

# Net-Zero America - Ohio 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 -		247	0.648	0.646	0.62	0.473	0.046
Fuel Comb - Electric Generation - Coal							
(deaths)  Premature deaths from air pollution -		43.2	27.0	00.0	10 /	10	2.00
Fuel Comb - Electric Generation - Natural		43.2	34.9	22.2	18.4	10	3.88
Gas (deaths)							
Premature deaths from air pollution -		448	416	315	183	84.6	35.2
Mobile - On-Road (deaths)		7-70	410	010	100	04.0	00.2
Premature deaths from air pollution - Gas		58.8	53.9	40.6	24	11.7	5.62
Stations (deaths)							
Premature deaths from air pollution -		88	75.9	54.3	31.3	14.7	5.03
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		10.9	8.96	6.13	3.49	1.36	0.353
Fuel Comb - Residential - Oil (deaths)		10./		700			4.07
Premature deaths from air pollution -		10.4	9.89	7.98	5.44	2.99	1.37
Fuel Comb - Residential - Other (deaths)  Premature deaths from air pollution -		6.26	5.96	5.64	5.3	4.96	4.61
Fuel Comb - Comm/Institutional - Coal		6.26	5.96	5.64	5.3	4.90	4.01
(deaths)							
Premature deaths from air pollution -		58	52.8	41.1	26.6	14.9	7.06
Fuel Comb - Comm/Institutional - Natural			02.0		20.0		
Gas (deaths)							
Premature deaths from air pollution -		5.74	4.63	3.44	2.37	1.57	1.01
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		3.9	3.27	2.66	2.07	1.51	0.993
Fuel Comb - Comm/Institutional - Other							
(deaths)		0.07	0.007	0.01/	0.000	0.00	0.070
Premature deaths from air pollution -		2.27	0.936	0.914	0.883	0.88	0.863
Industrial Processes - Coal Mining (deaths)							
Premature deaths from air pollution -		177	162	142	109	78.4	47.2
Industrial Processes - Oil & Gas			102	172	107	10.4	71.2
Production (deaths)							
Monetary damages from air pollution -		2,187	5.75	5.73	5.5	4.19	0.407
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		382	309	197	163	88.6	34.3
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)  Monetary damages from air pollution -		3,979	3,697	0.000	1,624	753	313
Mobile - On-Road (million \$2019)		3,919	3,091	2,802	1,024	193	313
Monetary damages from air pollution -		521	478	359	213	104	49.7
Gas Stations (million \$2019)		021	710	337	210	104	77.1
Monetary damages from air pollution -		779	673	481	277	131	44.6
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		96.7	79.4	54.3	31	12.1	3.13
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		92.5	87.6	70.7	48.2	26.5	12.2
Fuel Comb - Residential - Other (million							
\$2019) Monetary damages from air pollution -		55.4	52.8	49.9	46.9	43.9	40.8
Fuel Comb - Comm/Institutional - Coal		55.4	ე2.ზ	49.9	40.9	43.9	40.8
(million \$2019)							
Monetary damages from air pollution -		514	467	364	235	132	62.5
Fuel Comb - Comm/Institutional - Natural		3		30 .		.02	02.0
Gas (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		50.8	41	30.5	20.9	13.9	8.91
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		34.6	28.9	23.6	18.3	13.4	8.79
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		20	8.26	8.06	7.79	7.77	7.61
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		1,576	1,441	1,264	972	696	419
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 2: E+ scenario - IMPACTS - Jobs

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Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		991	1,049	946	522	643	1,916
By economic sector - Construction (jobs)		10,256	10,979	20,269	20,807	22,041	21,263
By economic sector - Manufacturing		9,317	9,766	11,331	10,168	8,510	9,575
(jobs)							
By economic sector - Mining (jobs)		11,133	8,438	6,292	4,037	2,522	1,363
By economic sector - Other (jobs)		454	584	2,641	2,977	3,850	3,490
By economic sector - Pipeline (jobs)		1,603	1,561	1,101	823	555	476
By economic sector - Professional (jobs)		5,635	5,503	9,514	9,962	11,408	13,287
By economic sector - Trade (jobs)		5,432	4,861	7,044	6,907	7,482	7,529
By economic sector - Utilities (jobs)		12,408	12,143	17,592	18,990	18,493	19,934
By resource sector - Biomass (jobs)		2,429	2,442	2,131	1,241	2,390	8,335
By resource sector - CO2 (jobs)		0	1,539	0	0	131	1,132
By resource sector - Coal (jobs)		1,710	216	18	13.3	10.4	8.76
By resource sector - Grid (jobs)		10,721	11,497	25,660	29,591	31,067	34,857
By resource sector - Natural Gas (jobs)		18,143	15,108	12,583	10,498	6,865	4,378
By resource sector - Nuclear (jobs)		662	651	641	631	621	612
By resource sector - Oil (jobs)		19,280	16,571	13,779	9,722	6,954	4,254
By resource sector - Solar (jobs)		1,617	2,544	15,658	16,241	20,540	16,484
By resource sector - Wind (jobs)		2,667	4,315	6,262	7,256	6,926	8,772
By education level - All sectors - High		23,702	23,003	32,558	31,770	31,873	33,469
school diploma or less (jobs)							•
By education level - All sectors -		17,178	16,646	23,961	23,885	24,057	24,778
Associates degree or some college (jobs)							
By education level - All sectors -		12,877	12,008	15,827	15,260	15,199	15,920
Bachelors degree (jobs)							
By education level - All sectors - Masters		3,063	2,846	3,848	3,750	3,814	4,055
or professional degree (jobs)							
By education level - All sectors - Doctoral		409	380	538	527	560	612
degree (jobs)							
Related work experience - All sectors -		8,184	7,894	11,120	10,928	11,005	11,534
None (jobs)							
Related work experience - All sectors - Up		10,976	10,648	15,293	14,905	15,088	16,066
to 1 year (jobs)							
Related work experience - All sectors - 1		20,969	19,996	27,690	27,130	27,227	28,312
to 4 years (jobs)							
Related work experience - All sectors - 4		13,418	12,836	17,864	17,585	17,598	18,180
to 10 years (jobs)							
Related work experience - All sectors -		3,682	3,509	4,765	4,644	4,587	4,743
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		3,105	2,939	4,130	4,016	4,078	4,251
(jobs)							
On-the-Job Training - All sectors - Up to 1	$\exists$	38,336	36,640	50,535	49,183	49,301	52,035
year (jobs)							

Table 2. F+	scenario	- IMPACTS -	Inhe	(continued)	)
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Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		11,757	11,357	16,176	16,065	16,101	16,459
On-the-Job Training - All sectors - 4 to 10 years (jobs)		3,490	3,419	5,150	5,214	5,316	5,375
On-the-Job Training - All sectors - Over 10 years (jobs)		542	528	740	716	708	715
On-Site or In-Plant Training - All sectors - None (jobs)		9,090	8,710	12,257	12,012	12,161	12,759
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		34,773	33,235	45,932	44,750	44,825	47,155
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		9,174	8,859	12,581	12,456	12,480	12,790
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		3,731	3,625	5,296	5,306	5,367	5,434
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		461	455	665	668	671	695
Wage income - All (million \$2019)		3,228	3,112	4,323	4,283	4,333	4,571

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		183	157	120	85.6	58.3	37
Oil consumption - Cumulative (million							3,717
bbls)							
Oil production - Annual (million bbls)		30.1	30.2	30.2	23.9	19.4	12.9
Natural gas consumption - Annual (tcf)		882	743	596	449	282	196
Natural gas consumption - Cumulative							17,958
(tcf)							
Natural gas production - Annual (tcf)		2,865	2,708	2,358	1,994	1,581	1,228

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	952	886	773	638	516	442	411
Final energy use - Residential (PJ)	555	515	478	416	348	297	264
Final energy use - Commercial (PJ)	372	366	351	325	295	272	261
Final energy use - Industry (PJ)	602	619	627	629	639	647	652

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		6.24	6.43	13.3	14.2	13.1	13.8
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)	54.1	946	1,837	4,958	8,078	10,572	13,065
Vehicle stocks - LDV – All others (1000 units)	10,894	10,374	9,853	7,180	4,507	2,550	593
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		2,095	5,367	8,700	13,178	14,344	13,675
Public EV charging plugs - DC Fast (1000 units)	0.326		3.65		16		25.9
Public EV charging plugs - L2 (1000 units)	1.06		87.7		386		624

