

Net-Zero America - Maine 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 -		14	0.017	0.017	0.016	0.009	0
Fuel Comb - Electric Generation - Coal			0.0	0.011	0.010		C C
(deaths)							
Premature deaths from air pollution -		396	2 23	142	1.31	0.807	0.376
Fuel Comb - Electric Generation - Natural		0.70	2.20	1.72	1.01	0.001	0.010
Gas (deaths)							
Dremature deaths from air pollution -		18 /	16.8	10 5	7.05	2 11	11/.
Mobile On Read (deaths)		10.4	10.0	12.0	1.05	5.11	1.14
Promotune doaths from air pollution. Coo		0.071	0.070	0.(40	0.2/0	0.17	0.072
Stationa (dootho)		0.971	0.073	0.642	0.300	0.17	0.075
		0.05		0.07	1.0/	0.50/	
Premature deaths from air pollution -		3.95	3.3	2.26	1.26	0.594	0.222
Fuel Comb - Residential - Natural Gas							
[deaths]							
Premature deaths from air pollution -		9.32	7.1	4.51	2.4	0.972	0.276
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.12	0.997	0.754	0.476	0.249	0.113
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.29	0.272	0.254	0.236	0.218	0.2
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		3.85	3.5	2.81	1.98	1.28	0.753
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		9.58	735	4 71	2 55	154	1.09
Fuel Comb - Comm/Institutional - Oil		7.00	1.00		2.00	1.0-4	1.07
(deaths)							
Dramature deaths from air pollution		0.757	0 429	0 5 0 2	0 204	0.277	0 170
Fuel Comp. Comm/Institutional Other		0.151	0.020	0.505	0.300	0.211	0.176
(dootho)							
(UEd(IIS) Description desthe from sin pollution		0.000	0.04.2	0.040	0.04	0.04	0.020
Premature deaths from an ponution -		0.089	0.043	0.042	0.04	0.04	0.039
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		7.17	6.46	5.55	4.23	2.96	1.74
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		124	0.147	0.147	0.14	0.083	0.004
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		35.1	19.8	12.6	11.6	7.15	3.33
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		163	149	111	62.7	27.6	10.1
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		8.6	7.73	5.69	3.26	1.51	0.648
Gas Stations (million \$2019)							
Monetary damages from air pollution -		35	29.2	20.1	11.2	5.26	1.97
Fuel Comh - Residential - Natural Gas			_//_		=	0.20	
(million \$2019)							
Monetary damages from air pollution -		82.6	62.9	/.0	21.3	8.61	2/1/1
Fuel Comb - Residential - Oil (million		02.0	02.7	40	21.0	0.01	2.77
¢2010)							
Manatany domagon from air pollution		0.01	0.07	6 6 9	4.00	0.0	1
Municially using the second se		7.71	0.84	0.68	4.22	۷.۷	I
Monetary damages from air pollution -		2.57	2.41	2.25	2.09	1.93	1.77
Fuel Comb - Comm/Institutional - Coal							
[million \$2019]				_			<u> </u>
Monetary damages from air pollution -		34	31	24.9	17.6	11.3	6.66
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 -		84.8	65	41.7	22.6	13.6	9.64
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		6.7	5.56	4.46	3.41	2.45	1.57
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		0.786	0.377	0.367	0.353	0.35	0.34
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		63.6	57.3	49.3	37.5	26.3	15.5
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 2: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (iobs)	2020	239	508	2000	160	118	2000
By economic sector - Construction (jobs)		1,741	2,193	2,796	3,686	5,341	19,362
By economic sector - Manufacturing		1,135	1,515	1,694	1,599	2,161	5,491
(jobs)			-	-	-		-
By economic sector - Mining (jobs)		648	485	333	220	145	94.3
By economic sector - Other (jobs)		153	180	264	370	530	2,150
By economic sector - Pipeline (jobs)		98.9	121	72.1	70.3	56.4	70.6
By economic sector - Professional (jobs)		1,521	1,935	2,120	2,787	3,740	9,680
By economic sector - Trade (jobs)		900	985	1,169	1,503	2,030	5,617
By economic sector - Utilities (jobs)		1,079	1,430	1,934	2,988	5,286	23,803
By resource sector - Biomass (jobs)		1,028	1,401	586	482	430	1,046
By resource sector - CO2 (jobs)		0	272	0	112	111	313
By resource sector - Grid (jobs)		1,367	1,975	3,332	4,978	9,979	48,862
By resource sector - Natural Gas (jobs)		701	421	242	523	296	262
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,867	1,546	1,179	872	650	481
By resource sector - Solar (jobs)		984	770	611	737	1,055	5,994
By resource sector - Wind (jobs)		1,569	2,966	4,637	5,679	6,884	9,555
By education level - All sectors - High		3,093	3,943	4,368	5,443	7,933	28,146
school diploma or less (jobs)							
By education level - All sectors -		2,221	2,775	3,285	4,239	6,235	21,718
Associates degree or some college (jobs)							
By education level - All sectors -		1,702	2,029	2,264	2,842	4,031	12,918
Bachelors degree (jobs)							
By education level - All sectors - Masters		429	518	577	738	1,045	3,291
or professional degree (jobs)							
By education level - All sectors - Doctoral		71.4	86.7	94.1	120	161	441
degree (jobs)							
Related work experience - All sectors -		1,062	1,338	1,504	1,910	2,787	9,766
None (jobs)			1001	- -		0.010	
Related work experience - All sectors - Up		1,520	1,934	2,137	2,651	3,818	13,115
to I year (jobs)		0.70 (0.010		7005	
Related work experience - All sectors - 1		2,736	3,382	3,819	4,833	7,005	23,944
to 4 years (Jobs)		1700	0.10.(0 / 7/	0.1//	(500	15 (00
Related Work experience - All sectors - 4		1,738	2,136	2,474	3,166	4,599	15,639
to IU years (Jobs)		/ 50	F (0)	(50	000	1 107	
Related Work experience - All sectors -		459	562	653	823	1,197	4,049
On the Joh Training All sectors None		(0)	F1 /	F70	700	1 000	0 / 10
Conclude Job Maining - All Sectors - None		426	514	578	723	1,029	3,419
(JUDS)		F 00/	(005	7000	0 70 0	10 ((0	(0.007
voan (jobs)		5,084	0,333	1,032	ō,(ðU	12,662	42,987
On-the-loh Training - All sectors - 1 to /-		1 /.00	10/.4	<u> 9 10 /.</u>	0 00E	/. 140	1/, 504
		1,402	1,040	2,104	2,023	4,160	14,090
γεαι ο (JUNOJ							

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 4 to 10		452	569	693	929	1,379	4,938
years (jobs)							
On-the-Job Training - All sectors - Over 10		71	87.2	102	125	176	573
years (jobs)							
On-Site or In-Plant Training - All sectors -		1,258	1,568	1,756	2,207	3,150	10,442
None (jobs)							
On-Site or In-Plant Training - All sectors -		4,566	5,676	6,341	7,940	11,490	39,275
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		1,160	1,444	1,693	2,177	3,202	11,252
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		474	589	708	941	1,387	4,916
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		58.5	74.2	89.8	118	177	629
Over 10 years (jobs)							
Wage income - All (million \$2019)		400	498	567	727	1,067	3,682

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		42	37.9	31.3	24.9	19.9	15.7
Oil consumption - Cumulative (million							956
bbls)							
Oil production - Annual (million bbls)		0	0	0	0	0	0
Natural gas consumption - Annual (tcf)		36	30.3	24.3	18.3	11.5	7.99
Natural gas consumption - Cumulative							732
(tcf)							
Natural gas production - Annual (tcf)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	106	92.8	76.3	61.2	51.9	48
Final energy use - Residential (PJ)	77.2	68.5	59.5	49.6	40.9	34.8	31.1
Final energy use - Commercial (PJ)	35.3	33	31.4	29.1	26.7	25.2	24.5
Final energy use - Industry (PJ)	90.9	89.1	85.7	82.2	79.8	103	102

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.631	0.64	1.22	1.29	1.26	1.32
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)	6.7	98.6	190	512	834	1,091	1,347
Vehicle stocks - LDV – All others (1000	1,124	1,070	1,016	741	465	263	61.1
units)							
Light-duty vehicle capital costs vs. REF -		216	554	896	1,358	1,478	1,409
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.118		0.513		2.24		3.63
units)							
Public EV charging plugs - L2 (1000 units)	0.3		12.3		53.9		87.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3	12.5	61.9	80.8	83.2	83.5	83.4
Heat Pump (%)							

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

There	0000	0005	0000		00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	1.39	1.41	1.15	0.541	0.387	0.388	0.424
Resistance (%)							
Sales of space heating units - Gas (%)	6.74	3.55	2.57	0.511	0.068	0.03	0.029
Sales of space heating units - Fossil (%)	88.9	82.5	34.4	18.2	16.4	16.1	16.2
Sales of water heating units - Electric	0	2.79	18.7	33.9	36.7	36.9	37
Heat Pump (%)							
Sales of water heating units - Electric	25.5	44.1	55.6	61.8	62.9	63	62.9
Resistance (%)							
Sales of water heating units - Gas Furnace	31.8	28.3	20.9	4	0.319	0.011	0
(%)							
Sales of water heating units - Other (%)	42.8	24.8	4.76	0.282	0.088	0.088	0.088
Sales of cooking units - Electric	64.2	71.8	95.2	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	35.8	28.2	4.82	0.243	0	0	0
Residential HVAC investment in 2020s vs.		1.25	1.28				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.33	11	39.5	71.3	77.4	77.8	78
Heat Pump (%)							
Sales of space heating units - Electric	1.31	4.27	16.7	21.3	22	22.2	22
Resistance (%)							
Sales of space heating units - Gas (%)	12.2	51.3	37.5	7.1	0.562	0.018	0
Sales of space heating units - Fossil (%)	84.1	33.4	6.38	0.27	0	0	0
Sales of water heating units - Electric	4.05	3.58	15.8	40	45.3	45.8	45.9
Heat Pump (%)							
Sales of water heating units - Electric	19.4	12.5	23.7	47.2	52.2	52.5	52.5
Resistance (%)							
Sales of water heating units - Gas (%)	58.2	78.7	58.4	11.2	0.896	0.03	0
Sales of water heating units - Other (%)	18.4	5.18	2.06	1.6	1.59	1.59	1.61
Sales of cooking units - Electric	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s -		2,622	2,862				
Cumulative 5-yr (million \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Natural gas (MW)	1,556	568	308	308	1,766	1,762	1,762
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	86.1	150	176	205	239	277	319
Installed renewables - Solar - Base land	85.4	85.4	85.4	85.4	85.4	85.4	4,582
use assumptions (MW)							
Installed renewables - Wind - Base land	1,011	1,011	1,011	1,011	1,011	1,011	1,052
use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	0	3,018	28,436
Base land use assumptions (MW)							
Installed renewables - Solar -	85.4	85.4	85.4	614	940	940	4,197
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	1,011	1,011	1,011	1,011	1,011	1,011	1,011
land use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	0	0	32,868
Constrained land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		0	0	0	0	0	4.17
\$2018)							
Capital invested - Wind - Base (billion		0	0	0	0	0	0.077
\$2018)							

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

	at the set of the set	onor acting o		nemaoaj			
Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base		0	0	0	0	5.07	33.7
(billion \$2018)							
Capital invested - Solar PV - Constrained		0.114	0	0	0	0.302	5.36
(billion \$2018)							
Capital invested - Wind - Constrained		0	0	0	0	0	0
(billion \$2018)							
Capital invested - Biomass power plant	0	0	0.184	0	0	0	0
(billion \$2018)							
Capital invested - Biomass w/ccu allam	0	0	0	0	0	0	0
power plant (billion \$2018)							
Capital invested - Biomass w/ccu power	0	0	0	0	0	0	0
plant (billion \$2018)							
					1		

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	176	176	176	176	176	176	8,224
Wind - Base land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,304
OffshoreWind - Base land use	0	0	0	0	0	15,250	142,922
assumptions (GWh)							
Solar - Constrained land use assumptions	176	176	176	1,129	1,717	1,717	7,529
(GWh)							
Wind - Constrained land use assumptions	4,130	4,130	4,130	4,130	4,130	4,130	4,130
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	15,250	142,922
assumptions (GWh)							
Biomass power plant (GWh)	0	0	361	361	361	361	361
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

