2,030	1,426
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		6,976	6,254	5,621	4,973	4,269	2,598
By resource sector - Solar (jobs)		941	1,200	2,914	4,851	7,111	9,101
By resource sector - Wind (jobs)		2,947	4,830	5,227	4,692	5,643	8,018
By education level - All sectors - High		13,221	10,596	10,817	11,290	12,670	14,960
school diploma or less (jobs)							
By education level - All sectors -		9,002	7,433	7,678	8,168	9,310	11,227
Associates degree or some college (jobs)							
By education level - All sectors -		6,344	5,330	5,361	5,548	6,167	7,153
Bachelors degree (jobs)							
By education level - All sectors - Masters		1,477	1,231	1,258	1,339	1,505	1,749
or professional degree (jobs)							
By education level - All sectors - Doctoral		199	168	179	199	227	260
degree (jobs)							
Related work experience - All sectors -		4,105	3,379	3,483	3,703	4,206	5,026
None (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - Up to 1 year (jobs)		6,150	4,966	5,108	5,352	6,058	7,200
Related work experience - All sectors - 1 to 4 years (jobs)		11,291	9,162	9,303	9,727	10,886	12,774
Related work experience - All sectors - 4 to 10 years (jobs)		6,798	5,651	5,786	6,104	6,878	8,160
Related work experience - All sectors - Over 10 years (jobs)		1,898	1,600	1,612	1,657	1,851	2,189
On-the-Job Training - All sectors - None (jobs)		1,553	1,289	1,332	1,414	1,607	1,898
On-the-Job Training - All sectors - Up to 1 year (jobs)		20,728	16,914	17,148	17,789	19,925	23,448
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,054	4,982	5,129	5,458	6,177	7,385
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,637	1,333	1,436	1,627	1,882	2,275
On-the-Job Training - All sectors - Over 10 years (jobs)		271	240	247	255	288	344
On-Site or In-Plant Training - All sectors - None (jobs)		4,593	3,867	3,988	4,210	4,784	5,709
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		18,914	15,358	15,563	16,159	18,088	21,275
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,784	3,927	4,035	4,276	4,831	5,755
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,740	1,427	1,515	1,688	1,932	2,311
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		212	181	192	211	244	299
Wage income - All (million \$2019)		1,568	1,295	1,327	1,405	1,587	1,884

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	151	143	129	118	110	100	89.1
Final energy use - Residential (PJ)	38.4	36.2	35	33.8	32.2	30.3	28.1
Final energy use - Commercial (PJ)	48.6	48.8	48.2	47.6	46.4	45.3	44.7
Final energy use - Industry (PJ)	185	197	202	207	214	216	219

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.829	0.837	1.16	1.2	1.73	1.83
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)	1.55	42.4	83.2	272	461	880	1,299		
Vehicle stocks - LDV – All others (1000	1,698	1,698	1,698	1,610	1,523	1,174	824		
units)									
Light-duty vehicle capital costs vs. REF -		0	52.1	111	373	1,179	1,716		
Cumulative 5-yr (million \$2018)									
Public EV charging plugs - DC Fast (1000	0.06		0.211		1.17		3.29		
units)									
Public EV charging plugs - L2 (1000 units)	0.164		5.06		28.1		79		

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	20.6	29.9	33.3	43.4	60.9	75.7	82.6
Sales of space heating units - Electric Resistance (%)	18.3	21.3	20.5	17.4	12.3	8.13	6.18
Sales of space heating units - Gas (%)	50.2	31.9	30	25.2	16.5	8.57	4.78
Sales of space heating units - Fossil (%)	10.8	16.9	16.2	14	10.4	7.61	6.49
Sales of water heating units - Electric Heat Pump (%)	0	1.02	3.88	12.4	26.6	38	43.1
Sales of water heating units - Electric Resistance (%)	45	61.1	60.3	58	54.9	53.5	53.2
Sales of water heating units - Gas Furnace (%)	52.2	35.8	33.7	27.7	16.7	6.76	2.07
Sales of water heating units - Other (%)	2.8	2.09	2.06	1.96	1.8	1.69	1.66
Sales of cooking units - Electric Resistance (%)	62.4	63.4	66.8	75.9	88.5	96.3	99
Sales of cooking units - Gas (%)	37.6	36.6	33.2	24.1	11.5	3.71	0.997
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.678	0.66				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3.31	16.5	20.2	31.4	51.9	70.8	80
Heat Pump (%)							
Sales of space heating units - Electric	3.22	7.96	8.26	9.15	10.8	12.6	13.5
Resistance (%)							
Sales of space heating units - Gas (%)	89.4	70.9	67.2	56.1	35.6	16.1	6.3
Sales of space heating units - Fossil (%)	4.12	4.72	4.38	3.31	1.62	0.515	0.135
Sales of water heating units - Electric	0.114	1.49	4.92	15.1	32.6	47.1	53.7
Heat Pump (%)							
Sales of water heating units - Electric	2.92	7.34	9.03	14.3	24.3	33.8	38.6
Resistance (%)							
Sales of water heating units - Gas (%)	94.5	86.9	81.8	66.8	39.9	16.2	4.96
Sales of water heating units - Other (%)	2.43	4.23	4.21	3.78	3.24	2.87	2.74
Sales of cooking units - Electric	32	36.2	40.9	53.4	71	81.7	85.5
Resistance (%)							
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Commercial HVAC investment in 2020s -		5,823	6,480				
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)	11,355	3,640	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,216	1,224	1,224	815	15	15	15
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+ scenar	io - 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	0	0
(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	0	0
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	3.53
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	3.53
Cumulative - All (MMT)		0	0	0	0	0	3.53
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	3.53