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	5.51	13.7	41.4	84.2	91.7	92.1	91.9
Heat Pump (%)							
Sales of space heating units - Electric	15.4	21.4	16.1	7.17	5.54	5.47	5.69
Resistance (%)							
Sales of space heating units - Gas (%)	74	56.5	36.7	5.84	0.489	0.156	0.159
Sales of space heating units - Fossil (%)	5.05	8.47	5.81	2.79	2.31	2.27	2.21
Sales of water heating units - Electric	0	1.79	15.1	34.7	38	38.3	38.3
Heat Pump (%)							
Sales of water heating units - Electric	32.2	48.8	51.7	60	61.5	61.6	61.5
Resistance (%)							
Sales of water heating units - Gas Furnace	67.7	49.3	33	5.17	0.303	0	0
(%)							
Sales of water heating units - Other (%)	0.083	0.169	0.17	0.17	0.168	0.168	0.17
Sales of cooking units - Electric	61.8	69.9	94.9	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	38.2	30.1	5.14	0.259	0	0	0
Residential HVAC investment in 2020s vs.		9.7	12.8				
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	1.41	8.43	35.7	81.1	89	89.5	89.5
Heat Pump (%)							
Sales of space heating units - Electric	4.39	3.49	5.31	9.37	10.1	10.2	10.2
Resistance (%)							
Sales of space heating units - Gas (%)	88.8	85.5	58.5	9.54	0.892	0.356	0.356
Sales of space heating units - Fossil (%)	5.44	2.58	0.487	0.021	0	0	0
Sales of water heating units - Electric	0.454	2.53	19.6	46.2	50.8	51.1	51.1
Heat Pump (%)							
Sales of water heating units - Electric	4.26	4.67	18.3	43.9	48.4	48.7	48.7
Resistance (%)							
Sales of water heating units - Gas (%)	95	92.6	61.9	9.69	0.569	0	0
Sales of water heating units - Other (%)	0.252	0.187	0.187	0.189	0.188	0.188	0.189
Sales of cooking units - Electric	41	54.2	82.9	88.6	88.9	88.9	88.9
Resistance (%)							
Sales of cooking units - Gas (%)	59	45.8	17.1	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s -		36,680	40,065				
Cumulative 5-yr (million \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	7,904	1,455	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,672	14,788	15,171	18,473	14,988	12,493	9,851
Installed thermal - Nuclear (MW)	1,312	1,312	1,312	1,312	1,312	1,312	1,312
Installed renewables - Rooftop PV (MW)	152	228	303	401	518	653	807
Installed renewables - Solar - Base land use assumptions (MW)	552	552	1,071	12,379	21,718	34,525	39,741
Installed renewables - Wind - Base land use assumptions (MW)	638	827	4,636	15,584	33,653	35,902	38,809
Installed renewables - Solar - Constrained land use assumptions (MW)	539	539	2,105	11,799	23,367	36,327	43,696
Installed renewables - Wind - Constrained land use assumptions (MW)	827	827	9,867	19,628	19,628	19,628	19,628
Capital invested - Solar PV - Base (billion \$2018)		0	0.621	12.5	9.71	12.6	4.83
Capital invested - Wind - Base (billion \$2018)		0	5.07	13.6	21.4	2.52	3.08

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion \$2018)		1.55	0.276	10.4	9.72	11.5	5.9
Capital invested - Wind - Constrained (billion \$2018)		0	12.9	11.3	0	0	0.2
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	1,454	1,454	2,369	22,189	38,393	60,473	69,347
Wind - Base land use assumptions (GWh)	2,973	2,973	14,885	48,163	98,677	104,614	112,056
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Constrained land use assumptions	1,334	1,334	4,096	21,004	41,108	63,417	76,016
(GWh)							
Wind - Constrained land use assumptions	2,973	2,973	28,568	53,532	53,532	53,532	53,532
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	7	30
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment -		0	0	0	0	6,167	22,362
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	0	0	402	1,858

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	7.93	36.7
Annual - BECCS (MMT)		0	0	0	0	7.93	36.7
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	7.93	44.6
Cumulative - BECCS (MMT)		0	0	0	0	7.93	44.6
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	477	477	477	477	477
Spur (km)		0	0	0	0	301	1,550
All (km)		0	477	477	477	778	2,027
Cumulative investment - Trunk (million \$2018)		0	1,555	1,555	1,555	1,555	1,555
Cumulative investment - Spur (million \$2018)		0	0	0	0	350	1,462
Cumulative investment - All (million \$2018)		0	1,555	1,555	1,555	1,905	3,017

#### 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							-90.3
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-522
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,319
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-112
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,583
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-672
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-583
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-349
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-698
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,927
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-135
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,826
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-2,377
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-163
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-3,166
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-1,296
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-874
cropland (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest							-2,477
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-1,384
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-13,699
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-180
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-3,130
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-3,434
rotation length (1000 tC02e/y)							
Carbon sink potential - High - Improve							-219
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,749
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,920
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,166
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-4,605
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-21,474
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,070
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							14.7
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							398
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							671
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							96
Low - Increase trees outside forests							,0
(1000 hectares)							
Land impacted for carbon sink potential -							38.5
Low - Reforest cropland (1000 hectares)							00.0
Land impacted for carbon sink potential -							22.7
Low - Reforest pasture (1000 hectares)							22.1
Land impacted for carbon sink potential -							415
Low - Restore productivity (1000							413
hectares)							
Land impacted for carbon sink potential -							1,696
Low - Total impacted (over 30 years)							1,090
(1000 hectares)							00.1
Land impacted for carbon sink potential -							22.1
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							411
Mid - Avoid deforestation (over 30 years)							
(1000 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 -							1,211
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							60.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							139
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							57.8
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							164
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							836
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,902
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							29.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							424
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,751
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							80.7
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							182
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							77.1
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							131
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							686
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,362
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							-1,255
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,883
deployment - Cropland measures (1000							
tCO2e/y)							