		0,					
Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	1	1	1	1	1
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	2
(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	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment -		0.039	205	0	0	0	2,372
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0.025	14.3	14.3	14.3	14.3	126

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	3.32	3.42	6.58
Annual - BECCS (MMT)		0	0	0	0	0	3.05
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Cumulative - All (MMT)		0	0	0	3.32	6.74	13.3
Cumulative - BECCS (MMT)		0	0	0	0	0	3.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	151	151	151	151	151
Spur (km)		0	0	0	116	116	498
All (km)		0	151	151	267	267	649
Cumulative investment - Trunk (million \$2018)		0	273	273	273	273	273
Cumulative investment - Spur (million \$2018)		0	0	0	115	116	350
Cumulative investment - All (million \$2018)		0	273	273	388	390	623

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-53.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-89.7
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-4,068
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-157
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-3,636
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-46.4
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-201
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-28.2
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,195
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-9,475
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.5
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-314
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-7,329
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-230
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-7,273
retention of HWP (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 - Increase							-89.4
trees outside forests (1000 tCO2e/y)							
Carbon sink notential - Mid - Reforest							-301
cronland (1000 tC02e/v)							001
Carbon sink notential - Mid - Reforest							_200
pasture (1000 tC02e/v)							200
Carbon sink notantial Mid Destans							0.270
carbon sink polenilar - Miu - Restore							-2,370
Derhan sink naturtial Mid. All (nat							10 107
Carbon Sink potential - Mid - All (not							-18,187
counting overlap) (1000 tC02e/y)							
Carbon sink potential - High - Accelerate							-107
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-538
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-10,590
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-309
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-10,909
retention of HWP (1000 tCO2e/v)							
Carbon sink notential - High - Increase							-133
trees outside forests (1000 tC02e/v)							
Carbon sink notential - High - Reforest							_/_01
cropland (1000 tC02e/y)							-401
Corpor aink potential High Defenset							272
Carbon Sink potential - High - Reforest							-373
Carbon Sink potential - Hign - All (not							-26,905
counting overlap) (1000 tC02e/y)							
Carbon sink potential - High - Restore							-3,545
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							8.77
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							68.4
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2.069
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink notential -							56.9
Low - Improve plantations (1000							00.7
hertares)							
Lond imported for carbon sink notantial							0
Lanu Impacted for carbon sink potential -							0
LOW - Increase recention of HWP (1000							
							((0
Land impacted for carbon sink potential -							6.63
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							13.3
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							1.84
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							711
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,936
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink notential -							13.2
Mid - Accelerate regeneration (1000							.0.2
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							70.6
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,734
Mid - Extend rotation length (1000							0,101
hectares)							
Land impacted for carbon sink potential -							85.7
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 -							9.61
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							19.9
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							13.3
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,432
Mid - Restore productivity (1000							·
hectares)							
Land impacted for carbon sink potential -							5,379
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							17.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							72.9
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,400
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							114
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 -							12.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							26.5
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							10.6
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,175
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,829
High - Total impacted (over 30 years)							
(1000 hectares)							

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - Moderate						2010	-164
deployment - Cropland measures (1000							
tCO2e/v)							
Carbon sink potential - Moderate							-5.04
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-169
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-312
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-10.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-322
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							91.1
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							9.16
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							100
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							173
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							18.3
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							191
Aggressive deployment - Total (1000							
hectaresJ							

Table 17: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		14	0.017	0.017	0.016	0.009	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		3.86	1.81	0.691	0.292	0.09	0.1
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		18.7	18.5	17.6	15.5	12.1	8.08
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		0.992	0.98	0.925	0.809	0.627	0.421
Stations (deaths)							
Premature deaths from air pollution -		3.97	3.59	3.14	2.57	1.91	1.26
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		9.46	8.43	7.54	6.34	4.81	3.33
Fuel Comb - Residential - Oil (deaths)							