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	0	0	0	0
Spur (km)		0	0	0	0	0	30.7
All (km)		0	0	0	0	0	30.7
Cumulative investment - Trunk (million \$2018)		0	0	0	0	0	0
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	36
Cumulative investment - All (million \$2018)		0	0	0	0	0	36

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, permitting costs (million \$2020)		0	0	0	0	0	0
Wells and facilities construction costs (million \$2020)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - Low - Accelerate							-53.9
regeneration (1000 tC02e/v)							00.7
Carbon sink notontial Low Avoid							101
defendentation (1000 ±0020 /v)							-121
Oenhon sink notential Low Extend							0/5/
Carbon sink polential - Low - Extend							-2,454
rotation length (1000 tC02e/y)							
Carbon sink potential - Low - Improve							-30.8
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,480
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-69.1
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/v)							-
Carbon sink notential - Low - Reforest							-236
$p_{asture} (1000 \pm 0.02 e/v)$							200
Carbon sink notantial Low Restore							007
carbon sink potential - Low - Restore							-921
Carbon sink potential - Low - All (not							-5,372
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-422
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4.421
rotation length (1000 tCO2e/v)							,
Carbon sink notential - Mid - Improve							-45.2
plantations (1000 tC02e/v)							-40.2
Contractions (1000 10026/y)							0.0/1
							-2,901
							100
Carbon sink potential - Mid - Increase							-133
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,675
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-1,839
productivity (1000 tCO2e/y)							
Carbon sink notential - Mid - All (not							-11.577
counting overlan) (1000 tC02e/v)							,
Carbon sink notential - High - Accelerate							_108
nogeneration (1000 tC020/y)							-100
Control of the stantial High Avoid							70/
dafanastation (1000 t000s (v)							-724
deforestation (1000 tc02e/y)							
Carbon sink potential - High - Extend							-6,389
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-60.6
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,441
retention of HWP (1000 tCO2e/y)							
Carbon sink notential - High - Increase							-197
trees outside forests (1000 tC02e/v)							
Carhon sink notential - High - Reforest							0
cronland (1000 ±002a/v)							0
Contract (1000 10026/ y)							0.11/
oai puli Silik puletiliai - Alyfi - Kelurest							-3,114
							4770/
Carbon sink potential - High - All (not							-17,784
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,750
productivity (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink notential -						20.0	8.8
Low - Accelerate regeneration (1000							0.0
hectares)							
Land impacted for carbon sink notantial							021
Land impacted for carbon sink potential -							72.1
(1000 hostonos)							
Land impacted for carbon sink potential -							1,248
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							11.2
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares							
Land impacted for carbon sink notential -							9.87
Low - Increase trees outside forests							7.01
(1000 hectares)							
Land impacted for earbon sink notantial							0
Lanu inipacteu ior carbon sink potential -							U
Low - Reforest cropiand (1000 nectares)							
Land impacted for carbon sink potential -							15.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							552
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,937
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							13.2
Mid - Accelerate regeneration (1000							
hertares)							
Land impacted for carbon sink notential							05.1
Mid Avoid defensetation (over 20 vers)							75.1
(1000 bootopoo)							
							0.050
Land impacted for carbon sink potential -							2,253
Mid - Extend rotation length (1000							
hectaresj							
Land impacted for carbon sink potential -							16.8
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 -							14.3
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink notential -							0
Mid - Reforest cronland (1000 bectares)							Ũ
Land impacted for carbon sink notantial							111
Mid Defenset posture (1000 besteres)							111
Hand imposted for early notantial							1 111
Land impacted for carbon sink potential -							1,111
Mid - Restore productivity (1000							
nectaresj							
Land impacted for carbon sink potential -							3,614
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							17.6
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							98.1
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
				1			