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

Carbon sink potential - Moderate	2020	2025	2030	2035	2040	2045	2050
deployment - Permanent conservation   cover (1000 t002e/y)   Carbon sink potential - Moderate   deployment - Total (1000 t002e/y)   - 4,246   deployment - Total (1000 t002e/y)   - 5,465   deployment - Corne-thanol to energy grasses (1000 t002e/y)   - 5,465   deployment - Corne-thanol to energy grasses (1000 t002e/y)   - 5,465   deployment - Gropland measures (1000 t002e/y)   - 5,465   deployment - Gropland measures (1000 t002e/y)   - 6,933   deployment - Total (1000 total to energy grasses (1000 total to energy grasses (1000 tectares)   - 6,933   deployment - Corne-chanol to energy grasses (1000 tectares)   - 1,86   deployment - Corne-chanol to energy grasses (1000 tectares)   - 1,86   deployment - Corpland measures (1000 tectares)   - 1,86   deployment - Total (1000 tectares)   - 1,86   deployment - Corpland measures (1000 tectares)   - 1,86   deployment - Permanent conservation cover (1000 hectares)   - 1,86   deployment - Permanent conservation cover (1000 hectares)   - 1,86   deployment - Permanent conservation cover (1000 hectares)   - 1,86   deployment - Permanent conservation cover (1000 hectares)   - 1,86   deployment - Permanent conservation cover (1000 hectares)   - 1,86   deployment - 1,86   - 1,8							-107
Cover (1000 CC02e/y)							
Carbon sink potential - Moderate							
deployment - Total (1000 tC02e/y)   Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tC02e/y)   Carbon sink potential - Aggressive deployment - Corpland measures (1000 tC02e/y)   Carbon sink potential - Aggressive deployment - Corpland measures (1000 tC02e/y)   Carbon sink potential - Aggressive deployment - Total (1000 tC02e/y)   Carbon sink potential - Aggressive deployment - Total (1000 tC02e/y)   Carbon sink potential - Aggressive deployment - Total (1000 tC02e/y)   Carbon sink potential - Aggressive deployment - Total (1000 tC02e/y)   Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)   Carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)   Carbon sink - Moderate deployment - Corpland measures (1000 hectares)   Carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)   Carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)   Carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)   Carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)   Carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)   Carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)   Carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)   Carbon sink - Aggressive deployment - Carbon sink -							-4,245
1,25t							.,,
deployment - Corn-ethanol to energy   grasses (1000 to 102e/v)							-1.255
grasses (1000 (C02e/v) Carbon sink potential - Aggressive deployment - Cropland measures (1000 (C02e/v)) Carbon sink potential - Aggressive deployment - Pernament conservation cover (1000 (C02e/v)) Carbon sink potential - Aggressive deployment - Pernament conservation cover (1000 (C02e/v)) Carbon sink potential - Aggressive deployment - Total (1000 (C02e/v)) Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares) Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares) Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares) Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares) Land impacted for carbon sink - Moderate deployment - Pernament conservation cover (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) Land i							.,_00
Carbon sink potential - Aggressive deployment - Coropland measures (1000 total cover (1000 total cov							
deployment - Cropland measures (1000 t002e/r)   Carbon sink potential - Aggressive deployment - Potal (1000 t002e/r)   Carbon sink potential - Aggressive deployment - Total (1000 t002e/r)   Carbon sink potential - Aggressive deployment - Total (1000 t002e/r)   Carbon sink potential - Aggressive deployment - Total (1000 t002e/r)   Carbon sink - Moderate deployment - Cropland measures (1000 hectares)   Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)   Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)   195 deployment - Permanent conservation cover (1000 hectares)   2,576 deployment - Total (1000 hectares)   Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)   2,576 deployment - Total (1000 hectares)   2,576 deployment - Total (1000 hectares)   2,576 deployment - Cropland measures (1000 hectares)   3,524 deployment - Cropland measures (1000 hectares)   2,576 deployment - Cropland measures (1000 hectares)   3,524 deployment - Cropland measures (1000 hectares)   2,576 deployment - Cropland measures (1000 hectares)   3,524 deployment - Demand (1000 hectares)   3,524 deployment - Demand (1000 hectares)   3,524 deployment - Cropland (1000 hectares)   3,524 deployment - Cropland (1000 hectares)   3,524 deployment - Total (1000 hectares)   3,524 deployment - Demand (1000 hectares)   3,524 deployment - Total (100							-5 463
Carbon sink potential - Aggressive   -216							0, 100
Carbon sink potential - Aggressive   deployment - Permanent conservation   cover (1000 tCO2e/v)   -6,932   deployment - Total (1000 tCO2e/v)   -6,932   deployment - Corn-ethanol to energy grasses (1000 hectares)   -6,932   deployment - Corpland measures (1000 hectares)   -6,932   deployment - Corpland measures (1000 hectares)   -6,932   deployment - Permanent conservation   -6,932   deployment - Permanent   -7,932   deplo							
deployment - Permanent conservation   cover (1000 tcO2e/y)   Carbon sink potential - Aggressive   deployment - Total (1000 tcO2e/y)   Carbon sink potential - Aggressive   deployment - Total (1000 tcO2e/y)   Carbon sink potential - Aggressive   deployment - Corn-ethanol to energy grasses (1000 hectares)   Carbon sink - Moderate deployment - Cropland measures (1000 hectares)   Carbon sink - Moderate deployment - Cropland measures (1000 hectares)   Carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)   Carbon sink - Moderate deployment - Total (1000 hectares)   Carbon sink - Moderate deployment - Total (1000 hectares)   Carbon sink - Moderate deployment - Total (1000 hectares)   Carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)   Carbon sink - Aggressive deployment - Cropland measures (1000 hectares)   Carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)   Carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)   Carbon sink - Aggressive deployment - Total (1000 hectares)   Carbon sink - Carbon sink - Carbon sink - Aggressive deployment - Total (1000 hectares)   Carbon sink - Carbon s							-914
Cover (1000 tCO2e/v)							217
Carbon sink potential - Aggressive   -6,93′ deployment - Total (1000 tc0ze/y)   -6,93′ deployment - Total (1000 tc0ze/s)   -6,93′ deployment - Corn-ethanol to energy grasses (1000 hectares)   -6,93′ deployment - Cropland measures (1000 hectares)   -6,93′ deployment - Cropland measures (1000 hectares)   -6,93′ deployment - Cropland measures (1000 hectares)   -6,93′ deployment - Permanent conservation cover (1000 hectares)   -6,93′ deployment - Permanent conservation cover (1000 hectares)   -6,93′ deployment - Permanent conservation cover (1000 hectares)   -6,93′ deployment - Total (1000 hectares)   -6,93′ deployment - Total (1000 hectares)   -6,93′ deployment - Total (1000 hectares)   -6,93′ deployment - Cropland deployment - Total (1000 hectares)   -6,93′ deployment - Total (1000 hectares)   -6,93′ deployment - Cropland deployment - Total (1000 hectares)   -6,93′ deployment - Cropland deployment - Total (1000 hectares)   -6,93′ deployment - Cropland deployment - Cropland deployment - Cropland deployment - Cropland de							
deployment - Total (1000 iC02e/y)							4 022
Land impacted for carbon sink - Moderate deployment - Corne-thanol to energy grasses (1000 hectares)   1,86 deployment - Corne-thanol to energy grasses (1000 hectares)   1,86 deployment - Corpland measures (1000 hectares)   1,86 deployment - Total (1000 hectares)   1,86 deployment - Total (1000 hectares)   1,86 deployment - Total (1000 hectares)   1,86 deployment - Corn-ethanol to energy grasses (1000 hectares)   1,86 deployment - Corn-ethanol to energy grasses (1000 hectares)   1,86 deployment - Corn-ethanol to energy grasses (1000 hectares)   1,86 deployment - Corn-ethanol to energy grasses (1000 hectares)   1,86 deployment - Corn-ethanol to energy grasses (1000 hectares)   1,86 deployment - Corn-ethanol to energy grasses (1000 hectares)   1,86 deployment - Total (1000 hectares							-0,732
deployment - Corn-ethanol to energy grasses (1000 hectares)   1,86							EOO
Grasses (1000 hectares)   1,86   1,							523
1,86							
deployment - Cropland measures (1000							1.0/1
hectares							1,861
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)   Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)   Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon							
deployment - Permanent conservation							
Cover (1000 hectares)   Candimpacted for carbon sink - Moderate deployment - Total (1000 hectares)   Candimpacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Corn-ethanol to energy grasses (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Cropland measures (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Permanent conservation cover (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Total (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Coal (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Coal (1000 hectares)   Candimpacted for carbon sink - Maggressive deployment - Candimpacted for carbon sink - Maggressive depl							195
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							
deployment - Total (1000 hectares)							
Land impacted for carbon sink -   Aggressive deployment - Corn-ethanol to energy grasses [1000 hectares]   Say							2,578
Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)  Land impacted for carbon sink -  Aggressive deployment - Cropland measures (1000 hectares)  Land impacted for carbon sink -  Aggressive deployment - Permanent conservation cover (1000 hectares)  Land impacted for carbon sink -  Aggressive deployment - Permanent conservation cover (1000 hectares)  Land impacted for carbon sink -  Aggressive deployment - Total (1000 hectares)  Land impacted for carbon sink -  Aggressive deployment - Total (1000 hectares)  Table 17: E- scenario - IMPACTS - Health  Item 2020 2025 2030 2035 2040 2045 2050 2050 premature deaths from air pollution -  Fuel Comb - Electric Generation - Coal (deaths)  Premature deaths from air pollution -  Fuel Comb - Electric Generation - Natural Gas (deaths)  Premature deaths from air pollution -  Mobile - On-Road (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution -  Fuel Comb - Residential - Natural Gas (deaths)							
Energy grasses (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Land (1000 hectares)   Land impacted for carbon sink - Land (1000 hectares)   Land impacted for carbon sink - Land (1000 hectares)   Land impacted for carbon sink - Land (1000 hectares)   Land impacted for carbon sink - Land (1000 hectares)   Land impacted for carbon sink - Land (1000 hectares)   Land impacted for carbon sink - Land (1000 hectares)   Land impacted for carbon sink - Land (1000 hectares)   Land (1000 hectares)   Land (1000 hectares)   Land (1000 hectares)   Land							523
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   Aggressive deployment - Total (1000 hectares)   Table 17: E- scenario - IMPACTS - Health   Item							
Aggressive deployment - Cropland measures (1000 hectares)  Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)  Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)  Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)  Table 17: E- scenario - IMPACTS - Health  Item 2020 2025 2030 2035 2040 2045 2056 Premature deaths from air pollution - Coal (deaths)  Premature deaths from air pollution - Sull (1000 hectares)  Premature deaths from air pollut							
Measures (1000 hectares)   Land impacted for carbon sink -   390							3,526
Land impacted for carbon sink -   Aggressive deployment - Permanent   Conservation cover (1000 hectares)   Land impacted for carbon sink -   Aggressive deployment - Total (1000 hectares)   Land impacted for carbon sink -   Aggressive deployment - Total (1000 hectares)   Aggressive deployment - Total (1000 hectares)   Table 17: E- scenario - IMPACTS - Health							
Aggressive deployment - Permanent conservation cover (1000 hectares)  Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)  Table 17: E- scenario - IMPACTS - Health  Item 2020 2025 2030 2035 2040 2045 2050 Premature deaths from air pollution - 247 0.648 0.646 0.62 0.473 0.046 (deaths)  Premature deaths from air pollution - 39.5 25.5 9.81 4.31 1.44 0.866 Premature deaths from air pollution - 39.5 25.5 9.81 4.31 1.44 0.866 (deaths)  Premature deaths from air pollution - 455 459 446 402 320 220 Mobile - On-Road (deaths)  Premature deaths from air pollution - 638 5tations (deaths)  Premature deaths from air pollution - 88.3 80.5 71.9 61.1 47 31.3 (deaths)  Premature deaths from air pollution - 88.3 80.5 71.9 61.1 47 31.3 (deaths)  Premature deaths from air pollution - 11.1 10.7 10.3 8.94 6.52 4.00 Premature deaths from air pollution - 11.1 10.7 10.3 8.94 6.52 4.00 Premature deaths from air pollution - 11.1 10.7 10.3 8.94 6.52 4.00 Premature deaths from air pollution - 11.1 10.7 10.7 9.99 8.12 5.83							
Conservation cover (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   4,439							390
Conservation cover (1000 hectares)   Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)   4,439							
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							
Table 17: E- scenario - IMPACTS - Health   Item   2020   2025   2030   2035   2040   2045   2050     Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)   Premature deaths from air pollution - Gas Stations (deaths)   Premature deaths from air pollution - Gas Stations (deaths)   Premature deaths from air pollution - Gas Stations (deaths)   Premature deaths from air pollution - Gas Stations (deaths)   Premature deaths from air pollution - Gas Stations (deaths)   Premature deaths from air pollution - Gas Stations (deaths)   Premature deaths from air pollution - Gas Stations (deaths)   Premature deaths from air pollution - Gas (deaths)   Draw Gas (deaths)   Premature deaths from air pollution - Gas (deaths)   Draw Gas (							4,439
Table 17: E- scenario - IMPACTS - Health  Item 2020 2025 2030 2035 2040 2045 2050  Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)  Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)  Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)  Premature deaths from air pollution - Fuel Comb - Read (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)							, -
Table 17: E- scenario - IMPACTS - Health  Item							
Titem   2020   2025   2030   2035   2040   2045   2050							
Titem   2020   2025   2030   2035   2040   2045   2050							
Titem   2020   2025   2030   2035   2040   2045   2050							
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)         247         0.648         0.646         0.62         0.473         0.046           Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)         39.5         25.5         9.81         4.31         1.44         0.866           Premature deaths from air pollution - Mobile - On-Road (deaths)         455         459         446         402         320         220           Premature deaths from air pollution - Gas Stations (deaths)         60.1         60.6         58.5         52.5         41.8         28.5           Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)         88.3         80.5         71.9         61.1         47         31.3           Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)         11.1         10.7         10.3         8.94         6.52         4.0           Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)         10.5         10.7         10.7         9.99         8.12         5.83	2020	2025	2030	2035	20/.0	20/.5	2050
Fuel Comb - Electric Generation - Coal (deaths)	2020	I					
Combound		241	0.046	0.046	0.62	0.473	0.046
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)         39.5         25.5         9.81         4.31         1.44         0.866           Premature deaths from air pollution - Mobile - On-Road (deaths)         455         459         446         402         320         220           Premature deaths from air pollution - Gas Stations (deaths)         60.1         60.6         58.5         52.5         41.8         28.9           Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)         88.3         80.5         71.9         61.1         47         31.3           Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)         11.1         10.7         10.3         8.94         6.52         4.0           Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)         10.5         10.7         10.7         9.99         8.12         5.83							
Fuel Comb - Electric Generation - Natural Gas (deaths)         455         459         446         402         320         220           Premature deaths from air pollution - Gas Stations (deaths)         60.1         60.6         58.5         52.5         41.8         28.5           Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)         88.3         80.5         71.9         61.1         47         31.3           Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)         11.1         10.7         10.3         8.94         6.52         4.0           Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)         10.5         10.7         10.7         9.99         8.12         5.83		20.5	05.5	0.01	. 01	4.1.	0.0//
Gas (deaths)   Premature deaths from air pollution -		39.5	25.5	9.81	4.31	1.44	0.866
Premature deaths from air pollution - Mobile - On-Road (deaths)         455         459         446         402         320         220           Premature deaths from air pollution - Gas Stations (deaths)         60.1         60.6         58.5         52.5         41.8         28.9           Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)         88.3         80.5         71.9         61.1         47         31.3           Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)         11.1         10.7         10.3         8.94         6.52         4.0           Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)         10.5         10.7         10.7         9.99         8.12         5.83							
Mobile - On-Road (deaths)         60.1         60.6         58.5         52.5         41.8         28.9           Stations (deaths)         88.3         80.5         71.9         61.1         47         31.3           Fuel Comb - Residential - Natural Gas (deaths)         (deaths)         11.1         10.7         10.3         8.94         6.52         4.0           Fuel Comb - Residential - Oil (deaths)         10.5         10.7         10.7         9.99         8.12         5.83							
Premature deaths from air pollution - Gas Stations (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution -  10.5 10.7 10.7 9.99 8.12 5.83		455	459	446	402	320	220
Stations (deaths)         88.3         80.5         71.9         61.1         47         31.3           Fuel Comb - Residential - Natural Gas (deaths)         (deaths)         11.1         10.7         10.3         8.94         6.52         4.0           Fuel Comb - Residential - Oil (deaths)         10.5         10.7         10.7         9.99         8.12         5.83							
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution -  10.5  10.7  10.7  10.7  9.99  8.12  5.83		60.1	60.6	58.5	52.5	41.8	28.9
Fuel Comb - Residential - Natural Gas (deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution -  11.1 10.7 10.3 8.94 6.52 4.00  Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution -  10.5 10.7 10.7 9.99 8.12 5.83							
(deaths)11.110.710.38.946.524.00Fuel Comb - Residential - Oil (deaths)10.510.710.79.998.125.83		88.3	80.5	71.9	61.1	47	31.3
(deaths)11.110.710.38.946.524.00Fuel Comb - Residential - Oil (deaths)10.510.710.79.998.125.83							
Premature deaths from air pollution - 11.1 10.7 10.3 8.94 6.52 4.0 Fuel Comb - Residential - Oil (deaths)  Premature deaths from air pollution - 10.5 10.7 10.7 9.99 8.12 5.83							
Fuel Comb - Residential - Oil (deaths)10.510.710.79.998.125.83		11.1	10.7	10.3	8.94	6.52	4.01
Premature deaths from air pollution -         10.5         10.7         10.7         9.99         8.12         5.83		[					
		10.5	10.7	10.7	9,99	8.12	5.83
Fuel Comb - Residential - Other (deaths)					,,,,	0.12	5.55
		2020	2020 2025 2020 2025 247  39.5  455  60.1  88.3	2020 2025 2030 247 0.648 39.5 25.5 455 459 60.1 60.6 88.3 80.5	2020         2025         2030         2035           2020         2025         2030         2035           2020         2025         2030         2035           247         0.648         0.646           39.5         25.5         9.81           455         459         446           60.1         60.6         58.5           88.3         80.5         71.9           11.1         10.7         10.3	2020         2025         2030         2035         2040           2020         2025         2030         2035         2040           2020         2025         2030         2035         2040           247         0.648         0.646         0.62           39.5         25.5         9.81         4.31           455         459         446         402           60.1         60.6         58.5         52.5           88.3         80.5         71.9         61.1           11.1         10.7         10.3         8.94	2020         2025         2030         2035         2040         2045           2020         2025         2030         2035         2040         2045           2020         2025         2030         2035         2040         2045           247         0.648         0.646         0.62         0.473           39.5         25.5         9.81         4.31         1.44           455         459         446         402         320           60.1         60.6         58.5         52.5         41.8           88.3         80.5         71.9         61.1         47           11.1         10.7         10.3         8.94         6.52