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

Investigation Dots Dots <thdots< th=""> Dots Dots</thdots<>	Item	2020	2025	2030	2035	2040	2045	2050
Tension Deckin from air pollution - preduction (deaths) 1.33 1.33 1.34 1.35	Dromature deaths from air pollution	2020	112	2030	1.02	2040	0.722	0.520
Trade Colling - Restriction - Output (Dearlis) 0.29 0.272 0.236 0.236 0.218 0.21 Fremature dearlis from an pollution - Fuel Comb - Comm/Institutional - Natural Gas (dearlis) 0.29 0.272 0.254 0.236 0.218 0.21 Fremature dearlis from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (dearlis) 0.673 0.59 0.51 0.433 0.362 Fremature dearlis from air pollution - Fuel Comb - Comm/Institutional - Other (dearlis) 0.673 0.59 0.51 0.433 0.362 Freu Comb - Comm/Institutional - Other 0.757 0.673 0.59 0.51 0.433 0.362 Freu Comb - Comm/Institutional - Other 0.757 0.673 0.59 0.51 0.433 0.362 Geaths From air pollution - Industrial Processes - Coal Mining (dearlis) 0.043 0.042 0.041 0.04 0.037 Geaths Free dearlis from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019) 1124 0.147 0.14 0.088 0.004 Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019) 1166 164<	Fuel Camb Desidential Other (desthe)		1.13	1.00	1.02	0.911	0.755	0.559
Premature deaths from air pollution - fuel Comb - Comm/Institutional - Coal (deaths) 0.29 0.272 0.254 0.238 0.218 0.23 Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural (ass (deaths) 3.86 3.8 3.7 3.41 2.92 2.35 Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths) 0.757 0.673 0.59 0.51 0.433 0.362 Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths) 0.086 0.043 0.042 0.044 0.04 0.037 Premature deaths from air pollution - fudustrial Processes - Coll Mining (deaths) 0.086 0.043 0.042 0.044 0.04 0.037 Monetary damages from air pollution - fuel Comb - Electric Generation - Coal (milion \$2019) 0.147 0.147 0.147 0.148 0.004 Monetary damages from air pollution - fuel Comb - Electric Generation - Natural Gas (milion \$2019) 36.2 31.8 27.8 22.8 16.9 11.2 Monetary damages from air pollution - fuel Comb - Residential - Natural Gas 35.2 31.8 27.8 22.8 16.9 11.2	Fuel Comb - Residential - Other (deaths)		0.00	0.070	0.05/	0.00(0.010	
Fuel Comb - Comm/Institutional - Local (deaths)	Premature deaths from air pollution -		0.29	0.272	0.254	0.236	0.218	0.2
(leasths)	Fuel Comb - Comm/Institutional - Coal							
Premature deaths from air pollution - Fuel Com- Comm/Institutional - Natural (as (deaths)) 3.86 3.8 3.7 3.41 2.92 2.35 Premature deaths from air pollution - Fuel Com- Comm/Institutional - Dil (deaths) 9.64 8.08 6.56 5.16 4.3 3.66 Premature deaths from air pollution - Fuel Com- Comm/Institutional - Dther (deaths) 0.0757 0.673 0.59 0.011 0.0362 Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths) 0.086 0.043 0.042 0.041 0.04 0.037 Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths) 714 6.13 4.91 4 3.33 2.34 Production (feaths) 714 0.147 0.147 0.14 0.083 0.004 Montary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million S2019) 16.1 6.12 2.58 0.799 0.888 Montary damages from air pollution - Fuel Comb - Residential - Natural Gas (million S2019) 8.68 8.19 716 5.55 3.73 Montary damages from air pollution - Fuel Comb - Residential - 0.10 9.59 <td< td=""><td>(deaths)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	(deaths)							
Fuel Comb - Comm/Institutional - Natural (asa (fdaths) - - - Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oli (deaths) 0.673 0.59 0.51 0.433 0.362 Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths) 0.066 0.043 0.042 0.041 0.043 0.043 0.332 0.334 Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths) 0.086 0.043 0.042 0.041 0.04 0.037 Industrial Processes - Coal Mining (deaths) 0.086 0.043 0.042 0.041 0.04 0.037 Industrial Processes - Coal Mining (deaths) 0.047 0.147 0.147 0.147 0.147 0.147 0.043 0.004 Industrial Processes - Coal Mining (deaths) 0.088 0.004 0.083 0.004 Industrial Processes - Coal Mining (million \$2019) 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147 0.147	Premature deaths from air pollution -		3.86	3.8	3.7	3.41	2.92	2.35
Gas (deaths) - - - <t< td=""><td>Fuel Comb - Comm/Institutional - Natural</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Fuel Comb - Comm/Institutional - Natural							
Premature deaths from air pollution - fuel Comb - Commy/Institutional - Oli (deaths) 9.64 8.08 6.56 5.16 4.3 3.66 Premature deaths from air pollution - fuel Comb - Commy/Institutional - Other (deaths) 0.757 0.673 0.59 0.51 0.433 0.362 Premature deaths from air pollution - Industrial Processes - Deal Mining (deaths) 0.086 0.043 0.042 0.041 0.044 0.037 Premature deaths from air pollution - Industrial Processes - Deal Mining (deaths) 7.14 6.13 4.91 4 3.33 2.34 Production (deaths) Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (milion \$2019) 124 0.147 0.147 0.147 0.048 0.004 Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (milion \$2019) 34.2 16.1 6.12 2.58 0.799 0.888 Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas 35.2 31.8 27.8 22.8 16.9 11.2 Monetary damages from air pollution - Fuel Comb - Residential - Oli (million \$2019) 85.2 31.8 27.4 2.25 2.09 </td <td>Gas (deaths)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Gas (deaths)							
Fuel Comb - Comm/Institutional - Oil (deaths) Image: Comm (Institutional - Other (Ideaths) Image: Comm (Institutional - Other (Image: Comm (Institutional - Other (Imalion 32019) Image: Comm (Institutional - Other (Imalion 32019) Image: Comm (Institutional - Other (Imalion 32019) Image: Comm (Institutional - Coal (Imalion 32019) Image: Comm (Ins	Premature deaths from air pollution -		9.64	8.08	6.56	5.16	4.3	3.66
(deaths) -<	Fuel Comb - Comm/Institutional - Oil							
Premature deaths from air pollution - fuel Comb - Comm/Institutional - Other (deaths) 0.757 0.673 0.59 0.51 0.433 0.362 Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths) 0.086 0.043 0.042 0.041 0.04 0.037 Industrial Processes - Oil & Gas Production (deaths) Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019) 124 0.147 0.147 0.141 0.083 0.004 Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019) 34.2 16.1 6.12 2.58 0.799 0.888 Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas Stations (million \$2019) 166 164 156 138 107 71.8 Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019) 8.79 8.68 8.19 7.16 5.55 3.73 Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019) 8.747 66.8 56.2 42.6 29.5 Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019) 2.57	(deaths)							
Fuel Comb - Comm/Institutional - Other (deaths) Institutional - Other (million \$2019) Institutional - Other (million \$2019) <thinstitutional -="" other<br="">(million \$2019) Ins</thinstitutional>	Premature deaths from air pollution -		0.757	0.673	0.59	0.51	0.433	0.362
(deaths) Image: Control of the second s	Fuel Comb - Comm/Institutional - Other							
Premature 0.086 0.043 0.042 0.041 0.041 0.041 0.041 0.037 Industrial Processes - Coal Mining (deatrs) 714 6.13 4.91 4 3.33 2.34 Premature deaths from air pollution - Industrial Processes - Coal (million \$2019) 124 0.147 0.147 0.14 0.083 0.004 Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019) 124 0.147 0.147 0.14 0.083 0.004 Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019) 166 164 156 138 107 71.8 Monetary damages from air pollution - fuel Comb - Residential - Natural Gas (million \$2019) 8.68 8.19 7.16 5.55 3.73 Monetary damages from air pollution - fuel Comb - Residential - Natural Gas (million \$2019) 35.2 31.8 27.8 22.8 16.9 11.2 Monetary damages from air pollution - fuel Comb - Residential - 01 (million \$2019) 10 9.59 9.05 8.07 6.49 4.78 Monetary damages from air pollution - fuel Comb - Comm/Ins	(deaths)							
Industrial Processes - Coal Mining (deaths) 0.000 0.000 0.001 0.001 0.001 Premature deaths from air pollution - Industrial Processes - Oil & Gas 7.14 6.13 4.91 4 3.33 2.34 Production (deaths) 124 0.147 0.147 0.14 0.083 0.004 Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019) 166 164 156 138 107 71.8 Monetary damages from air pollution - fuel Comb - Electric Generation - Natural Gas (million \$2019) 166 164 156 138 107 71.8 Mohie - On-Road (million \$2019) 8.68 8.19 7.16 5.55 3.73 Gas Stations (million \$2019) 35.2 31.8 27.8 22.8 16.9 11.2 Monetary damages from air pollution - fuel Comb - Residential - Natural Gas 35.2 31.8 27.8 22.8 16.9 11.2 Monetary damages from air pollution - fuel Comb - Residential - Oil (million \$2019) 0.959 9.05 8.07 6.49 4.78 Monetary damages from air pollution - fuel Comb - Comm/Institutional - Oil (million \$2019) 2.57 2.41	Premature deaths from air pollution -		0.086	0.043	0.042	0.041	0.04	0.037
Industrial Processes - Oal Minning (deatris) Image of the set of the s	Industrial Processes - Coal Mining		0.000	0.040	0.042	0.041	0.04	0.001
Lobality 714 6.13 4.91 4 3.33 2.34 Industrial Processes - 0il & Gas Production (deaths) -	(dootho)							
Prefindure usatus from air pollution - Industrial Processes - Oil & Gas 7.14 0.13 4.91 4 3.33 2.34 Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019) 124 0.147 0.147 0.14 0.083 0.004 Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019) 34.2 16.1 6.12 2.58 0.799 0.888 Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019) 8.68 8.19 7.16 5.55 3.73 Monetary damages from air pollution - Buel Comb - Residential - Natural Gas (million \$2019) 8.79 8.68 8.19 7.16 5.55 3.73 Monetary damages from air pollution - Buel Comb - Residential - Natural Gas (million \$2019) 35.2 31.8 27.8 22.8 16.9 11.2 Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019) 8.37 74.7 66.8 56.2 42.6 29.5 Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019) 10 9.59 9.05 8.07 6.49 4.78 Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$	Dromoture deaths from air collution		71/	(10	/ 01		0.00	0.07
Industrial Processes - UI & Lass	Premature deaths from an pollution -		(.14	0.13	4.91	4	3.33	2.34
Production (leasths) Images from air pollution - fuel Comb - Electric Generation - Coal (million \$2019) Images from air pollution - fuel Comb - Electric Generation - Natural Gas (million \$2019) Images from air pollution - fuel Comb - Electric Generation - Natural Gas (million \$2019) Images from air pollution - fuel Comb - Electric Generation - Natural Gas (million \$2019) Images from air pollution - fuel Comb - Electric Generation - Natural Gas (million \$2019) Images from air pollution - gas (million \$2019) Images from air pollution - gas (million \$2019) Images from air pollution - fuel Comb - Residential - Natural Gas (million \$2019) Images from air pollution - gas (million \$2019) Images from air pollution - gas (million \$2019) Images from air pollution - fuel Comb - Residential - Oil (million \$2019) Images from air pollution - fuel Comb - Residential - Oil (million \$2019) Images from air pollution - fuel Comb - Residential - Oil (million \$2019) Images from air pollution - fuel Comb - Residential - Other (million \$2019) Images from air pollution - fuel Comb - Comm/Institutional - Coal (million \$2019) Images from air pollution - fuel Comb - Comm/Institutional - Coal (million \$2019) Images from air pollution - fuel Comb - Comm/Institutional - Other (million \$2019) Images from air pollution - fuel Comb - Comm/Institutional - Other (million \$2019) Images from air pollution - fundustrial Processes - Coal Mining (million \$2019) Images from air pollution - fundustrial Processes - Coal Mining (million \$2019) Images from air pollution - fundustrial Processes - Coal Mining (million \$2019) Images from air pollution - fundustrial Pro	Industrial Processes - Ull & Gas							
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019) 124 0.147 0.148 0.147 0.148 0.147 0.148 0.147 0.148 0.147 0.168 0.168 0.168<	Production (deaths)							
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Monetary damages from air pollution - Gas Stations (million \$2019) 8.79 8.68 8.19 7.16 5.55 3.73 Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019) 35.2 31.8 27.8 22.8 16.9 11.2 Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019) 83.8 74.7 66.8 56.2 42.6 29.5 Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019) 10 9.59 9.05 8.07 6.49 4.78 Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019) 10 9.59 9.05 8.07 6.49 4.78 Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019) 1.77 2.41 2.25 2.09 1.93 1.77 Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019) 34.1 33.7 32.7 30.2 25.9 20.8 Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019) 6.7 5.96 5.23 4.51 3.84 3.2	Mobile - On-Road (million \$2019)			-			-	-
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Construction Construction<	Gas Stations (million \$2019)		0.17	0.00	0.17	1.10	0.00	0.10
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\$2019)Anomaly constrained by the second	Fuel Comb - Residential - Other (million							
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Gas (million \$2019)Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)85.371.55845.73832.4Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)6.75.965.234.513.843.2Monetary damages from air pollution - (million \$2019)0.760.3780.370.3590.3510.328Monetary damages from air pollution - (million \$2019)0.760.3780.370.3590.3510.328Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)63.454.443.635.529.620.8Industrial Processes - Oil & Gas Production (million \$2019)0.18 & 0.140.14 & 0.160.160.16	Fuel Comb - Comm/Institutional - Natural		0	0011	02.1	00.2	20.7	2010
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Fuel common community institutional - On (million \$2019)AntiperiodAntiperiodAntiperiodMonetary damages from air pollution - (million \$2019)6.75.965.234.513.843.2Monetary damages from air pollution - (million \$2019)0.760.3780.370.3590.3510.328Monetary damages from air pollution - (million \$2019)0.760.3780.370.3590.3510.328Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)63.454.443.635.529.620.8Industrial Processes - Oil & Gas Production (million \$2019)0.1280.1280.1280.1280.128	Fuel Comp. Comm/Institutional Oil		00.0	11.5	50	40.1	50	52.4
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Fuel Comp - Comm/Institutional - Other (million \$2019)Image: Comm - Comm/Institutional - Other (million \$2019)Image: Comm - Comm/Institutional - Other (Comm - Comm -	Monetary damages from air pollution -		6./	5.96	5.23	4.51	3.84	3.2
Imilion \$2019)OutputOutputOutputMonetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)0.760.3780.370.3590.3510.328Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)63.454.443.635.529.620.8	Fuel Comp - Comm/Institutional - Other							
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Industrial Processes - Coal Mining (million \$2019)Image: Coal Mining (mining \$2019)Image: Coal Mining \$2019)	Monetary damages from air pollution -		0.76	0.378	0.37	0.359	0.351	0.328
(million \$2019)63.454.443.635.529.620.8Industrial Processes - Oil & Gas Production (million \$2019)Production (million \$2019)Production (million \$2019)Production (million \$2019)Production (million \$2019)	Industrial Processes - Coal Mining							
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Industrial Processes - Oil & Gas Production (million \$2019)	Monetary damages from air pollution -		63.4	54.4	43.6	35.5	29.6	20.8
Production (million \$2019)	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)		292	465	180	121	100	246
By economic sector - Construction (jobs)		1,751	2,305	2,628	3,323	5,923	24,254
By economic sector - Manufacturing		1,168	1,554	1.563	1.501	2,652	7.099
(inhs)		.,	.,	.,	.,	_,00_	.,.,,
By economic sector - Mining (jobs)		653	509	395	298	216	143
By economic sector - Other (jobs)		15/	183	2/18	270	576	2 526
By containe sector - Other (jobs)		00.4	1/.7	240	055	95.4	2,020
By economic sector - Pipeline (jobs)		77.0	141	00.1	90.0	65.0	114
By economic sector - Professional (Jobs)		1,550	1,000	2,037	2,607	4,096	11,910
By economic sector - Trade (Jobs)		905	1,009	1,182	1,468	2,268	6,909
By economic sector - Utilities (Jobs)		1,064	1,489	1,617	2,238	5,771	30,548
By resource sector - Biomass (jobs)		1,106	1,251	597	508	426	1,015
By resource sector - CO2 (jobs)		0	467	0	191	191	537
By resource sector - Grid (jobs)		1,328	1,876	2,729	3,740	11,036	62,755
By resource sector - Natural Gas (jobs)		701	419	182	147	141	262
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,884	1,637	1,422	1,202	978	729
By resource sector - Solar (jobs)		1,003	795	556	676	1,174	6,152
By resource sector - Wind (jobs)		1.615	3.084	4,443	5.522	7,742	12.304
By education level - All sectors - High		3 161	4 027	4 085	4 854	8 882	35 464
school dinloma or less (jobs)		0,101	1,021	1,000	1,001	0,002	00,101
By education level - All sectors -		2.2/16	2 8/.0	3 055	3 75/	6 9 5 5	27 378
Associatos dogras on somo collogo (inhe)		2,240	2,047	3,033	5,154	0,700	21,510
Py education level All contons		1700	2.050	0.151	0 500	/. E10	14 0/.1
By education level - All Sector's -		1,123	2,050	2,151	2,095	4,510	10,241
Bachelor's degree (Jobs)		(05	F10	E / 7	(70	11/0	/ 105
By education level - All sectors - Masters		435	518	547	673	1,162	4,125
or professional degree (jobs)		=== (170	
By education level - All sectors - Doctoral		72.6	85.4	91	113	178	546
degree (jobs)							
Related work experience - All sectors -		1,082	1,366	1,407	1,700	3,111	12,298
None (jobs)							
Related work experience - All sectors - Up		1,554	1,964	2,006	2,386	4,273	16,478
to 1 year (jobs)							
Related work experience - All sectors - 1		2,779	3,442	3,585	4,330	7,827	30,159
to 4 years (jobs)							
Related work experience - All sectors - 4		1,759	2,183	2,319	2,833	5,135	19,709
to 10 years (jobs)		, -	,	, -	,	-,	
Related work experience - All sectors -		465	574	612	738	1342	5 110
Over 10 years (inhs)		100	011	012	100	1,0 12	0,110
On-the- Joh Training - All sectors - None		/.32	523	5/,9	660	1 151	/, 285
(inhe)		402	525	547	000	1,101	4,200
(JUDS)		E 170	6 4.00	6 610	7 900	1/, 175	E /. 110
Un-the-Job Training - All Sectors - Up to T		5,179	6,429	0,012	1,899	14,175	54,110
year (jubs)		1 / 00	1 000	0.000	0 / 00	((00	10 / 1/
Un-the-Job Training - All sectors - 1 to 4		1,499	1,898	2,030	2,499	4,638	18,416
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		456	589	642	815	1,525	6,223
years (jobs)							
On-the-Job Training - All sectors - Over 10		71.9	90	95.8	114	198	720
years (jobs)							
On-Site or In-Plant Training - All sectors -		1,280	1,592	1,651	1,989	3,518	13,115
None (jobs)							
On-Site or In-Plant Training - All sectors -		4,647	5,769	5,959	7,134	12,862	49,454
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		1,174	1.483	1.576	1.929	3.574	14,195
1 to 4 years (jobs)		.,	,	.,	.,	-,	.,
On-Site or In-Plant Training - All sectors -		477	609	659	831	1.538	6.197
4 to 10 years (inhs)			207	507	501	.,000	0,171
On-Site or In-Diant Training - All sectors		50	76 5	ΩΩ	107.	104	70/.
Over 10 years (inde)		57	10.0	00	104	170	174
Wago income All (million #0010)		4.07	EOZ	FOO	/ 50	1 101	6.740
wage income - All (million \$2019)		406	507	533	652	1,191	4,640

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	107	97.2	89.2	82.9	75.5	66.9
Final energy use - Residential (PJ)	77.2	68.8	62.6	57.4	52.4	47.4	42.8
Final energy use - Commercial (PJ)	35.3	33	32	31	30	29	28.3
Final energy use - Industry (PJ)	90.9	89.2	86.1	83	81.1	104	103