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							3,258
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							22.3
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 -							18.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							0
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							88.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							912
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,415
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Itom	0000	0005	0000	0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-17
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-268
deployment - Cropland measures (1000							
							10 /
Carbon sink potential - Moderate							-10.4
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Moderate							-296
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-17
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-509
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-20.7
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Aggressive							-546
deployment - Total (1000 tCO2e/y)							

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

			0000	0005	00/0	0015	0050
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							6.53
deployment - Corn-ethanol to energy							
grasses (1000 nectares)							
Land impacted for carbon sink - Moderate							179
deployment - Gropland measures (1000							
hectares							
Land impacted for carbon sink - Moderate							18.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							0.058
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							110
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							314
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							6.53
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							838
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							37.7
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							0.058
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							110
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							993
Aggressive deployment - Total (1000							
hectares)							

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		135	82.3	74.7	71	68.8	63.8
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		5.33	6.23	6.87	6.6	6.8	6.09
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		40.4	39.1	38	37	36.1	35.2
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		4.29	4.14	3.99	3.86	3.74	3.61
Stations (deaths)							
Premature deaths from air pollution -		6.47	5.65	5	4.55	4.24	3.95
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		1.97	1.58	1.08	0.664	0.375	0.221
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.18	1.11	1.07	1.03	0.983	0.932
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		1.22	1.15	1.09	1.02	0.962	0.899
Fuel Comb - Comm/Institutional - Coal							
(deaths)							

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

	(,					
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		8.33	7.73	6.81	5.88	5.35	5.21
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		1.06	0.958	0.838	0.707	0.619	0.561
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Dremature deaths from air pollution -		0 / 1	0.308	0 387	0.37/	0 362	0 351
Freihaldre dealins ir onn air pondtion -		0.41	0.370	0.501	0.514	0.302	0.551
(deethe)							
			11.0			0.10	
Premature deaths from air pollution -		16.6	11.9	9.74	8.84	8.18	7.37
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		119	122	120	108	103	94.2
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		1 200	729	662	630	609	565
Fuel Comb - Electric Generation - Coal		1,200	127	002	000	007	000
(million \$2019)							
		(70		(0.0	FO F	(0.0	
Monetary damages from air pollution -		47.2	55.2	60.9	58.5	60.2	53.9
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		359	348	338	329	321	313
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		37.9	36.6	35.3	34.2	33.1	31.9
Gas Stations (million \$2019)							
Monetary damages from air pollution -		57.3	50	44.3	40.3	376	35
Fuel Comb - Residential - Natural Cas		01.0	00	0	40.0	01.0	00
(million \$2010)							
		17 5	1/	0.57	F 00	0.00	10/
Monetary damages from air pollution -		17.5	14	9.56	5.88	3.32	1.96
Fuel Comb - Residential - Uli (million							
\$2019)							
Monetary damages from air pollution -		10.5	9.85	9.45	9.13	8.71	8.26
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		10.8	10.2	9.62	9.05	8.51	7.96
Fuel Comh - Comm/Institutional - Coal			_	_			_
(million \$2019)							
Monetary damages from air pollution -		73.7	68 /	60.2	52	/.73	461
Fuel Comb. Comm/Institutional Natural		13.1	00.4	00.2	52	41.5	40.1
Cas (million #0010)							
				7/0		/ 0	
Monetary damages from air pollution -		9.42	8.48	7.42	6.26	5.48	4.97
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		3.63	3.52	3.42	3.31	3.21	3.11
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -	+ +	147	105	86	78	72.2	651
Industrial Processes - Coal Mining		171	100	00	10	12.2	00.1
(million \$2010)							
Monotony domogoo from sin nellution	+	1.050	1.000	10/0	057	010	007
Monetary damages from air pollution -		1,058	1,082	1,063	957	912	837
Industrial Processes - Ull & Gas							
Production (million \$2019)							

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	0
By economic sector - Construction (jobs)		3,794	3,544	3,564	3,645	3,851	3,559
By economic sector - Manufacturing		4,346	4,251	4,227	4,466	4,107	3,727
(jobs)							
By economic sector - Mining (jobs)		12,528	8,894	6,945	5,597	4,637	3,604