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

Table II. L Scenario In Aoro Ticaltii (	Continucuj						
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal		6.26	5.96	5.64	5.3	4.96	4.61
(deaths)		50.0	F ( 7	E / /	/01	(0)	001
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		58.2	56.7	54.4	49.1	40.6	30.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		5.76	5.12	4.52	3.82	3.11	2.45
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		3.9	3.51	3.12	2.74	2.37	2.02
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.18	0.939	0.925	0.903	0.882	0.824
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		177	155	128	107	91.1	64.2
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		2,187	5.75	5.73	5.5	4.19	0.407
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		350	226	86.9	38.1	12.7	7.67
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		4,048	4,080	3,966	3,572	2,847	1,959
Monetary damages from air pollution - Gas Stations (million \$2019)		532	537	518	465	370	256
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		782	713	637	541	417	278
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		98.3	95.2	91.1	79.2	57.8	35.5
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		93.1	94.5	94.7	88.6	72	51.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		55.4	52.8	49.9	46.9	43.9	40.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		515	502	482	435	359	267
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		51	45.3	40	33.8	27.5	21.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		34.6	31	27.6	24.2	21	17.9
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		19.2	8.28	8.17	7.97	7.78	7.27
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		1,571	1,374	1,133	947	809	570

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		1,003	1,023	936	510	859	1,915
By economic sector - Construction (jobs)		9,975	10,820	16,311	17,322	23,035	22,075

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

Table 18: E- Scendino - IMPAG 13 - Jobs (Con	шиеиј						
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing		9,386	9,819	10,200	9,964	10,882	11,910
(jobs)							
By economic sector - Mining (jobs)		11,148	8,410	6,386	4,816	3,578	2,069
By economic sector - Other (jobs)		434	560	2,132	2,518	4,076	3,530
By economic sector - Pipeline (jobs)		1,605	1,639	1,038	845	713	733
By economic sector - Professional (jobs)		5,512	5,273	7,968	8,741	12,645	13,918
By economic sector - Trade (jobs)		5,385	4,827	6,320	6,475	8,431	8,105
By economic sector - Utilities (jobs)		11,826	11,457	12,595	13,908	17,588	19,727
By resource sector - Biomass (jobs)		2,447	2,363	2,118	1,230	3,658	8,057
By resource sector - CO2 (jobs)		0	2,638	0	0	225	1,942
By resource sector - Coal (jobs)		1,695	217	19.6	15.8	10.6	4.86
By resource sector - Grid (jobs)		9,658	9,893	17,093	20,412	29,448	33,543
By resource sector - Natural Gas (jobs)		17,970	13,848	10,237	8,717	6,444	4,688
By resource sector - Nuclear (jobs)		662	651	641	631	621	612
By resource sector - Oil (jobs)		19,377	17,062	15,072	12,950	10,831	6,847
By resource sector - Solar (jobs)		1,680	2,653	12,895	14,084	22,232	16,602
By resource sector - Wind (jobs)		2,784	4,503	5,811	7,059	8,335	11,686
By education level - All sectors - High		23,307	22,596	27,086	27,407	34,503	35,585
school diploma or less (jobs)							
By education level - All sectors -		16,847	16,289	19,627	20,325	25,715	26,289
Associates degree or some college (jobs)							
By education level - All sectors -		12,699	11,791	13,456	13,579	16,777	17,135
Bachelors degree (jobs)							
By education level - All sectors - Masters		3,016	2,781	3,252	3,312	4,184	4,321
or professional degree (jobs)							
By education level - All sectors - Doctoral		404	371	464	477	627	652
degree (jobs)							
Related work experience - All sectors -		8,039	7,738	9,210	9,389	11,861	12,234
None (jobs)							
Related work experience - All sectors - Up		10,803	10,460	12,776	12,902	16,416	17,067
to 1 year (jobs)							
Related work experience - All sectors - 1		20,621	19,606	23,097	23,572	29,540	30,205
to 4 years (jobs)							
Related work experience - All sectors - 4		13,185	12,581	14,820	15,188	18,996	19,380
to 10 years (jobs)							
Related work experience - All sectors -		3,624	3,443	3,981	4,048	4,993	5,095
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		3,060	2,891	3,485	3,525	4,462	4,532
(jobs)							
On-the-Job Training - All sectors - Up to 1		37,743	35,962	42,368	42,914	53,822	55,599
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		11,530	11,118	13,264	13,687	17,183	17,458
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		3,405	3,335	4,143	4,342	5,562	5,617
years (jobs)							
On-the-Job Training - All sectors - Over 10		535	522	624	631	777	775
years (jobs)							
On-Site or In-Plant Training - All sectors -		8,949	8,549	10,241	10,444	13,230	13,610
None (jobs)							
On-Site or In-Plant Training - All sectors -		34,224	32,615	38,451	38,973	48,842	50,345
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		9,002	8,677	10,352	10,652	13,364	13,584
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		3,648	3,542	4,304	4,470	5,661	5,710
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		451	444	538	560	710	732
Over 10 years (jobs)							
Wage income - All (million \$2019)		3,173	3,048	3,600	3,712	4,688	4,866