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.484	0.475	0.654	0.668	1.11	1.17
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)	5.19	32.2	59.2	184	309	586	863
Vehicle stocks - LDV – All others (1000	1,128	1,128	1,128	1,070	1,012	780	548
units)							
Light-duty vehicle capital costs vs. REF -		0	35	73.4	248	780	1,136
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.118		0.159		0.833		2.32
units)							
Public EV charging plugs - L2 (1000 units)	0.3		3.82		20		55.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3	2.62	5.43	13.6	26.9	36.8	40.8
Heat Pump (%)							
Sales of space heating units - Electric	1.39	1.43	1.43	1.44	1.28	1.11	1.03
Resistance (%)							
Sales of space heating units - Gas (%)	6.74	3.62	3.58	3.39	2.96	2.45	2.07
Sales of space heating units - Fossil (%)	88.9	92.3	89.6	81.5	68.9	59.6	56.1
Sales of water heating units - Electric	0	0.324	1.24	4.01	9.3	14.5	17.2
Heat Pump (%)							
Sales of water heating units - Electric	25.5	41.9	42.4	44.6	47.8	50.5	51.8
Resistance (%)							
Sales of water heating units - Gas Furnace	31.8	28.7	28.4	26.9	23.4	18.8	16
(%)							
Sales of water heating units - Other (%)	42.8	29.1	28	24.5	19.5	16.2	15
Sales of cooking units - Electric	64.1	65	68.3	77	89	96.5	99
Resistance (%)							
Sales of cooking units - Gas (%)	35.9	35	31.7	23	11	3.54	0.953
Residential HVAC investment in 2020s vs.		1.25	1.38				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.33	6.89	8.48	13.3	22.8	32.7	38.1
Heat Pump (%)							
Sales of space heating units - Electric	1.31	1.76	2.43	4.48	7.93	10.5	11.3
Resistance (%)							
Sales of space heating units - Gas (%)	12.2	52.1	51	48.4	42.5	34.6	29.5
Sales of space heating units - Fossil (%)	84.1	39.2	38.1	33.9	26.8	22.3	21
Sales of water heating units - Electric	4.05	2.68	3.38	5.63	11.1	17.9	22
Heat Pump (%)							
Sales of water heating units - Electric	19.4	11.6	11.9	14.5	19.6	26	29.9
Resistance (%)							
Sales of water heating units - Gas (%)	58.2	79.9	79.4	75.1	65.2	52.6	44.8
Sales of water heating units - Other (%)	18.4	5.77	5.34	4.75	4.17	3.55	3.28

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

Item	2020	2025	2030	2035	2040	2045	2050		
Sales of cooking units - Electric	36.9	40.7	44.7	56.5	72.7	82.9	86.4		
Resistance (%)									
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6		
Commercial HVAC investment in 2020s -		2,622	2,866						
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 - Natural gas (MW)	1,556	568	3.8	3.8	3.8	121	1,014
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							-53.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-89.7
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-4,068
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-157
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-3,636
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-46.4
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-201
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-28.2
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,195
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-9,475
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.5
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-314
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-7,329
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-230
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-7,273
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-89.4
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-301
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-200
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-2,370
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-18,187
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-107
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-538
deforestation (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend							-10.590
rotation length (1000 tC02e/v)							
Carbon sink notential - High - Improve							-309
nlantations (1000 t CO2e/y)							-307
Carbon sink potential High Increase							10 000
notantian of HWD (1000 t CO20/y)							-10,909
							10.0
Carbon sink potentiai - Hign - Increase							-133
trees outside forests (1000 tc02e/y)							
Carbon sink potential - High - Reforest							-401
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-373
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-26,905
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,545
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							8.77
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							68.4
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink notential -							2 069
$L_{\rm ow}$ - Extend rotation length (1000							2,007
hostanos)							
Lond imposted for carbon sink notantial							E40
Lanu impacteu for carbon sink potential -							50.9
Low - Improve plantations (1000							
Land impacted for carbon sink potential -							U
Low - Increase retention of HWP (1000							
hectaresj							
Land impacted for carbon sink potential -							6.63
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							13.3
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							1.84
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							711
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,936
Low - Total impacted (over 30 years)							_,
(1000 hectares)							
Land impacted for carbon sink notential -							13.2
Mid - Accelerate regeneration (1000							10.2
hectaree)							
Lond imposted for carbon sink potential							70.4
Mid Avoid defense tation (over 20 verse)							70.0
(1000 hostopoo)							
							0.70/
Land impacted for carbon sink potential -							3,734
Mid - Extend rotation length (1000							
hectaresj							
Land impacted for carbon sink potential -							85.7
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 -							9.61
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 -							19.9
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							13.3
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,432
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,379
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							17.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							72.9
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,400
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							114
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 -							12.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							26.5
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							10.6
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,175
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,829
High - Total impacted (over 30 years)							
(1000 hectares)							

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

	0						
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							-164
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-5.04
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-169
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-312
deployment - Cropland measures (1000							
tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-10.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-322
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							91.1
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							9.16
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							100
_deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							173
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							18.3
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							191
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 -		14	0.017	0.017	0.016	0.009	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		3.68	1.98	1.09	0.848	0.287	0.103
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		18.4	16.8	12.5	7.05	3.11	1.14
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		0.971	0.873	0.642	0.368	0.17	0.073
Stations (deaths)							
Premature deaths from air pollution -		3.95	3.3	2.26	1.26	0.594	0.222
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		9.32	7.1	4.51	2.4	0.972	0.276
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.12	0.997	0.754	0.476	0.249	0.113
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.29	0.272	0.254	0.236	0.218	0.2
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		3.85	3.5	2.81	1.98	1.28	0.753
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		9.58	7.35	4.71	2.55	1.54	1.09
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.757	0.628	0.503	0.386	0.277	0.178
Fuel Comb - Comm/Institutional - Other							
(deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		0.096	0.043	0.042	0.04	0.04	0.036
Industrial Processes - Coal Mining		0.070		0.0.1		0.01	0.000
(deaths)							
Premature deaths from air nollution -		7	6.33	51	3 55	199	0 211
Industrial Processes - Oil & Gas			0.00	0.1			0.2
Production (deaths)							
Monetary damages from air pollution -		124	0.147	0.147	0.14	0.083	0.004
Fuel Comb - Electric Generation - Coal				0		0.000	0.001
(million \$2019)							
Monetary damages from air pollution -		32.6	17.5	9.62	7.52	2.54	0.916
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		163	149	111	62.7	27.6	10.1
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		8.6	7.73	5.69	3.26	1.51	0.648
Gas Stations (million \$2019)			_			_	
Monetary damages from air pollution -		35	29.2	20.1	11.2	5.26	1.97
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		82.6	62.9	40	21.3	8.61	2.44
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		9.91	8.84	6.68	4.22	2.2	1
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		2.57	2.41	2.25	2.09	1.93	1.77
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		34	31	24.9	17.6	11.3	6.66
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		84.8	65	41.7	22.6	13.6	9.64
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		6.7	5.56	4.46	3.41	2.45	1.57
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		0.851	0.377	0.366	0.353	0.35	0.315
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		62.2	56.2	45.2	31.5	17.7	1.88
Industrial Processes - Oil & Gas							
Production (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		241	500	203	132	105	237
By economic sector - Construction (jobs)		1,806	2,235	3,702	5,141	13,750	32,631
By economic sector - Manufacturing		1,178	1,651	2,433	2,059	3,978	8,155
(jobs)							
By economic sector - Mining (jobs)		646	479	322	201	111	2.56
By economic sector - Other (jobs)		159	193	391	572	1,718	3,883
By economic sector - Pipeline (jobs)		97.8	85.9	67	49.2	32.1	3.61
By economic sector - Professional (jobs)		1,519	2,077	2,701	3,881	8,046	16,519
By economic sector - Trade (jobs)		893	1,037	1,469	2,077	4,550	9,637
By economic sector - Utilities (jobs)		1,114	1,381	2,480	3,956	14,071	39,104
By resource sector - Biomass (jobs)		937	1,410	547	433	391	1,041
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Grid (jobs)		1,433	2,221	4,316	6,846	28,205	80,850
By resource sector - Natural Gas (jobs)		688	317	231	496	200	178

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1.868	1.533	1.152	811	504	0.051
By resource sector - Solar (jobs)		1.049	905	1.386	1.460	5.613	10.959
By resource sector - Wind (jobs)		1.679	3.254	6,135	8.023	11,449	17.145
By education level - All sectors - High		3 155	4 039	5 680	7303	19 246	46 457
school diploma or less (jobs)		0,100	4,007	0,000	1,000	17,240	40,401
By education level - All sectors -		2 273	2 855	4 315	5 759	15.070	36.057
Associates degree or some college (inhs)		2,210	2,000	4,010	0,107	10,010	00,001
By education level - All sectors -		1721	2 112	2 91/	3 837	9 288	21 / 22
Bachelore degree (jobe)		1,1 2 1	2,112	2,714	3,001	7,200	21,422
By adjugation loval All soctors Masters		/.22	Б/.1	720	100/	2 /.02	5 /.01
or professional degree (jobs)		433	541	137	1,004	2,402	5,471
By education level All sectors Dectored		71.4	01.0	120	144	257	7/.5
dograda (icho)		(1.0	91.0	120	100	554	745
Deleted work experience. All easters		1 0 0 1	1.070	1050	0 571	(720	1/ 1/ 5
Related work experience - All sectors -		1,081	1,370	1,953	2,571	6,730	16,165
Notic (JODS)		15//	1007	0.707	0 577	0.151	01 / 07
Related work experience - All sectors - Op		1,546	1,997	2,786	3,577	9,151	21,697
to i year (jobs)		0.70 (0 / 07	(050	(500	1/ 700	00 (71
Related Work experience - All sectors - I		2,786	3,487	4,953	6,520	16,700	39,671
to 4 years (jobs)		4 7 7 0		0.000		10.050	
Related work experience - All sectors - 4		1,772	2,202	3,222	4,288	10,952	25,944
to 10 years (jobs)							
Related work experience - All sectors -		469	582	854	1,112	2,828	6,696
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		431	533	750	981	2,444	5,684
(jobs)							
On-the-Job Training - All sectors - Up to 1		5,167	6,544	9,121	11,814	30,005	71,064
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		1,519	1,894	2,858	3,833	10,087	24,231
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		464	578	903	1,270	3,411	8,245
years (jobs)							
On-the-Job Training - All sectors - Over 10		72.8	90.2	135	170	414	949
years (jobs)							
On-Site or In-Plant Training - All sectors -		1,280	1,622	2,288	2,988	7,433	17,329
None (jobs)							
On-Site or In-Plant Training - All sectors -		4,642	5,860	8,228	10,689	27,330	64,941
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		1,187	1,482	2,214	2,949	7,764	18,664
1 to 4 years (jobs)		-		-	-		-
On-Site or In-Plant Training - All sectors -		485	599	920	1,281	3,403	8,195
4 to 10 years (jobs)			-			,	
On-Site or In-Plant Training - All sectors -		59.9	75.9	118	161	431	1.043
Over 10 years (jobs)				_			,
Wage income - All (million \$2019)		407	513	733	980	2.532	6.095
	1	: • •				_,	-,

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

Item	2020	2025	2030	2035	2040	2045	2050	
Final energy use - Transportation (PJ)	115	106	92.8	76.3	61.2	51.9	48	
Final energy use - Residential (PJ)	77.2	68.5	59.5	49.6	40.9	34.8	31.1	
Final energy use - Commercial (PJ)	35.3	33	31.4	29.1	26.7	25.2	24.5	
Final energy use - Industry (PJ)	90.9	89.1	85.7	82.2	79.8	103	102	

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

		infloation	Licotrioity	aomana			
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.631	0.64	1.22	1.29	1.26	1.32

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

Item	2020	2025	2030	2035	2040	2045	2050	
Vehicle stocks - LDV – EV (1000 units)	6.7	98.6	190	512	834	1,091	1,347	
Vehicle stocks - LDV – All others (1000	1,124	1,070	1,016	741	465	263	61.1	
units)								
Light-duty vehicle capital costs vs. REF -		216	554	896	1,358	1,478	1,409	
Cumulative 5-yr (million \$2018)								
Public EV charging plugs - DC Fast (1000	0.118		0.513		2.24		3.63	
units)								
Public EV charging plugs - L2 (1000 units)	0.3		12.3		53.9		87.1	