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		155	129	125	147	163	158
By economic sector - Pipeline (jobs)		589	625	640	602	606	593
By economic sector - Professional (jobs)		3,780	3,025	2,703	2,710	2,699	2,403
By economic sector - Trade (jobs)		4,540	3,335	2,850	2,632	2,475	2,087
By economic sector - Utilities (jobs)		5,450	4,365	4,151	4,158	4,381	3,687
By resource sector - Biomass (jobs)		0	0	0	0	0	0
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		15,988	10,167	7,615	6,605	5,881	4,489
By resource sector - Grid (jobs)		4,304	2,815	2,749	2,885	3,448	2,467
By resource sector - Natural Gas (jobs)		7,247	7,523	7,588	7,071	6,866	6,690
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		6,985	6,279	5,685	5,119	4,668	3,958
By resource sector - Solar (jobs)		-	213	313	248	250	424
By resource sector - Wind (jobs)		658	1,170	1,253	2,029	1,805	1,789
By education level - All sectors - High		15,899	12,438	11,004	10,374	9,870	8,507
school diploma or less (jobs)					·		·
By education level - All sectors -		10,361	8,373	7,566	7.264	7.012	6.098
Associates degree or some college (jobs)		-,	-,	,	, -	, -	-,
By education level - All sectors -		7.036	5,804	5.239	4,991	4,763	4,111
Bachelors degree (jobs)		,	-,	-, -		,	,
By education level - All sectors - Masters		1,662	1.366	1,227	1,168	1.120	967
or professional degree (jobs)		.,	.,	.,	.,	.,.==	
By education level - All sectors - Doctoral		225	187	167	160	155	136
degree (jobs)		_	_	_			
Related work experience - All sectors -		4,746	3,834	3,461	3.310	3,191	2,771
None (jobs)		, -	-,	-, -	-,	-,	,
Related work experience - All sectors - Up		7,341	5,721	5,038	4,755	4,505	3,876
to 1 year (jobs)				-		·	-
Related work experience - All sectors - 1		13,259	10,570	9,425	8,924	8,520	7,350
to 4 years (jobs)							
Related work experience - All sectors - 4		7,734	6,314	5,716	5,473	5,273	4,580
to 10 years (jobs)							
Related work experience - All sectors -		2,103	1,728	1,564	1,495	1,429	1,240
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		1,768	1,429	1,280	1,215	1,159	1,000
(jobs)							
On-the-Job Training - All sectors - Up to 1		24,193	19,235	17,120	16,221	15,431	13,298
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		6,992	5,668	5,121	4,896	4,729	4,112
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,947	1,596	1,462	1,410	1,395	1,226
years (jobs)							
On-the-Job Training - All sectors - Over 10		282	240	221	214	205	181
years (jobs)							
On-Site or In-Plant Training - All sectors -		5,142	4,202	3,796	3,642	3,492	3,035
None (jobs)							
On-Site or In-Plant Training - All sectors -		22,210	17,604	15,641	14,795	14,071	12,117
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		5,553	4,480	4,036	3,850	3,709	3,219
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		2,041	1,684	1,545	1,487	1,466	1,287
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		237	199	186	183	181	160
Over 10 years (jobs)							
Wage income - All (million \$2019)		1,821	1,484	1,348	1,295	1,257	1,100

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	151	143	130	122	122	126	130

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

			•	-			
Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	38.4	36.3	35.7	35.7	36	36.8	37.6
Final energy use - Commercial (PJ)	48.6	49.4	49.9	50.1	50.6	52.1	55
Final energy use - Industry (PJ)	186	200	210	215	221	226	233