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	954	894	812	747	696	637	566
Final energy use - Residential (PJ)	555	516	488	461	427	383	335
Final energy use - Commercial (PJ)	372	367	358	350	337	320	302
Final energy use - Industry (PJ)	602	620	630	637	652	659	663

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		5.04	5.08	6.88	7.14	11.1	11.9
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)	41.9	304	566	1,780	2,994	5,681	8,368
Vehicle stocks - LDV – All others (1000 units)	10,939	10,939	10,939	10,376	9,813	7,562	5,311
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	338	712	2,404	7,567	11,023
Public EV charging plugs - DC Fast (1000 units)	0.326		1.12		5.95		16.6
Public EV charging plugs - L2 (1000 units)	1.06		27		143		400

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	5.51	11.2	14.4	24.6	46.6	71.6	85.5
Heat Pump (%)							
Sales of space heating units - Electric	15.4	21.8	21.1	19.1	14.6	9.52	6.85
Resistance (%)							
Sales of space heating units - Gas (%)	74	58.2	56	48.7	33.1	15.1	4.95
Sales of space heating units - Fossil (%)	5.05	8.79	8.51	7.56	5.72	3.8	2.74
Sales of water heating units - Electric	0	0.549	2.08	6.92	17.2	28.8	35.3
Heat Pump (%)							
Sales of water heating units - Electric	32.2	48.8	49	50.1	53.4	57.7	60.3
Resistance (%)							
Sales of water heating units - Gas Furnace	67.7	50.5	48.8	42.8	29.2	13.3	4.31
(%)							
Sales of water heating units - Other (%)	0.083	0.169	0.17	0.171	0.17	0.17	0.17
Sales of cooking units - Electric	61.7	62.7	66.2	75.4	88.3	96.2	99
Resistance (%)							
Sales of cooking units - Gas (%)	38.3	37.3	33.8	24.6	11.7	3.78	1.02
Residential HVAC investment in 2020s vs.		9.67	12.6				
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	1.41	6.26	9.41	19.5	41.8	67.8	82.5
Heat Pump (%)							
Sales of space heating units - Electric	4.39	3.42	3.62	4.32	6.06	8.25	9.52
Resistance (%)							
Sales of space heating units - Gas (%)	88.8	87.3	84.2	74.1	51.1	23.6	7.9
Sales of space heating units - Fossil (%)	5.44	2.99	2.75	2.06	1.03	0.337	0.088
Sales of water heating units - Electric	0.454	1.05	3.02	9.27	22.8	38.3	47
Heat Pump (%)							
Sales of water heating units - Electric	4.26	3.81	5.35	10.5	22.3	36.6	44.8
Resistance (%)							
Sales of water heating units - Gas (%)	95	94.9	91.4	80	54.7	25	8.07
Sales of water heating units - Other (%)	0.252	0.187	0.187	0.189	0.188	0.188	0.189

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric	41	45.8	49.8	60.5	75.4	84.5	87.7
Resistance (%)							
Sales of cooking units - Gas (%)	59	54.2	50.2	39.5	24.6	15.5	12.3
Commercial HVAC investment in 2020s -		36,676	40,057				
Cumulative 5-yr (million \$2018)							

## Table 24: E- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	7,904	1,455	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,672	14,585	13,536	12,232	8,044	5,478	4,146
Installed thermal - Nuclear (MW)	1,312	1,312	1,312	1,312	1,312	1,312	1,312

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-90.3
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-522
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,319
Carbon sink potential - Low - Improve plantations (1000 tC02e/y)							-112
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-1,583
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)							-672
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-583
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-349
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-698
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-5,927
Carbon sink potential - Mid - Accelerate regeneration (1000 tC02e/y)							-135
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,826
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,377
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-163
Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)							-3,166
Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y)							-1,296
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-874
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,477
Carbon sink potential - Mid - Restore							-1,384
productivity (1000 tC02e/y)  Carbon sink potential - Mid - All (not							-13,699
counting overlap) (1000 tC02e/y)  Carbon sink potential - High - Accelerate							-180
regeneration (1000 tCO2e/y)  Carbon sink potential - High - Avoid							-3,130
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							-3,434
rotation length (1000 tC02e/y)							010
Carbon sink potential - High - Improve							-219
plantations (1000 tC02e/y)							. 7/0
Carbon sink potential - High - Increase							-4,749
retention of HWP (1000 tC02e/y)							1000
Carbon sink potential - High - Increase							-1,920
trees outside forests (1000 tC02e/y)							11//
Carbon sink potential - High - Reforest							-1,166
cropland (1000 tC02e/y)							/ / 05
Carbon sink potential - High - Reforest							-4,605
pasture (1000 tC02e/y)							01 /7/
Carbon sink potential - High - All (not							-21,474
counting overlap) (1000 tC02e/y)							0.070
Carbon sink potential - High - Restore							-2,070
productivity (1000 tC02e/y)							1/ 7
Land impacted for carbon sink potential -							14.7
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							398
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							671
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							96
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							38.5
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							22.7
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							415
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,696
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							22.1
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							411
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,211
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							60.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -			1				0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							139
Mid - Increase trees outside forests (1000							
hectares)							

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

Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)	57.8
Mid - Reforest cronland (1000 hectares)	
The Motor oct of opining (1000 houter ob)	
Land impacted for carbon sink potential -	164
Mid - Reforest pasture (1000 hectares)	
Land impacted for carbon sink potential -	836
Mid - Restore productivity (1000	
hectares)	
Land impacted for carbon sink potential -	2,902
Mid - Total impacted (over 30 years) (1000	
hectares)	
Land impacted for carbon sink potential -	29.5
High - Accelerate regeneration (1000	
hectares)	
Land impacted for carbon sink potential -	424
High - Avoid deforestation (over 30 years)	
(1000 hectares)	
Land impacted for carbon sink potential -	1,751
High - Extend rotation length (1000	
hectares)	
Land impacted for carbon sink potential -	80.7
High - Improve plantations (1000	
hectares)	
Land impacted for carbon sink potential -	0
High - Increase retention of HWP (1000	
hectares)	
Land impacted for carbon sink potential -	182
High - Increase trees outside forests	
(1000 hectares)	
Land impacted for carbon sink potential -	77.1
High - Reforest cropland (1000 hectares)	
Land impacted for carbon sink potential -	131
High - Reforest pasture (1000 hectares)	
Land impacted for carbon sink potential -	686
High - Restore productivity (1000	
hectares)	
Land impacted for carbon sink potential -	3,362
High - Total impacted (over 30 years)	
(1000 hectares)	

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-1,255
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,883
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-107
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-4,245
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,255
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,463
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							-214
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,932
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							523
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,861
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							195
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							2,578
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							523
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							3,526
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							390
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							4,439
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 - Fuel Comb - Electric Generation - Coal (deaths)		247	0.648	0.646	0.62	0.473	0.046
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		35.7	26	15.4	10.2	3.41	0.815
Premature deaths from air pollution - Mobile - On-Road (deaths)		448	416	315	183	84.6	35.2
Premature deaths from air pollution - Gas Stations (deaths)		58.8	53.9	40.6	24	11.7	5.62
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		88	75.9	54.3	31.3	14.7	5.03
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		10.9	8.96	6.13	3.49	1.36	0.353
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		10.4	9.89	7.98	5.44	2.99	1.37
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		6.26	5.96	5.64	5.3	4.96	4.61
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		58	52.8	41.1	26.6	14.9	7.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		5.74	4.63	3.44	2.37	1.57	1.01
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		3.9	3.27	2.66	2.07	1.51	0.993