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3	12.5	61.9	80.8	83.2	83.5	83.4
Heat Pump (%)							
Sales of space heating units - Electric	1.39	1.41	1.15	0.541	0.387	0.388	0.424
Resistance (%)							
Sales of space heating units - Gas (%)	6.74	3.55	2.57	0.511	0.068	0.03	0.029
Sales of space heating units - Fossil (%)	88.9	82.5	34.4	18.2	16.4	16.1	16.2
Sales of water heating units - Electric	0	2.79	18.7	33.9	36.7	36.9	37
Heat Pump (%)							
Sales of water heating units - Electric	25.5	44.1	55.6	61.8	62.9	63	62.9
Resistance (%)							
Sales of water heating units - Gas Furnace	31.8	28.3	20.9	4	0.319	0.011	0
(%)							
Sales of water heating units - Other (%)	42.8	24.8	4.76	0.282	0.088	0.088	0.088
Sales of cooking units - Electric	64.2	71.8	95.2	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	35.8	28.2	4.82	0.243	0	0	0
Residential HVAC investment in 2020s vs.		1.25	1.28				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.33	11	39.5	71.3	77.4	77.8	78
Heat Pump (%)							
Sales of space heating units - Electric	1.31	4.27	16.7	21.3	22	22.2	22
Resistance (%)							
Sales of space heating units - Gas (%)	12.2	51.3	37.5	7.1	0.562	0.018	0
Sales of space heating units - Fossil (%)	84.1	33.4	6.38	0.27	0	0	0
Sales of water heating units - Electric	4.05	3.58	15.8	40	45.3	45.8	45.9
Heat Pump (%)							
Sales of water heating units - Electric	19.4	12.5	23.7	47.2	52.2	52.5	52.5
Resistance (%)							
Sales of water heating units - Gas (%)	58.2	78.7	58.4	11.2	0.896	0.03	0
Sales of water heating units - Other (%)	18.4	5.18	2.06	1.6	1.59	1.59	1.61
Sales of cooking units - Electric	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s -		2,622	2,862				
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 - Natural gas (MW)	1,556	568	568	568	1,234	1,234	1,230
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	86.1	150	176	205	239	277	319
Installed renewables - Solar - Base land use assumptions (MW)	85.4	85.4	85.4	479	796	4,351	13,882

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

		.,		., (
Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Wind - Base land	1,011	1,011	1,011	1,011	1,011	1,011	1,052
use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	208	12,804	46,382
Base land use assumptions (MW)							
Installed renewables - Solar -	85.5	85.5	85.5	85.5	403	4,624	14,230
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	1,145	1,145	1,145	1,145	1,145	1,145	1,145
land use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	0	0	51,104
Constrained land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		0	0	0.434	0.33	3.49	8.83
\$2018)							
Capital invested - Wind - Base (billion		0	0	0	0	0	0.077
\$2018)							
Capital invested - Offshore Wind - Base		0	0	0	0.583	20.6	44.7
(billion \$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)	176	176	176	888	1,458	7,777	24,453
Wind - Base land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,304
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	1,440	64,157	234,209
Solar - Constrained land use assumptions (GWh)	352	352	352	352	1,493	16,521	50,111
Wind - Constrained land use assumptions (GWh)	8,259	8,259	8,259	8,259	8,259	8,259	8,259
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	512,804

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-53.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-89.7
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-4,068
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-157
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-3,636
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-46.4
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-201
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-28.2
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,195
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-9,475
_counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.5
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-314
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-7,329
rotation length (1000 tCO2e/y)							

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

 Item
 2020
 2025
 2030

Item	2020	2025	2030	2035	2040	2045	2050
Caphan sink natantial Mid Impnova	2020	2020	2000	2000	2040	2040	2000
							-230
plantations (1000 to02e/y)							
Carbon sink potential - Mid - Increase							-7,273
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-89.4
trees outside forests (1000 tC02e/v)							
Carbon sink notential - Mid - Reforest							-301
anonlond (1000 ±000 c/u)							-301
Carbon sink potential - Mid - Reforest							-200
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-2,370
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-18.187
counting overlan) (1000 tC02e/v)							
Carbon sink notantial High Accolorate							107
cal boll Sillk potential - High - Accelerate							-107
Carbon sink potential - High - Avoid							-538
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-10,590
rotation length (1000 tCO2e/v)							
Carbon sink notential - High - Improve							-309
plantations (1000 tC020/y)							007
							10.000
Carbon sink potential - Hign - Increase							-10,909
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-133
trees outside forests (1000 tCO2e/y)							
Carbon sink notential - High - Reforest							-401
cronland (1000 tC02e/v)							
Carbon sink potential High Defenset							272
							-313
pasture (1000 tC02e/y)							
Carbon sink potential - High - All (not							-26,905
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,545
productivity (1000 tCO2e/y)							
Land impacted for carbon sink notential -							877
Low - Accelerate regeneration (1000							0.11
bostance)							
Land impacted for carbon sink potential -							68.4
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,069
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink notential							56.0
Land Impacted for Carbon Sink potential -							50.7
nectaresj							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							6.63
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for earbon sink notential							10.0
							13.3
LUW - REFOREST CROPIAND (IUUU NECTARES)							
Land impacted for carbon sink potential -							1.84
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							711
Low - Restore productivity (1000							
hectares)							

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

			,				
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							2,936
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 -							70.6
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential							3 73/
Mid Extend notation longth (1000							5,154
							0.5.7
Land impacted for carbon sink potential -							85.7
Mid - Improve plantations (1000 nectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							9.61
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							19.9
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							13.3
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink notential -							1432
Mid - Restore productivity (1000							1, 102
hertares)							
Land impacted for carbon sink potential							E 270
Mid Total impacted (over 20 verse) (1000							5,517
hostonoo)							
							17 5
Land impacted for carbon sink potential -							17.5
Hign - Accelerate regeneration (1000							
hectaresj							
Land impacted for carbon sink potential -							72.9
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,400
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							114
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink notential -							0
High - Increase retention of HWP (1000							C C
hertares)							
Land impacted for carbon sink notential -							12.6
High Thanaaaa thaaa autaida fanaata							12.0
(1000 bostopoo)							
(1000 fieldares)							0/ 5
Land impacted for carbon sink potential -							26.5
nigii - keiorest cropiano (1000 nectares)							
Land impacted for carbon sink potential -							10.6
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,175
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,829
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 tCO2e/y)							
Carbon sink potential - Moderate							-164
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-5.04
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-169
deployment - Total (1000 tC02e/v)							-
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							C
grasses (1000 tC02e/v)							
Carbon sink notential - Angressive							-312
denlovment - Cronland measures (1000							012
Carbon sink notential - Angressive							-10.1
denloyment - Permanent conservation							10.1
cover $(1000 \pm 0.02 \text{ e}/\text{v})$							
Carbon sink notential - Aggressive							
denloyment - Total (1000 tC02e/v)							-022
Land impacted for carbon sink - Moderate							0
deployment - Corp-ethanol to energy							0
arasses (1000 bectares)							
Land impacted for carbon sink Moderate							011
doployment Chenland measures (1000							71.1
hostanos)							
Lond imported for earbon sink. Medanate							0.14
deployment . Depresent concentration							9.10
acuan (1000 bostonoo)							
Lond imposted for earlier sink. Medanate							100
doploymont Total (1000 bostonos)							100
Lond imposted for corbon sink							
Lanu impacteu ior carbon sink -							U
Aggressive deployment - Comin-ethanol to							
Lond imposted for containing							170
Lanu impacteu ior carbon sink -							113
measures (1000 nectares)							10.0
Land impacted for carbon sink -							18.3
Aygressive deployment - Permanent							
conservation cover (IUUU nectares)							
Land impacted for carbon sink -							191
Aggressive deployment - Total (1000							
hectaresj							

Tahle	38.	F+RF-	scenario	- TMPAC	TS - Health
Idule	30.		SCENUIIO	- IMPAG	13 - HEUILII

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		14	0.017	0.017	0.016	0.009	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		3.92	2.19	2.37	1.77	0.84	0.197
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		18.4	16.8	12.5	7.05	3.11	1.14
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		0.971	0.873	0.642	0.368	0.17	0.073
Stations (deaths)							

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

Item	2020	2025	2030	2035	20/.0	20/15	2050
Dependent of the free of pollution	2020	2023	2030	2000	2040	2043	2030
Freihalure dealis from all polition -		3.95	3.3	2.20	1.20	0.594	0.222
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		9.32	7.1	4.51	2.4	0.972	0.276
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.12	0.997	0.754	0.476	0.249	0.113
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.29	0.272	0.254	0.236	0.218	0.2
Fuel Comb - Comm/Institutional - Coal		-					_
(deaths)							
Dremature deaths from air pollution -		3.85	25	2 81	108	1.28	0.753
Fieldule dealisti oni al polition -		3.00	3.0	2.01	1.70	1.20	0.755
Fuel Comp - Comm/Institutional - Natural							
				(74			
Premature deaths from air pollution -		9.58	7.35	4.71	2.55	1.54	1.09
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.757	0.628	0.503	0.386	0.277	0.178
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.082	0.043	0.042	0.04	0.04	0.036
Industrial Processes - Coal Mining		0.001		0.0.1			0.000
(deates)							
Descrition desthe from air collution		700	(02	(50	E E E	(E (0.05
Premature deaths from an ponution -		1.20	0.03	0.52	5.55	4.56	3.30
Industrial Processes - Ull & Gas							
Production (deaths)							
Monetary damages from air pollution -		124	0.147	0.147	0.14	0.083	0.004
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		34.7	19.4	21	15.7	7.44	1.74
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		163	149	111	627	27.6	10.1
Mobile - $\Omega_{\rm p}$ -Pood (million \$2019)		100			02.1	21.0	10.1
Monotony domagoo from ain pollution		0 (770	E (0	2.07	1 51	0.(1.0
Monetary damages from air poliution -		0.0	1.13	5.69	3.20	1.51	0.648
Gas Stations (million \$2019)							
Monetary damages from air pollution -		35	29.2	20.1	11.2	5.26	1.97
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		82.6	62.9	40	21.3	8.61	2.44
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		9.91	8.84	6.68	4.22	2.2	1
Fuel Comh - Residential - Other (million							
\$2019)							
Monotony domagoe from air pollution		2.57	2 / 1	2.25	2.00	102	177
Fuel Comb. Comm/Institutional. Cool		2.01	2.41	2.25	2.09	1.75	1.00
Monetary damages from air pollution -		34	31	24.9	17.6	11.3	6.66
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		84.8	65	41.7	22.6	13.6	9.64
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		67	5.56	4.46	3.41	2,45	1.57
Fuel Comb - Comm/Institutional - Other			2.00		2	o	
(million \$2019)							
Monotony domagoe from air collution		0.701		0.247	0.353	0.95	0.91/
Multerial Processon Ocel Mining		0.721	0.377	0.306	0.333	0.35	0.314
mustrial 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 -		64.7	60.6	57.9	49.3	40.5	29.8
Industrial Processes - Oil & Gas							
Production (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		274	491	169	131	113	252
By economic sector - Construction (jobs)		1,653	1,846	1,801	2,330	2,374	2,871
By economic sector - Manufacturing		1,378	1,043	1,107	890	714	1,437
(jobs)				-			
By economic sector - Mining (jobs)		650	488	340	228	155	112
By economic sector - Other (jobs)		145	138	164	215	245	339
By economic sector - Pipeline (jobs)		100	155	77.9	91.1	78.9	118
By economic sector - Professional (jobs)		1,411	1,483	1,323	1,926	1,812	2,259
By economic sector - Trade (jobs)		835	807	800	1,008	998	1,197
By economic sector - Utilities (jobs)		1,019	1,254	1,260	3,795	2,351	2,791
By resource sector - Biomass (jobs)		959	1,258	579	491	444	1,048
By resource sector - CO2 (jobs)		0	527	0	216	216	607
By resource sector - Grid (jobs)		1,211	1,456	2,134	3,064	3,355	3,902
By resource sector - Natural Gas (jobs)		749	427	282	273	217	182
By resource sector - Nuclear (jobs)		0	0	0	2,611	528	520
By resource sector - Oil (jobs)		1,866	1,546	1,179	872	663	540
By resource sector - Solar (jobs)		882	395	422	425	424	1,351
By resource sector - Wind (jobs)		1,797	2,095	2,445	2,662	2,995	3,225
By education level - All sectors - High		3,103	3,301	2,942	3,492	3,433	4,532
school diploma or less (jobs)							
By education level - All sectors -		2,206	2,269	2,150	2,696	2,661	3,446
Associates degree or some college (jobs)							
By education level - All sectors -		1,673	1,648	1,509	1,878	1,797	2,307
Bachelors degree (jobs)							
By education level - All sectors - Masters		416	418	379	493	473	598
or professional degree (jobs)							
By education level - All sectors - Doctoral		67.7	68.7	61	82.6	77.8	97.2
degree (jobs)							
Related work experience - All sectors -		1,055	1,116	1,007	1,230	1,211	1,583
None (jobs)							
Related work experience - All sectors - Up		1,519	1,595	1,428	1,710	1,668	2,218
to 1 year (jobs)							
Related work experience - All sectors - 1		2,714	2,789	2,544	3,130	3,054	3,947
to 4 years (jobs)							
Related work experience - All sectors - 4		1,717	1,749	1,632	2,042	1,996	2,565
to 10 years (jobs)							
Related work experience - All sectors -		459	455	431	529	513	668
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		419	422	387	473	459	595
(jobs)							
On-the-Job Training - All sectors - Up to 1		5,068	5,214	4,706	5,697	5,531	7,260
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		1,469	1,521	1,432	1,799	1,780	2,280
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		437	477	450	592	597	743
years (jobs)							
Un-the-Job Training - All sectors - Over 10		71.8	70.4	66.7	79.1	76.3	101
years (jobs)							
Un-Site or In-Plant Training - All sectors -		1,250	1,283	1,161	1,428	1,384	1,809
						F 0.0-	/
Un-Site or In-Plant Training - All sectors -		4,547	4,676	4,244	5,146	5,007	6,557
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 -		1,151	1,191	1,116	1,389	1,371	1,764
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		459	494	463	603	604	754
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		57.5	61.1	58.5	75.3	75.2	96.6
Over 10 years (jobs)							
Wage income - All (million \$2019)		396	411	379	473	467	609