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.92	0.94	1.05	1.08	1.2	1.24
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	19.1	38.2	38.9	39.9	40.6	41.6	42.9
Heat Pump (%)							
Sales of space heating units - Electric	18.7	19	18.9	18.2	17.3	16.5	15
Resistance (%)							
Sales of space heating units - Gas (%)	51.1	28.6	30.6	31.9	32.2	32.1	32
Sales of space heating units - Fossil (%)	11	14.2	11.6	10.1	9.89	9.86	9.99
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	45	61.3	61.3	61	60.7	60.7	60.4
Resistance (%)							
Sales of water heating units - Gas Furnace	52.2	36.6	36.6	36.8	37.1	37.2	37.3
(%)							
Sales of water heating units - Other (%)	2.8	2.1	2.11	2.14	2.17	2.19	2.21
Sales of cooking units - Electric	62.1	62.1	62.1	62.1	62.1	62.1	62.1
Resistance (%)							
Sales of cooking units - Gas (%)	37.9	37.9	37.9	37.9	37.9	37.9	37.9
Residential HVAC investment in 2020s vs.		0.676	0.631				
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	3.31	21.2	47.1	68.4	72	72.3	72.3
Heat Pump (%)							
Sales of space heating units - Electric	3.22	8.68	12.7	19.9	24.9	25.7	25.8
Resistance (%)							
Sales of space heating units - Gas (%)	89.4	65.6	36.9	10.2	2.94	1.96	1.9
Sales of space heating units - Fossil (%)	4.12	4.58	3.35	1.41	0.205	0.017	0
Sales of water heating units - Electric	0.114	0.273	0.269	0.271	0.272	0.271	0.272
Heat Pump (%)							
Sales of water heating units - Electric	2.92	6.72	6.66	6.66	6.69	6.67	6.68
Resistance (%)							
Sales of water heating units - Gas (%)	94.5	88.7	88.7	88.7	88.7	88.7	88.7
Sales of water heating units - Other (%)	2.43	4.27	4.39	4.32	4.36	4.39	4.37
Sales of cooking units - Electric	32	34.3	34.3	34.3	34.4	34.3	34.3
Resistance (%)							
Sales of cooking units - Gas (%)	68	65.7	65.7	65.7	65.6	65.7	65.7
Commercial HVAC investment in 2020s -		5,743	5,973				
Cumulative 5-yr (million \$2018)							

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

	,		5 6				
Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	11,355	7,514	3,640	3,640	3,640	3,640	0
Installed thermal - Natural gas (MW)	1,216	1,224	1,224	1,049	537	1,753	2,679
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	10	15	19.9	26.4	34.1	42.9	53.1

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

Item	2020	2025	2030	2035	2040	2045	2050	
Installed renewables - Wind - Base land	740	740	2,587	3,052	4,815	4,896	5,013	
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)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	3,100	3,100	9,717	11,384	17,577	17,853	18,248
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural	-5.21		-10.5				-9.4
uptake (Mt CO2e/y)							
Business-as-usual carbon sink - Retained	-1.21		-2.17				-2.26
in Hardwood Products (Mt CO2e/y)							
Business-as-usual carbon sink - Total (Mt	-6.42		-12.7				-11.7
CO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-53.9
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-121
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,454
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-30.8
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,480
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-69.1
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-236
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-927
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,372
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-422
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,421
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-45.2
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,961
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-133
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							0
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,675
pasture (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - Mid - Restore							_1 839
productivity (1000 tC02e/y)							1,007
Carbon sink notontial Mid All (not							11 577
cal boll slik potential - Mid - All (not							-11,517
Containing over lap (1000 (0026/y)							100
Carbon Sink potential - High - Accelerate							-108
Carbon sink potential - High - Avoid							-724
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-6,389
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-60.6
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,441
retention of HWP (1000 tC02e/v)							,
Carbon sink notential - High - Increase							-197
trees outside forests (1000 tC02e/v)							171
Carbon sink notantial High Poferost							0
cal boll Silk potential - High - Kelol est							U
							0.11/
Carbon sink potential - High - Reforest							-3,114
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-17,784
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,750
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							8.8
Low - Accelerate regeneration (1000							0.0
hertares)							
Lond imposted for carbon sink notantial							001
Lanu inipacted for car boil Sink potential -							72.1
(1000 hostores)							
Land impacted for carbon sink potential -							1,248
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							11.2
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							-
hertares)							
Land impacted for carbon sink notential							0.97
							2.01
(1000 hasteres)							
Land impacted for carbon sink potential -							0
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							15.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							552
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1.937
l ow - Total impacted (over 30 years)							, -
(1000 hectares)							
Land impacted for carbon sink potential							12 0
Mid - Accelerate regeneration (1000							13.2
Miu - Aucelei ale regeneration (1000							
Land impacted for carbon sink potential -							95.1
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,253
Mid - Extend rotation length (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 -							16.8
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 -							14.3
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							0
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							111
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1.111
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3.614
Mid - Total impacted (over 30 years) (1000							-,
hectares)							
Land impacted for carbon sink potential -							17.6
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							98.1
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3.258
High - Extend rotation length (1000							-,
hectares)							
Land impacted for carbon sink notential -							22.3
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink notential -							0
High - Increase retention of HWP (1000							C C
hectares)							
Land impacted for carbon sink notential -							18.7
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink notential -							0
High - Reforest cronland (1000 hectares)							0
Land impacted for carbon sink notential -							88.5
High - Reforest nasture (1000 hectares)							00.0
Land impacted for carbon sink potential -							912
High - Restore productivity (1000							/12
hectares)							
Land impacted for carbon sink notential							<u> </u>
High - Total impacted (over 30 years)							-7,710
(1000 hectares)							
(1						