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.48	0.936	0.912	0.881	0.878	0.777
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		174	159	131	92.8	53.8	6.54
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		2,187	5.75	5.73	5.5	4.19	0.407
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		316	231	136	90.6	30.2	7.22
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		3,979	3,697	2,802	1,624	753	313
Monetary damages from air pollution - Gas Stations (million \$2019)		521	478	359	213	104	49.7
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		779	673	481	277	131	44.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		96.7	79.4	54.3	31	12.1	3.13
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		92.5	87.6	70.7	48.2	26.5	12.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		55.4	52.8	49.9	46.9	43.9	40.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		514	467	364	235	132	62.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		50.8	41	30.5	20.9	13.9	8.91
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		34.6	28.9	23.6	18.3	13.4	8.79
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		21.9	8.26	8.05	7.78	7.75	6.85
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		1,543	1,414	1,167	824	478	58

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

Table 20. LTNLT Scellal to - INTACTS - 300	13						
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		991	1,052	946	516	560	1,922
By economic sector - Construction (jobs)		10,912	11,887	28,513	27,464	25,255	28,307
By economic sector - Manufacturing		9,584	10,666	13,541	13,061	13,632	14,754
(jobs)							
By economic sector - Mining (jobs)		11,045	8,323	5,929	3,508	1,830	291
By economic sector - Other (jobs)		638	919	4,610	4,620	4,501	5,295
By economic sector - Pipeline (jobs)		1,559	1,323	955	630	339	95.8
By economic sector - Professional (jobs)		5,840	6,153	13,013	13,128	13,307	17,683
By economic sector - Trade (jobs)		5,584	5,247	9,333	8,905	8,472	10,108
By economic sector - Utilities (jobs)		11,946	11,665	19,949	21,900	20,894	24,307
By resource sector - Biomass (jobs)		2,407	2,458	2,123	1,229	2,120	8,609
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		1,750	216	17.8	13	10.2	0.028
By resource sector - Grid (jobs)		10,402	12,678	31,871	37,172	38,104	46,456

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Natural Gas (jobs)		17,259	14,208	10,411	8,083	4,546	2,653
By resource sector - Nuclear (jobs)		662	651	641	631	366	. 0
By resource sector - Oil (jobs)		19,282	16,488	13,369	8,776	5,198	815
By resource sector - Solar (jobs)		3,358	5,454	29,858	27,425	25,806	26,641
By resource sector - Wind (jobs)		2,977	5,081	8,496	10,403	12,639	17,588
By education level - All sectors - High		24,143	24,039	41,302	39,765	37,548	43,546
school diploma or less (jobs)		2 1,1 10	2 1,007	11,002	07,100	01,010	10,0 10
By education level - All sectors -		17,436	17,336	30,446	29,920	28,458	32,710
Associates degree or some college (jobs)		,	,000	33, 1.3	27/720	20, .00	0_,0
By education level - All sectors -		13,007	12,486	19,552	18,749	17,735	20,501
Bachelors degree (jobs)		10,001	12, 100	17,002	10,117	11,100	20,001
By education level - All sectors - Masters		3,094	2,970	4,792	4,630	4,407	5,216
or professional degree (jobs)		0,0 7 .	2,7.0	1,1.72	1,000	1,101	0,2.0
By education level - All sectors - Doctoral		418	405	696	666	641	790
degree (jobs)		""	.00	0,0	000	0	170
Related work experience - All sectors -		8,301	8,206	14,034	13,618	12,888	14,992
None (jobs)		0,001	0,200	1 1,00 1	10,010	12,000	,,,,_
Related work experience - All sectors - Up		11,223	11,236	19,632	18,879	17,939	21,149
to 1 year (jobs)		11,220	11,200	17,002	10,017	11,707	21,147
Related work experience - All sectors - 1		21,254	20,809	34,749	33,665	31,876	36,732
to 4 years (jobs)		2.,20.	20,007	0 1,1 17	00,000	01,010	00,102
Related work experience - All sectors - 4		13,592	13,331	22,438	21,821	20,639	23,686
to 10 years (jobs)		10,072	10,001	22,400	21,021	20,007	20,000
Related work experience - All sectors -		3,727	3,653	5,934	5,748	5,447	6,203
Over 10 years (jobs)		0,.2.	0,000	0,701	0,1.10	5,	0,200
On-the-Job Training - All sectors - None		3,166	3,094	5,290	5,065	4,783	5,570
(jobs)		0,.00	0,071	0,270	0,000	1,100	0,010
On-the-Job Training - All sectors - Up to 1		38,912	38,281	63,482	61,248	58,172	67,731
year (jobs)			00,=01	55, .5=			0.7.0.
On-the-Job Training - All sectors - 1 to 4		11,919	11,777	20,444	19,995	18,881	21,524
years (jobs)		,,,,,	,	_0,	,,,,	.5,55.	,
On-the-Job Training - All sectors - 4 to 10		3,543	3,527	6,616	6,514	6,100	6,982
years (jobs)			-,-=	2,212	-7	,,,,,,	-7
On-the-Job Training - All sectors - Over 10		556	556	954	908	853	956
years (jobs)							
On-Site or In-Plant Training - All sectors -		9,254	9,135	15,616	15,104	14,380	16,775
None (jobs)		, -	,	-,	-, -	,	
On-Site or In-Plant Training - All sectors -		35,291	34,698	57,701	55,703	52,831	61,360
Up to 1 year (jobs)			2 1,21 2	2.7.2.		52,551	0.,000
On-Site or In-Plant Training - All sectors -		9,306	9,200	15,897	15,510	14,646	16,711
1 to 4 years (jobs)			7,200	,	10,010	,.	,
On-Site or In-Plant Training - All sectors -		3,780	3,732	6,734	6,583	6,145	7,008
4 to 10 years (jobs)		3,.33	3,. 32	2,.0.	-,000	3,	-,000
On-Site or In-Plant Training - All sectors -		467	470	841	831	787	909
Over 10 years (jobs)							
Wage income - All (million \$2019)		3,264	3,224	5,381	5,274	5,034	5,874
	İ	,	-,	5,00.	-,	-,	-,

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	952	886	773	638	516	442	411
Final energy use - Residential (PJ)	555	515	478	416	348	297	264
Final energy use - Commercial (PJ)	372	366	351	325	295	272	261
Final energy use - Industry (PJ)	602	619	627	629	639	647	652

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		6.24	6.43	13.3	14.2	13.1	13.8
Cumulative 5-yr (billion \$2018)							

Table 31: E+RE+ scenario - PILLAR 1: Efficiency/Electrifica	ition - Transportatio	on
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Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	54.1	946	1,837	4,958	8,078	10,572	13,065
Vehicle stocks - LDV – All others (1000	10,894	10,374	9,853	7,180	4,507	2,550	593
units)							
Light-duty vehicle capital costs vs. REF -		2,095	5,367	8,700	13,178	14,344	13,675
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.326		3.65		16		25.9
units)							
Public EV charging plugs - L2 (1000 units)	1.06		87.7		386		624

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	5.51	13.7	41.4	84.2	91.7	92.1	91.9
Heat Pump (%)							
Sales of space heating units - Electric	15.4	21.4	16.1	7.17	5.54	5.47	5.69
Resistance (%)							
Sales of space heating units - Gas (%)	74	56.5	36.7	5.84	0.489	0.156	0.159
Sales of space heating units - Fossil (%)	5.05	8.47	5.81	2.79	2.31	2.27	2.21
Sales of water heating units - Electric	0	1.79	15.1	34.7	38	38.3	38.3
Heat Pump (%)							
Sales of water heating units - Electric	32.2	48.8	51.7	60	61.5	61.6	61.5
Resistance (%)							
Sales of water heating units - Gas Furnace	67.7	49.3	33	5.17	0.303	0	0
(%)							
Sales of water heating units - Other (%)	0.083	0.169	0.17	0.17	0.168	0.168	0.17
Sales of cooking units - Electric	61.8	69.9	94.9	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	38.2	30.1	5.14	0.259	0	0	0
Residential HVAC investment in 2020s vs.		9.7	12.8				
REF - Cumulative 5-yr (billion \$2018)							

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

145.6 56.1 = 1.1 = 1.50.14.15	, =						
Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	1.41	8.43	35.7	81.1	89	89.5	89.5
Heat Pump (%)							
Sales of space heating units - Electric	4.39	3.49	5.31	9.37	10.1	10.2	10.2
Resistance (%)							
Sales of space heating units - Gas (%)	88.8	85.5	58.5	9.54	0.892	0.356	0.356
Sales of space heating units - Fossil (%)	5.44	2.58	0.487	0.021	0	0	0
Sales of water heating units - Electric	0.454	2.53	19.6	46.2	50.8	51.1	51.1
Heat Pump (%)							
Sales of water heating units - Electric	4.26	4.67	18.3	43.9	48.4	48.7	48.7
Resistance (%)							
Sales of water heating units - Gas (%)	95	92.6	61.9	9.69	0.569	0	0
Sales of water heating units - Other (%)	0.252	0.187	0.187	0.189	0.188	0.188	0.189
Sales of cooking units - Electric	41	54.2	82.9	88.6	88.9	88.9	88.9
Resistance (%)							
Sales of cooking units - Gas (%)	59	45.8	17.1	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s -		36,680	40,065				
Cumulative 5-yr (million \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	7,904	1,455	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,672	13,088	13,501	13,930	10,816	8,250	9,925