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	106	92.8	76.3	61.2	51.9	48
Final energy use - Residential (PJ)	77.2	68.5	59.5	49.6	40.9	34.8	31.1
Final energy use - Commercial (PJ)	35.3	33	31.4	29.1	26.7	25.2	24.5
Final energy use - Industry (PJ)	90.9	89.1	85.7	82.2	79.8	103	102

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.631	0.64	1.22	1.29	1.26	1.32
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)	6.7	98.6	190	512	834	1,091	1,347
Vehicle stocks - LDV – All others (1000	1,124	1,070	1,016	741	465	263	61.1
units)							
Light-duty vehicle capital costs vs. REF -		216	554	896	1,358	1,478	1,409
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.118		0.513		2.24		3.63
units)							
Public EV charging plugs - L2 (1000 units)	0.3		12.3		53.9		87.1

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

	,,						
Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3	12.5	61.9	80.8	83.2	83.5	83.4
Heat Pump (%)							
Sales of space heating units - Electric	1.39	1.41	1.15	0.541	0.387	0.388	0.424
Resistance (%)							
Sales of space heating units - Gas (%)	6.74	3.55	2.57	0.511	0.068	0.03	0.029
Sales of space heating units - Fossil (%)	88.9	82.5	34.4	18.2	16.4	16.1	16.2
Sales of water heating units - Electric	0	2.79	18.7	33.9	36.7	36.9	37
Heat Pump (%)							
Sales of water heating units - Electric	25.5	44.1	55.6	61.8	62.9	63	62.9
Resistance (%)							
Sales of water heating units - Gas Furnace	31.8	28.3	20.9	4	0.319	0.011	0
(%)							
Sales of water heating units - Other (%)	42.8	24.8	4.76	0.282	0.088	0.088	0.088
Sales of cooking units - Electric	64.2	71.8	95.2	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	35.8	28.2	4.82	0.243	0	0	0
Residential HVAC investment in 2020s vs.		1.25	1.28				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.33	11	39.5	71.3	77.4	77.8	78
Heat Pump (%)							
Sales of space heating units - Electric	1.31	4.27	16.7	21.3	22	22.2	22
Resistance (%)							
Sales of space heating units - Gas (%)	12.2	51.3	37.5	7.1	0.562	0.018	0
Sales of space heating units - Fossil (%)	84.1	33.4	6.38	0.27	0	0	0
Sales of water heating units - Electric	4.05	3.58	15.8	40	45.3	45.8	45.9
Heat Pump (%)							
Sales of water heating units - Electric	19.4	12.5	23.7	47.2	52.2	52.5	52.5
Resistance (%)							
Sales of water heating units - Gas (%)	58.2	78.7	58.4	11.2	0.896	0.03	0
Sales of water heating units - Other (%)	18.4	5.18	2.06	1.6	1.59	1.59	1.61
Sales of cooking units - Electric	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s -		2,622	2,862				
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 - Natural gas (MW)	1,556	384	125	125	246	246	242
Installed thermal - Nuclear (MW)	0	0	0	0	1,114	1,114	1,114
Installed renewables - Rooftop PV (MW)	86.1	150	176	205	239	277	319
Installed renewables - Solar - Base land	85.4	85.4	85.4	85.4	85.4	85.4	85.4
use assumptions (MW)							
Installed renewables - Wind - Base land	1,011	1,011	1,011	1,011	1,011	1,011	1,011
use assumptions (MW)							
Installed renewables - Solar -	85.5	85.5	85.5	85.5	85.5	85.5	85.5
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	1,011	1,011	1,011	1,011	1,011	1,011	1,011
land use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	0	0	0
Constrained land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		0	0	0	0	0	0
\$2018)							
Capital invested - Wind - Base (billion		0	0	0	0	0	0
\$2018)							
Capital invested - Solar PV - Constrained		0	0	0	0	0	0
(billion \$2018)							
Capital invested - Wind - Constrained		0	0	0	0	0	0
(billion \$2018)							

Table 46: E+RE- scenario	- PILLAR 2: Clean	Electricity -	Generation
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Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	176	176	176	176	176	176	176
Wind - Base land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,130
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	176	176	176	176	176	176	176
Wind - Constrained land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,130
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 notential - Low - Accelerate							-537
regeneration (1000 tC02e/v)							00.1
Carbon sink notontial Low Avoid							007
defense tation (1000 ±0020 /v)							-07.1
Contraction (1000 (5022/y)							
Carbon sink polential - Low - Extend							-4,068
rotation length (1000 tC02e/y)							
Carbon sink potential - Low - Improve							-157
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-3,636
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-46.4
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-201
cropland (1000 tCO2e/v)							
Carbon sink notential - Low - Reforest							-28.2
p_{2}							20.2
Carbon sink notantial Low Destano							1 105
cal boll slik polencial - Low - Restore							-1,195
Carbon sink potential - Low - All (not							-9,475
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.5
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-314
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-7.329
rotation length (1000 tCO2e/v)							, -
Carbon sink notential - Mid - Improve							-230
plantations (1000 tC02e/v)							-200
Contractions (1000 10026/y)							7 070
							-1,213
Carbon sink potential - Mid - Increase							-89.4
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-301
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-200
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-2,370
productivity (1000 tCO2e/y)							
Carbon sink notential - Mid - All (not							-18 187
counting overlap) (1000 tCO2e/v)							10,101
Carbon sink notential - High - Accelerate							_107
non-proton (1000 ±000 k)							-101
Carbon Sink potential - Hign - Avoid							-538
deforestation (1000 tC02e/y)							
Carbon sink potential - High - Extend							-10,590
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-309
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-10,909
retention of HWP (1000 tC02e/v)							
Carhon sink notential - High - Increase							-133
trees outside forests (1000 tronge/v)							100
Carbon sink notential High Defenset							/.01
anonland (1000 +000a (v)							-401
Carbon Sink potential - High - Reforest							-373
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-26,905
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,545
productivity (1000 tCO2e/y)							

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 -							8.77
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink notential -							68.4
Low - Avoid deforestation (over 30 years)							00.4
(1000 hectares)							
Land impacted for earbon sink notantial							2.040
Lanu impacteu ior carbon sink potential -							2,069
nectares							
Land impacted for carbon sink potential -							56.9
Low - Improve plantations (1000							
hectaresj							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							6.63
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							13.3
Low - Reforest cronland (1000 hectares)							
Land impacted for carbon sink notential -							1.84
$L_{\rm ow}$ = Peforest pasture (1000 bectares)							1.04
Lond imposted for earlier sink retential							711
Lanu impacteu ior carbon sink potential -							(11
Low - Restore productivity (1000							
nectares							
Land impacted for carbon sink potential -							2,936
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 -							70.6
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3.734
Mid - Extend rotation length (1000							-,
hectares)							
Land impacted for carbon sink notential -							85.7
Mid - Improve plantations (1000 bectares)							00.1
Land impacted for carbon sink notantial							0
Mid Inpacted for carbon sink potential -							U
hostonoo)							
							0.11
Land impacted for carbon sink potential -							9.61
Mid - Increase trees outside forests (1000							
hectaresj							
Land impacted for carbon sink potential -							19.9
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							13.3
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,432
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink notential -							5.379
Mid - Total impacted (over 30 years) (1000							-,
hectares)							
Land impacted for carbon sink notantial							17 5
High - Accelerate regeneration (1000							11.0
hortanoe)							
Lond imported for earther sink natertial							70.0
Lanu impacteu iur carbon sink potential -							(2.9
nigii - Avolu uelorestation (over 30 years)							
(IUUU nectares)							

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 -							5,400
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							114
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 -							12.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							26.5
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							10.6
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,175
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,829
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 notential - Moderate	2020	2020	2000	2000	2040	2040	0
denloyment - Corn-ethanol to energy							0
grasses (1000 tC02e/v)							
Carbon sink notential - Moderate							-164
denloyment - Cronland measures (1000							10-1
tCO2e/v)							
Carbon sink potential - Moderate							-5.04
deployment - Permanent conservation							
cover (1000 tC02e/v)							
Carbon sink potential - Moderate							-169
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-312
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-10.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-322
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							91.1
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							9.16
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							100
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							173
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							18.3
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							191
Aggressive deployment - Total (1000							
hectares)							

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		14	0.017	0.017	0.016	0.009	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		3.86	1.7	0.816	0.613	0.359	0.142
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		18.7	18.5	17.6	15.5	12.1	8.08
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		0.992	0.98	0.925	0.809	0.627	0.421
Stations (deaths)							
Premature deaths from air pollution -		3.97	3.59	3.14	2.57	1.91	1.26
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		9.46	8.43	7.54	6.34	4.81	3.33
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.13	1.08	1.02	0.911	0.733	0.539
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.29	0.272	0.254	0.236	0.218	0.2
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		3.86	3.8	3.7	3.41	2.92	2.35
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		9.64	8.08	6.56	5.16	4.3	3.66
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.757	0.673	0.59	0.51	0.433	0.362
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.089	0.043	0.042	0.041	0.04	0.039
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		7.14	6.13	4.91	4	3.33	2.34
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		124	0.147	0.147	0.14	0.083	0.004
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		34.2	15.1	7.22	5.43	3.18	1.26
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		166	164	156	138	107	71.8
Mobile - On-Road (million \$2019)						_	
Monetary damages from air pollution -		8.79	8.68	8.19	7.16	5.55	3.73
Gas Stations (million \$2019)							

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		35.2	31.8	27.8	22.8	16.9	11.2
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		83.8	74.7	66.8	56.2	42.6	29.5
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10	9.59	9.05	8.07	6.49	4.78
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.57	2.41	2.25	2.09	1.93	1.77
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		34.1	33.7	32.7	30.2	25.9	20.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		85.3	71.5	58	45.7	38	32.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		6.7	5.96	5.23	4.51	3.84	3.2
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.783	0.378	0.37	0.36	0.356	0.343
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		63.4	54.4	43.6	35.5	29.6	20.8

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		267	544	220	163	136	353
By economic sector - Construction (jobs)		1,767	2,367	2,579	2,890	4,411	19,087
By economic sector - Manufacturing		1,162	1,592	1,455	1,156	1,849	5,671
(jobs)							
By economic sector - Mining (jobs)		653	509	395	306	216	139
By economic sector - Other (jobs)		156	188	243	287	433	2,065
By economic sector - Pipeline (jobs)		99.1	148	81.1	98	85.9	114
By economic sector - Professional (jobs)		1,549	1,990	2,040	2,298	3,165	9,516
By economic sector - Trade (jobs)		910	1,038	1,172	1,303	1,758	5,482
By economic sector - Utilities (jobs)		1,072	1,539	1,598	1,981	4,144	23,751
By resource sector - Biomass (jobs)		1,062	1,465	743	685	628	1,666
By resource sector - CO2 (jobs)		0	479	0	197	196	551
By resource sector - Grid (jobs)		1,345	1,956	2,697	3,263	7,762	48,613
By resource sector - Natural Gas (jobs)		696	418	186	189	170	275
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,884	1,637	1,422	1,235	982	710
By resource sector - Solar (jobs)		998	789	522	565	849	5,777
By resource sector - Wind (jobs)		1,649	3,172	4,212	4,349	5,609	8,585
By education level - All sectors - High		3,150	4,202	4,035	4,266	6,636	28,086
school diploma or less (jobs)							
By education level - All sectors -		2,251	2,949	2,994	3,254	5,152	21,552
Associates degree or some college (jobs)							
By education level - All sectors -		1,725	2,132	2,121	2,272	3,394	12,841
Bachelors degree (jobs)							
By education level - All sectors - Masters		435	542	542	591	878	3,263
or professional degree (jobs)							
By education level - All sectors - Doctoral		72.6	90	90.7	99.7	138	435
degree (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors -		1,080	1,424	1,389	1,493	2,325	9,728
None (jobs)							
Related work experience - All sectors - Up		1,549	2,053	1,983	2,093	3,203	13,085
to 1 year (jobs)							
Related work experience - All sectors - 1		2,778	3,581	3,533	3,789	5,847	23,810
to 4 years (jobs)							
Related work experience - All sectors - 4		1,762	2,263	2,279	2,467	3,826	15,529
to 10 years (jobs)							
Related work experience - All sectors -		465	594	599	639	996	4,026
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		432	544	542	579	867	3,401
(jobs)							
On-the-Job Training - All sectors - Up to 1		5,169	6,705	6,525	6,924	10,615	42,840
year (jobs)		1		1001			
On-the-Job Training - All sectors - 1 to 4		1,502	1,964	1,991	2,169	3,436	14,481
years (jobs)		(50		(01	744	1100	
Un-the-Job Training - All sectors - 4 to 10		458	609	631	711	1,132	4,887
years (jobs)		70.1		<u> </u>		4/7	
Un-the-Job Training - All sectors - Over 10		72.1	92.8	93.4	97.7	147	569
years (jobs)		1 070	1.((0	1 (0 0	170/	0 (0 0	10.070
Un-Site or In-Plant Training - All sectors -		1,279	1,660	1,628	1,736	2,633	10,378
None (Jobs)			(011	F 070	(050	0 (00	00100
Un-Site or In-Plant Training - All sectors -		4,640	6,011	5,878	6,252	9,623	39,133
Op Cite on In Plant Training All costons		1 17/	1 5 0 5	1 5 / 7	1 / 77	0 (5 0	11 170
Un-Sile of In-Plant framing - All sectors -		1,176	1,535	1,547	1,677	2,650	11,172
1 to 4 years (jobs)		(70	(00	(10	70/	11/5	/ 070
Un-Site of In-Plant Training - All sectors -		479	629	649	726	1,145	4,870
4 to 10 years (Jobs)		50.0	70.0	01 5	00 (1/ 5	(0)
UN-Site of IN-Plant Training - All Sectors -		59.2	(9.2	81.5	90.4	145	624
UVER IU YEARS (JODS)		101		F0.4	F70	000	0.(/0
wage income - All (million \$2019)		406	527	526	572	892	3,663

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	107	97.2	89.2	82.9	75.5	66.9
Final energy use - Residential (PJ)	77.2	68.8	62.6	57.4	52.4	47.4	42.8
Final energy use - Commercial (PJ)	35.3	33	32	31	30	29	28.3
Final energy use - Industry (PJ)	90.9	89.2	86.1	83	81.1	104	103

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

		•	•				
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.484	0.475	0.654	0.668	1.11	1.17
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)	5.19	32.2	59.2	184	309	586	863
Vehicle stocks - LDV – All others (1000	1,128	1,128	1,128	1,070	1,012	780	548
units)							
Light-duty vehicle capital costs vs. REF -		0	35	73.4	248	780	1,136
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.118		0.159		0.833		2.32
units)							
Public EV charging plugs - L2 (1000 units)	0.3		3.82		20		55.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3	2.62	5.43	13.6	26.9	36.8	40.8
Heat Pump (%)							
Sales of space heating units - Electric	1.39	1.43	1.43	1.44	1.28	1.11	1.03
Resistance (%)							
Sales of space heating units - Gas (%)	6.74	3.62	3.58	3.39	2.96	2.45	2.07
Sales of space heating units - Fossil (%)	88.9	92.3	89.6	81.5	68.9	59.6	56.1
Sales of water heating units - Electric	0	0.324	1.24	4.01	9.3	14.5	17.2
Heat Pump (%)							
Sales of water heating units - Electric	25.5	41.9	42.4	44.6	47.8	50.5	51.8
Resistance (%)							
Sales of water heating units - Gas Furnace	31.8	28.7	28.4	26.9	23.4	18.8	16
(%)							
Sales of water heating units - Other (%)	42.8	29.1	28	24.5	19.5	16.2	15
Sales of cooking units - Electric	64.1	65	68.3	77	89	96.5	99
Resistance (%)							
Sales of cooking units - Gas (%)	35.9	35	31.7	23	11	3.54	0.953
Residential HVAC investment in 2020s vs.		1.25	1.38				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.33	6.89	8.48	13.3	22.8	32.7	38.1
Heat Pump (%)							
Sales of space heating units - Electric	1.31	1.76	2.43	4.48	7.93	10.5	11.3
Resistance (%)							
Sales of space heating units - Gas (%)	12.2	52.1	51	48.4	42.5	34.6	29.5
Sales of space heating units - Fossil (%)	84.1	39.2	38.1	33.9	26.8	22.3	21
Sales of water heating units - Electric	4.05	2.68	3.38	5.63	11.1	17.9	22
Heat Pump (%)							
Sales of water heating units - Electric	19.4	11.6	11.9	14.5	19.6	26	29.9
Resistance (%)							
Sales of water heating units - Gas (%)	58.2	79.9	79.4	75.1	65.2	52.6	44.8
Sales of water heating units - Other (%)	18.4	5.77	5.34	4.75	4.17	3.55	3.28
Sales of cooking units - Electric	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Commercial HVAC investment in 2020s -		2,622	2,866				
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 - Natural gas (MW)	1,556	568	3.8	3.8	221	393	1,218
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Capital invested - Biomass power plant (billion \$2018)	0	0	0.917	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0.019
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0.022

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	1,801	1,801	1,801	1,801	1,801
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	24.7
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	18.7

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

	Table Biel	merg)		-			-
Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	2	2	2	2	2
Number of facilities - Power ccu	0	0	0	0	0	0	1
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	1
(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	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	1
(quantity)							
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	1
Conversion capital investment -		0.047	1,023	0	0	0	3,664
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0.052	136	136	136	136	457
Number of facilities - Sng (quantity) Number of facilities - Sng ccu (quantity) Conversion capital investment - Cumulative 5-yr (million \$2018) Biomass purchases (million \$2018/y)	0	1 0.047 0.052	1 0 1,023 136	1 0 0 136	1 0 0 136	1 0 0 136	1 1 3,664 457

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	3.32	3.42	8.05
Annual - BECCS (MMT)		0	0	0	0	0	4.52
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Cumulative - All (MMT)		0	0	0	3.32	6.74	14.8
Cumulative - BECCS (MMT)		0	0	0	0	0	4.52
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	151	151	151	151	151
Spur (km)		0	0	0	116	116	650
All (km)		0	151	151	267	267	801
Cumulative investment - Trunk (million		0	273	273	273	273	273
\$2018)							
Cumulative investment - Spur (million		0	0	0	115	116	487
\$2018)							
Cumulative investment - All (million		0	273	273	388	390	760
\$2018)							

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y)							-53.7
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)							-89.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - Low - Extend	2020	2020	2000	2000	2010	2010	_/, 068
notation longth (1000 tC020/y)							-4,000
							157
Carbon Sink potential - Low - Improve							-157
plantations (1000 tC02e/y)							
Carbon sink potential - Low - Increase							-3,636
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-46.4
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-201
cronland (1000 tCO2e/v)							-
Carbon sink notential - Low - Reforest							-28.2
cal boll sink potential - Low - Kelol est postupo (1000 ± 0020 h)							-20.2
							1105
Carbon sink potential - Low - Restore							-1,195
productivity (1000 tC02e/y)							
Carbon sink potential - Low - All (not							-9,475
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.5
regeneration (1000 tCO2e/v)							
Carbon sink notential - Mid - Avoid							-314
deforestation (1000 tC02e/v)							014
Oerben eink netentiel Mid Extend							7.000
Carbon sink potentiai - Miu - Exteriu							-1,329
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-230
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-7,273
retention of HWP (1000 tCO2e/v)							
Carbon sink notential - Mid - Increase							-89.4
trees outside forests (1000 tC02e/v)							07.4
Carbon sink notantial Mid Defenset							201
							-301
Carbon sink potential - Mid - Reforest							-200
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-2,370
productivity (1000 tCO2e/y)							
Carbon sink notential - Mid - All (not							-18,187
counting overlan) (1000 tCO2e/v)							
Carbon sink notantial High Accolorate							107
Cal buil Silk potential - High - Accelerate							-107
Carbon sink potential - High - Avoid							-538
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-10,590
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-309
plantations (1000 tC02e/v)							
Carbon sink notential - High - Increase							_10 909
notantian of HWR (1000 t0020/y)							-10,707
							100
Carbon sink potential - High - Increase							-133
trees outside forests (1000 tC02e/y)							
Carbon sink potential - High - Reforest							-401
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-373
pasture (1000 tCO2e/v)							
Carbon sink notential - High - All (not							-26 905
counting overlan) (1000 to02e/v)							20,700
Containing over apy (1000 (0026/ y)							9 5 / 5
Garbon Sink potential - High - Kestore							-3,545
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							8.77
Low - Accelerate regeneration (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							68.4
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2.069
low - Extend rotation length (1000							_,
hectares)							
Land impacted for carbon sink notential -							56.9
Low - Improve plantations (1000							0017
hectares)							
Land impacted for carbon sink notential -							0
Low - Increase retention of HWP (1000							Ũ
hectares)							
Land impacted for carbon sink notential -							6.63
Low - Increase trees outside forests							0.00
(1000 bectares)							
Land impacted for carbon sink notential -							13.3
Low - Reforest cronland (1000 bectares)							10.0
Land impacted for carbon sink notential -							1.84
$L_{\rm ow}$ - Deforest pacture (1000 bectares)							1.04
Land impacted for carbon sink notential -							711
Low - Pestore productivity (1000							
hertares)							
Land impacted for carbon sink notantial							2 0 2 4
Land impacted for carbon Sink potential -							2,930
(1000 hostoros)							
Lond imposted for earbon sink notantial							10.0
Mid Accolorate regeneration (1000							13.2
Milu - Accelerate regeneration (1000							
Lond imposted for earbon sink notantial							70 (
Mid Avoid defensetation (even 20 years)							70.0
(1000 hostonos)							
[IUUU Rectares]							0.707
Land Impacted for carbon sink potential -							3,734
Mid - Exterio Polation length (1000							
							05.7
Land impacted for carbon sink potential -							85.7
Mid - Improve plantations (1000 nectares)							
Land Impacted for carbon sink potential -							U
Mid - Increase recention of HWP (1000							
							0.(1
Land impacted for carbon sink potential -							9.61
Mid - Increase trees outside forests (1000							
							10.0
Land Impacted for carbon sink potential -							19.9
Mid - Reforest cropiand (1000 nectares)							10.0
Land Impacted for carbon sink potential -							13.3
Mid - Reforest pasture (1000 nectares)							
Land impacted for carbon sink potential -							1,432
Mid - Restore productivity (1000							
nectares							
Land impacted for carbon sink potential -							5,379
Mid - Total impacted (over 30 years) (1000							
hectaresj							
Land impacted for carbon sink potential -							17.5
High - Accelerate regeneration (1000							
hectaresj							
Land impacted for carbon sink potential -					\top	T	72.9
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,400
High - Extend rotation length (1000							
hectares)							