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	1,312	1,312	1,312	1,312	1,312	0	0
Installed renewables - Rooftop PV (MW)	152	228	303	401	518	653	807
Installed renewables - Solar - Base land	552	1,667	3,665	25,782	40,087	48,782	59,888
use assumptions (MW)							
Installed renewables - Wind - Base land	827	827	9,413	27,115	42,706	42,827	42,827
use assumptions (MW)							
Installed renewables - Solar -	724	1,070	5,050	25,599	35,300	37,387	53,098
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	904	904	18,372	19,705	19,705	19,705	45,105
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		1.49	2.39	24.4	14.9	8.53	10.3
\$2018)							
Capital invested - Wind - Base (billion		0	11.4	22	18.4	0.135	0
\$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	1,454	3,430	6,952	45,355	69,898	84,697	104,264
Wind - Base land use assumptions (GWh)	2,973	2,973	29,483	80,929	121,652	121,927	121,927
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	2,908	4,131	18,119	88,835	121,824	128,925	184,223
Wind - Constrained land use assumptions (GWh)	5,947	5,947	100,657	107,064	107,064	107,064	258,045
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-90.3
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-522
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,319
Carbon sink potential - Low - Improve plantations (1000 tC02e/y)							-112
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-1,583
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)							-672
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-583
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-349
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-698
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-5,927
Carbon sink potential - Mid - Accelerate regeneration (1000 tC02e/y)							-135
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,826
Carbon sink potential - Mid - Extend rotation length (1000 tC02e/y)							-2,377

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-163
							21//
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,166
Carbon sink potential - Mid - Increase							-1,296
trees outside forests (1000 tC02e/y)							-1,290
Carbon sink potential - Mid - Reforest							-874
cropland (1000 tCO2e/y)							-014
Carbon sink potential - Mid - Reforest							-2,477
pasture (1000 tC02e/y)							-2,411
Carbon sink potential - Mid - Restore							-1,384
productivity (1000 tCO2e/y)							1,004
Carbon sink potential - Mid - All (not							-13,699
counting overlap) (1000 tCO2e/y)							10,077
Carbon sink potential - High - Accelerate							-180
regeneration (1000 tCO2e/y)							100
Carbon sink potential - High - Avoid							-3,130
deforestation (1000 tC02e/y)							-,
Carbon sink potential - High - Extend							-3,434
rotation length (1000 tCO2e/y)							-, -
Carbon sink potential - High - Improve							-219
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,749
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,920
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,166
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-4,605
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-21,474
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-2,070
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							14.7
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							398
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							/71
Land impacted for carbon sink potential -							671
Low - Extend rotation length (1000							
hectares) Land impacted for carbon sink potential -							40.4
Low - Improve plantations (1000							40.4
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							96
Low - Increase trees outside forests							,,
(1000 hectares)							
Land impacted for carbon sink potential -							38.5
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							22.7
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							415
Low - Restore productivity (1000							
hectares)	1	1	1		1		

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

Table 36: E+RE+ scenario - PILLAR 6: Land Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							1,696
Low - Total impacted (over 30 years)							.,070
(1000 hectares)							
Land impacted for carbon sink potential -							22.1
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							411
Mid - Avoid deforestation (over 30 years)							411
(1000 hectares)							
Land impacted for carbon sink potential -							1,211
							1,211
Mid - Extend rotation length (1000							
hectares)							/ 0 0
Land impacted for carbon sink potential -							60.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							139
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							57.8
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							164
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							836
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,902
Mid - Total impacted (over 30 years) (1000							, -
hectares)							
Land impacted for carbon sink potential -							29.5
High - Accelerate regeneration (1000							27.0
hectares)							
Land impacted for carbon sink potential -							424
High - Avoid deforestation (over 30 years)							424
(1000 hectares)							
•							1,751
Land impacted for carbon sink potential -							1,751
High - Extend rotation length (1000							
hectares)							007
Land impacted for carbon sink potential -							80.7
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							182
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							77.1
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							131
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							686
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,362
High - Total impacted (over 30 years)							3,002
(1000 hectares)							
(וטטט וופטנמו פאן							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-1,255
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							0.000
Carbon sink potential - Moderate							-2,883
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-107
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-4,245
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,255
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,463
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-214
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-6,932
deployment - Total (1000 tC02e/y)							•
Land impacted for carbon sink - Moderate							523
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,86
deployment - Cropland measures (1000							,
hectares)							
Land impacted for carbon sink - Moderate							195
deployment - Permanent conservation							170
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							2,578
deployment - Total (1000 hectares)							2,010
Land impacted for carbon sink -							523
Aggressive deployment - Corn-ethanol to							020
energy grasses (1000 hectares)							
Land impacted for carbon sink -							3,526
Aggressive deployment - Cropland							3,320
. ,							
measures (1000 hectares)							200
Land impacted for carbon sink -							390
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							, , , ,
Land impacted for carbon sink -							4,439
Aggressive deployment - Total (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		247	0.648	0.646	0.62	0.473	0.046
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		40.4	32.3	41.2	30.5	10.7	3.26
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		448	416	315	183	84.6	35.2
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		58.8	53.9	40.6	24	11.7	5.62
Stations (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas		88	75.9	54.3	31.3	14.7	5.03
(deaths)  Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		10.9	8.96	6.13	3.49	1.36	0.353
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		10.4	9.89	7.98	5.44	2.99	1.37
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		6.26	5.96	5.64	5.3	4.96	4.61
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		58	52.8	41.1	26.6	14.9	7.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		5.74	4.63	3.44	2.37	1.57	1.01
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		3.9	3.27	2.66	2.07	1.51	0.993
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.05	0.934	0.913	0.882	0.881	0.776
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		180	171	165	140	116	86.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		2,187	5.75	5.73	5.5	4.19	0.407
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		358	286	365	271	94.9	28.9
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		3,979	3,697	2,802	1,624	753	313
Monetary damages from air pollution - Gas Stations (million \$2019)		521	478	359	213	104	49.7
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		779	673	481	277	131	44.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		96.7	79.4	54.3	31	12.1	3.13
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		92.5	87.6	70.7	48.2	26.5	12.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		55.4	52.8	49.9	46.9	43.9	40.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		514	467	364	235	132	62.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		50.8	41	30.5	20.9	13.9	8.91
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		34.6	28.9	23.6	18.3	13.4	8.79
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		18.1	8.24	8.06	7.78	7.77	6.85

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas		1,599	1,517	1,462	1,246	1,032	765
Production (million \$2019)							

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

Table 39: E+RE- Scenario - IMPACIS - Jobs							
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		999	1,027	933	514	711	1,911
By economic sector - Construction (jobs)		10,077	10,606	11,203	12,805	14,065	16,081
By economic sector - Manufacturing		8,773	7,982	7,686	7,706	7,210	7,259
(jobs)		11.010					
By economic sector - Mining (jobs)		11,219	8,650	6,747	4,565	3,099	1,942
By economic sector - Other (jobs)		426	422	618	789	1,022	1,156
By economic sector - Pipeline (jobs)		1,647	1,833	1,346	1,162	970	998
By economic sector - Professional (jobs)		5,475	4,891	5,613	8,329	9,902	12,145
By economic sector - Trade (jobs)		5,356	4,572	4,505	4,892	5,152	5,627
By economic sector - Utilities (jobs)		12,071	12,189	15,085	31,633	35,973	39,178
By resource sector - Biomass (jobs)		2,412	2,363	2,112	1,234	2,809	8,096
By resource sector - CO2 (jobs)		0	2,981	0	0	255	2,194
By resource sector - Coal (jobs)		1,671	216	17.9	13.2	10.4	0
By resource sector - Grid (jobs)		9,966	9,471	16,157	20,007	24,131	29,067
By resource sector - Natural Gas (jobs)		18,420	16,302	14,912	14,251	11,918	10,231
By resource sector - Nuclear (jobs)		662	651	2,844	22,223	26,048	26,362
By resource sector - Oil (jobs)		19,278	16,571	13,779	9,722	7,155	4,914
By resource sector - Solar (jobs)		1,414	1,340	1,737	1,981	2,689	2,458
By resource sector - Wind (jobs)		2,219	2,276	2,176	2,965	3,090	2,975
By education level - All sectors - High		23,197	21,848	22,441	28,738	30,916	34,702
school diploma or less (jobs)							
By education level - All sectors -		16,792	15,841	16,408	21,919	23,645	26,021
Associates degree or some college (jobs)							
By education level - All sectors -		12,641	11,419	11,687	16,887	18,221	19,733
Bachelors degree (jobs)							
By education level - All sectors - Masters		3,010	2,707	2,823	4,250	4,649	5,089
or professional degree (jobs)							
By education level - All sectors - Doctoral		403	357	377	602	674	752
degree (jobs)							
Related work experience - All sectors -		8,017	7,540	7,747	10,131	10,923	12,200
None (jobs)							
Related work experience - All sectors - Up		10,725	10,005	10,347	13,694	14,840	16,776
to 1 year (jobs)							
Related work experience - All sectors - 1		20,549	19,047	19,600	26,539	28,623	31,444
to 4 years (jobs)							
Related work experience - All sectors - 4		13,148	12,256	12,614	17,219	18,551	20,291
to 10 years (jobs)							
Related work experience - All sectors -		3,604	3,325	3,427	4,813	5,168	5,587
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		3,044	2,782	2,860	4,067	4,414	4,854
(jobs)							
On-the-Job Training - All sectors - Up to 1		37,525	34,673	35,657	48,012	51,793	57,410
year (jobs)							•
On-the-Job Training - All sectors - 1 to 4		11,516	10,884	11,247	15,117	16,277	17,813
years (jobs)			.				-
On-the-Job Training - All sectors - 4 to 10		3,428	3,337	3,470	4,507	4,883	5,426
years (jobs)			.				
On-the-Job Training - All sectors - Over 10		530	496	501	693	738	794
years (jobs)							
On-Site or In-Plant Training - All sectors -		8,897	8,232	8,467	11,790	12,802	14,160
None (jobs)		·	.		,	•	•
On-Site or In-Plant Training - All sectors -		34,043	31,494	32,413	43,616	47,017	52,036
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 -		8,984	8,472	8,747	11,658	12,540	13,746
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		3,668	3,537	3,653	4,769	5,141	5,678
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		451	437	454	564	605	677
Over 10 years (jobs)							
Wage income - All (million \$2019)		3,168	2,981	3,119	4,362	4,785	5,334