Table 62: E-B+ 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
Land impacted for carbon sink potential -							114
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 -							12.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							26.5
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							10.6
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,175
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,829
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-164
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-5.04
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Moderate							-169
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-312
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-10.1
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							-322
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							91.1
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							9.16
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							0
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							0.742
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							101
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							427
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							18.3
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							0.741
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							446
Aggressive deployment - Total (1000							
hectares)							

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		39.5	24.9	22.9	22.4	22	19.1
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		3.03	2.45	3.05	3.12	2.86	2.67
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		18.6	18.7	18.7	18.8	18.9	18.9
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		0.988	0.988	0.983	0.983	0.981	0.975
Stations (deaths)							
Premature deaths from air pollution -		3.96	3.81	3.82	3.81	3.75	3.61
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		9.16	6.89	4.23	2.41	1.36	0.841
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		1.11	1.04	0.96	0.904	0.861	0.826
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.303	0.298	0.292	0.285	0.278	0.269
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		3.91	3.97	3.84	3.64	3.55	3.6
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		9.63	7.86	5.75	3.7	2.61	2.04
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.791	0.798	0.803	0.803	0.801	0.798
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0,174	0.123	0.101	0.094	0.09	0.083
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		7,19	7.57	7.67	7,19	7.07	6.63
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		350	220	203	199	195	169
Fuel Comb - Electric Generation - Coal						_	_
(million \$2019)							
Monetary damages from air pollution -		26.9	21.7	27	27.6	25.4	23.6
Fuel Comb - Electric Generation - Natural					_	_	
Gas (million \$2019)							
Monetary damages from air pollution -		166	166	167	167	168	168
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		8.75	8.75	8.7	8.71	8.68	8.64
Gas Stations (million \$2019)							
Monetary damages from air pollution -		35.1	33.8	33.8	33.8	33.2	32
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		81.1	61	37.5	21.3	12.1	7.45
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		9.82	9.2	8.51	8.01	7.63	7.32
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		2.68	2.64	2.58	2.52	2.46	2.38
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		34.6	35.1	34	32.2	31.4	31.9
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		85.3	69.6	50.9	32.7	23.1	18.1
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		7	7.07	7.11	7.11	7.09	7.06
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		1.54	1.09	0.887	0.83	0.793	0.735
Industrial Processes - Coal Mining							
[million \$2019]				-		-	
Monetary damages from air pollution -		63.9	67.2	68.1	63.8	62.7	58.9
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		253	227	224	183	182	198
By economic sector - Construction (jobs)		1,065	1,191	1,296	1,495	1,684	1,979
By economic sector - Manufacturing		659	759	1,155	712	747	1,291
(jobs)							
By economic sector - Mining (jobs)		659	533	435	363	309	265
By economic sector - Other (jobs)		59.1	91.8	108	139	165	250
By economic sector - Pipeline (jobs)		101	101	101	99.4	102	104
By economic sector - Professional (jobs)		1,121	1,143	1,179	1,348	1,507	1,711

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		692	668	658	734	806	935
By economic sector - Utilities (jobs)		821	719	869	1,043	1,252	1,414
By resource sector - Biomass (jobs)		977	914	849	759	777	789
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Grid (jobs)		934	1,024	1,306	1,487	1,975	2,309
By resource sector - Natural Gas (jobs)		709	421	446	561	501	489
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1.898	1.671	1,502	1,406	1,343	1.301
By resource sector - Solar (jobs)		,	338	361	372	377	921
By resource sector - Wind (jobs)		912	1.063	1.561	1.531	1,782	2.338
By education level - All sectors - High		2,223	2,240	2,505	2.492	2,749	3,345
school diploma or less (jobs)		, -	, -	,	,		-,
By education level - All sectors -		1,553	1.568	1,778	1.832	2,043	2,492
Associates degree or some college (jobs)		,	,	, -	,	,	
By education level - All sectors -		1,276	1,252	1,350	1,376	1,505	1,778
Bachelors degree (jobs)					•		
By education level - All sectors - Masters		324	318	337	356	392	456
or professional degree (jobs)		-				_	
By education level - All sectors - Doctoral		53.8	53.5	55	60.2	66.1	75.4
degree (jobs)							
Related work experience - All sectors -		769	767	853	868	961	1,161
None (jobs)							
Related work experience - All sectors - Up		1,083	1,097	1,223	1,214	1,339	1,635
to 1 year (jobs)							
Related work experience - All sectors - 1		1,999	1,990	2,195	2,236	2,467	2,958
to 4 years (jobs)							
Related work experience - All sectors - 4		1,251	1,248	1,384	1,426	1,579	1,894
to 10 years (jobs)							
Related work experience - All sectors -		329	329	370	371	409	498
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		309	308	335	340	373	448
(jobs)							
On-the-Job Training - All sectors - Up to 1		3,714	3,704	4,101	4,102	4,514	5,455
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		1,045	1,052	1,182	1,228	1,368	1,651
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		314	317	350	389	439	517
years (jobs)							
On-the-Job Training - All sectors - Over 10		48.1	49.7	56.8	55.6	60.8	75.8
years (jobs)				1.0.00			
On-Site or In-Plant Training - All sectors -		905	907	1,003	1,014	1,116	1,349
None (jobs)			0.001				
On-Site or In-Plant Training - All sectors -		3,328	3,321	3,679	3,690	4,066	4,911
Up to 1 year (Jobs)						4.2.4	4.00 /
On-Site or In-Plant Training - All sectors -		821	827	928	957	1,064	1,286
I to 4 years (Jobs)			00/	2/2		(50	
Un-Site or In-Plant Training - All sectors -		334	336	368	404	453	533
4 to IU years (JODS)							(7.0
UN-SITE OF IN-Plant Training - All sectors -		40.4	41	46.8	49.7	56	67.8
		0.05	00/	000	0.00	070	
wage income - All (million \$2019)		295	296	328	339	379	457

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	107	98	92.4	92.1	94.8	98.3
Final energy use - Residential (PJ)	77.2	69.1	63.2	58.6	55.2	52.5	50.1
Final energy use - Commercial (PJ)	35.3	33.5	33	32	31	30.8	31.4
Final energy use - Industry (PJ)	90.9	92.9	93.4	94.3	96.6	99.5	102

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		0.574	0.576	0.751	0.773	0.756	0.774
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	2.88	4.65	4.91	5.31	5.38	5.44	5.51
Heat Pump (%)							
Sales of space heating units - Electric	1.4	1.38	1.39	1.43	1.39	1.36	1.32
Resistance (%)							
Sales of space heating units - Gas (%)	6.75	12.7	43.8	65.1	66.7	67	66.8
Sales of space heating units - Fossil (%)	89	81.3	49.9	28.1	26.5	26.2	26.4
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	25.5	41.6	41.5	41.7	41.6	41.6	41.5
Resistance (%)							
Sales of water heating units - Gas Furnace	31.8	28.9	29	29	29.1	29.2	29.2
(%)							
Sales of water heating units - Other (%)	42.8	29.5	29.5	29.3	29.3	29.2	29.2
Sales of cooking units - Electric	63.8	63.8	63.8	63.8	63.8	63.8	63.8
Resistance (%)							
Sales of cooking units - Gas (%)	36.2	36.2	36.2	36.2	36.2	36.2	36.2
Residential HVAC investment in 2020s vs.		1.23	1.26				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	2.33	12.7	40.4	63.6	67.5	67.8	68
Heat Pump (%)							
Sales of space heating units - Electric	1.31	2.46	7.45	19.9	30.2	32	32
Resistance (%)							
Sales of space heating units - Gas (%)	12.2	47.5	26.1	6.26	0.817	0.051	0
Sales of space heating units - Fossil (%)	84.1	37.3	26.1	10.2	1.47	0.119	0
Sales of water heating units - Electric	4.05	2.42	2.41	2.36	2.35	2.4	2.4
Heat Pump (%)							
Sales of water heating units - Electric	19.4	11.4	11	11.4	11.3	11.2	11.2
Resistance (%)							
Sales of water heating units - Gas (%)	58.2	80.4	81.1	80.9	80.9	81.3	81.5
Sales of water heating units - Other (%)	18.4	5.83	5.56	5.37	5.48	5.14	4.87
Sales of cooking units - Electric	36.9	39	38.6	38.5	38.3	38.5	38.4
Resistance (%)							
Sales of cooking units - Gas (%)	63.1	61	61.4	61.5	61.7	61.5	61.6
Commercial HVAC investment in 2020s -		2,590	2,664				
Cumulative 5-yr (million \$2018)							

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

		· · · · · •	J 1 /				
Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Natural gas (MW)	1,556	568	568	676	397	1,119	1,394
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	86.1	150	176	205	239	277	319
Installed renewables - Solar - Base land	85.4	85.4	85.4	85.4	85.4	85.4	85.4
	1.011	1.011	1.011	1 011	1 011	1.011	1.011
Installed renewables - wind - Base land use assumptions (MW)	1,011	1,011	1,011	1,011	1,011	1,011	1,011

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	176	176	176	176	176	176	176
Wind - Base land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,130
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	-6.38		-15.3				-13.7
uptake (Mt CO2e/y)							
Business-as-usual carbon sink - Retained	-2.97		-5.34				-5.55
in Hardwood Products (Mt CO2e/y)							
Business-as-usual carbon sink - Total (Mt	-9.35		-20.6				-19.2
CO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-53.7
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-89.7
deforestation (1000 tC02e/y)							
Carbon sink potential - Low - Extend							-4,068
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-157
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-3,636
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-46.4
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-201
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-28.2
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,195
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-9,475
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-80.5
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-314
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-7,329
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-230
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-7,273
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-89.4
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-301
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-200
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-2,370
productivity (1000 tC02e/y)							
Carbon sink potential - Mid - All (not							-18,187
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-107
regeneration (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - High - Avoid							-538
deforestation (1000 tC02e/v)							000
Carbon sink notential - High - Extend							_10 590
rotation length (1000 tC02e/v)							-10,370
Carbon sink notential - High - Improve							-300
plantations (1000 tC02e/v)							-307
Contractions (1000 10020/ y)							10,000
carbon sink potential - High - Increase							-10,909
							100
Carbon Sink potential - High - Increase							-133
trees outside forests (1000 tc02e/y)							
Carbon sink potential - High - Reforest							-401
cropland (1000 tC02e/y)							
Carbon sink potential - High - Reforest							-373
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-26,905
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,545
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							8.77
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							68.4
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink notential -							2 069
Low - Extend rotation length (1000							2,007
hostanos)							
Lond imposted for early a sink notantial							E(0
Lanu Impacteu for Carbon Sink potential -							30.9
Low - Improve plantations (1000							
Land impacted for carbon sink potential -							U
Low - Increase recention of HWP (1000							
nectaresj							
Land impacted for carbon sink potential -							6.63
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							13.3
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							1.84
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							711
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,936
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 notential -							70.6
Mid - Avoid deforestation (over 30 years)							10.0
(1000 bectares)							
Land impacted for carbon sink potential							2 727.
Mid - Extend rotation longth (1000							3,134
hootonoo)							
Incolares							057
Lanu impacted for carbon sink potential -							85.7
Milu - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							Û
Mid - Increase retention of HWP (1000							
hectaresJ							

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

Itam	0000	0005		0005	20/0	20/5	2050
Itelli	2020	2025	2030	2035	2040	2045	2030
Lanu impacteu for carbon sink potential -							9.01
Milu - Therease trees outside forests (1000							
Inductor improved for earther eight retential							10.0
Land Impacted for carbon sink potential -							19.9
Mid - Reforest cropiand (1000 nectares)							10.0
Land impacted for carbon sink potential -							13.3
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,432
Mid - Restore productivity (1000							
nectaresj							
Land impacted for carbon sink potential -							5,379
Mid - Total impacted (over 30 years) (1000							
hectaresj							
Land impacted for carbon sink potential -							17.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							72.9
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							5,400
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							114
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 -							12.6
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							26.5
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							10.6
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,175
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,829
High - Total impacted (over 30 years)							
(1000 hectares)							