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	952	886	773	638	516	442	411
Final energy use - Residential (PJ)	555	515	478	416	348	297	264
Final energy use - Commercial (PJ)	372	366	351	325	295	272	261
Final energy use - Industry (PJ)	602	619	627	629	639	647	652

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		6.24	6.43	13.3	14.2	13.1	13.8
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)	54.1	946	1,837	4,958	8,078	10,572	13,065
Vehicle stocks - LDV – All others (1000 units)	10,894	10,374	9,853	7,180	4,507	2,550	593
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		2,095	5,367	8,700	13,178	14,344	13,675
Public EV charging plugs - DC Fast (1000 units)	0.326		3.65		16		25.9
Public EV charging plugs - L2 (1000 units)	1.06		87.7		386		624

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	5.51	13.7	41.4	84.2	91.7	92.1	91.9
Heat Pump (%)							
Sales of space heating units - Electric	15.4	21.4	16.1	7.17	5.54	5.47	5.69
Resistance (%)							
Sales of space heating units - Gas (%)	74	56.5	36.7	5.84	0.489	0.156	0.159
Sales of space heating units - Fossil (%)	5.05	8.47	5.81	2.79	2.31	2.27	2.21
Sales of water heating units - Electric	0	1.79	15.1	34.7	38	38.3	38.3
Heat Pump (%)							
Sales of water heating units - Electric	32.2	48.8	51.7	60	61.5	61.6	61.5
Resistance (%)							
Sales of water heating units - Gas Furnace	67.7	49.3	33	5.17	0.303	0	0
(%)							
Sales of water heating units - Other (%)	0.083	0.169	0.17	0.17	0.168	0.168	0.17
Sales of cooking units - Electric	61.8	69.9	94.9	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	38.2	30.1	5.14	0.259	0	0	0
Residential HVAC investment in 2020s vs.		9.7	12.8				
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	1.41	8.43	35.7	81.1	89	89.5	89.5
Heat Pump (%)							
Sales of space heating units - Electric	4.39	3.49	5.31	9.37	10.1	10.2	10.2
Resistance (%)							
Sales of space heating units - Gas (%)	88.8	85.5	58.5	9.54	0.892	0.356	0.356
Sales of space heating units - Fossil (%)	5.44	2.58	0.487	0.021	0	0	0
Sales of water heating units - Electric	0.454	2.53	19.6	46.2	50.8	51.1	51.1
Heat Pump (%)							
Sales of water heating units - Electric	4.26	4.67	18.3	43.9	48.4	48.7	48.7
Resistance (%)							
Sales of water heating units - Gas (%)	95	92.6	61.9	9.69	0.569	0	0
Sales of water heating units - Other (%)	0.252	0.187	0.187	0.189	0.188	0.188	0.189
Sales of cooking units - Electric	41	54.2	82.9	88.6	88.9	88.9	88.9
Resistance (%)							
Sales of cooking units - Gas (%)	59	45.8	17.1	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s -		36,680	40,065				
Cumulative 5-yr (million \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	7,904	1,455	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,672	13,334	13,080	14,653	13,647	14,668	12,939
Installed thermal - Nuclear (MW)	1,312	1,312	1,312	2,237	11,261	20,239	27,689
Installed renewables - Rooftop PV (MW)	152	228	303	401	518	653	807
Installed renewables - Solar - Base land use assumptions (MW)	552	552	552	898	1,475	2,848	2,848
Installed renewables - Wind - Base land use assumptions (MW)	827	827	1,016	1,016	1,127	1,127	1,162
Installed renewables - Solar - Constrained land use assumptions (MW)	724	724	724	964	3,339	4,800	4,800
Installed renewables - Wind - Constrained land use assumptions (MW)	827	827	1,482	1,482	2,083	2,277	2,425
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0	0.381	0.599	1.35	0
Capital invested - Wind - Base (billion \$2018)		0	0.252	0	0.132	0	0.036
Capital invested - Solar PV - Constrained (billion \$2018)		0	0	0.265	2.47	1.43	0
Capital invested - Wind - Constrained (billion \$2018)		0	0.873	0	0.71	0.217	0.157

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	1,454	1,454	1,454	2,065	3,079	5,499	5,499
Wind - Base land use assumptions (GWh)	2,973	2,973	3,579	3,579	3,937	3,937	4,045
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Constrained land use assumptions	1,454	1,454	1,454	1,879	6,066	8,628	8,628
(GWh)							
Wind - Constrained land use assumptions	2,973	2,973	4,979	4,979	6,794	7,356	7,799
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-90.3
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-522
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,319
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-112
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,583
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-672
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-583
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-349
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-698
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,927
counting overlap) (1000 tC02e/y)							-,
Carbon sink potential - Mid - Accelerate							-135
regeneration (1000 tCO2e/y)							.00
Carbon sink potential - Mid - Avoid							-1,826
deforestation (1000 tC02e/y)							1,020
Carbon sink potential - Mid - Extend							-2,377
rotation length (1000 tCO2e/y)							2,011
Carbon sink potential - Mid - Improve							-163
plantations (1000 tCO2e/y)							-103
Carbon sink potential - Mid - Increase							-3,166
retention of HWP (1000 tC02e/y)							-3,100
Carbon sink potential - Mid - Increase							-1,296
•							-1,296
trees outside forests (1000 tC02e/y)							-874
Carbon sink potential - Mid - Reforest							-874
cropland (1000 tCO2e/y)							0.177
Carbon sink potential - Mid - Reforest							-2,477
pasture (1000 tC02e/y)							1.007
Carbon sink potential - Mid - Restore							-1,384
productivity (1000 tC02e/y)							
Carbon sink potential - Mid - All (not							-13,699
counting overlap) (1000 tC02e/y)							
Carbon sink potential - High - Accelerate							-180
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-3,130
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-3,434
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-219
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,749
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,920
trees outside forests (1000 tC02e/y)							
Carbon sink potential - High - Reforest							-1,166
cropland (1000 tCO2e/y)							,
Carbon sink potential - High - Reforest							-4,605
pasture (1000 tC02e/y)							.,000
Carbon sink potential - High - All (not							-21,474
counting overlap) (1000 tCO2e/y)							∠1,→1 <del>→</del>
Carbon sink potential - High - Restore							-2,070
productivity (1000 tCO2e/y)							-2,010
productivity (1000 to028/y)							

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

Item	2020	2025	2030	2035	2040	2045	205 14.
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000							14.
hectares)							
Land impacted for carbon sink potential -							39
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							67
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							40.
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							9
Low - Increase trees outside forests							,
(1000 hectares)							
Land impacted for carbon sink potential -							38.
Low - Reforest cropland (1000 hectares)							00.
Land impacted for carbon sink potential -							22.
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							41
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,69
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							22
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							4
Mid - Avoid deforestation (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							1,2
Mid - Extend rotation length (1000							1,2
hectares)							
Land impacted for carbon sink potential -							60.
Mid - Improve plantations (1000 hectares)							00.
Land impacted for carbon sink potential -							
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							13
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							57.
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							16
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							83
Mid - Restore productivity (1000							
hectares)							0.00
Land impacted for carbon sink potential -							2,90
Mid - Total impacted (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							29.
High - Accelerate regeneration (1000							29.
hectares)							
Land impacted for carbon sink potential -							42
High - Avoid deforestation (over 30 years)							72
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							1,751
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							80.7
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							182
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							77.1
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							131
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							686
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,362
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-1,255
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,883
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-107
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-4,245
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,255
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,463
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-214
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,932
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							523
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,861
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							195
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							2,578
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 -							523
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							3,526
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							390
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							4,439
Aggressive deployment - Total (1000							
hectares)							

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

Table 49: E-B+ Scenario - IMPACTS - Health							
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		247	0.648	0.646	0.62	0.473	0.046
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		38.3	22.1	12.3	7.99	4.07	1.32
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		455	459	446	402	320	220
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		60.1	60.6	58.5	52.5	41.8	28.9
Stations (deaths)							
Premature deaths from air pollution -		88.3	80.5	71.9	61.1	47	31.3
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		11.1	10.7	10.3	8.94	6.52	4.01
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		10.5	10.7	10.7	9.99	8.12	5.83
Fuel Comb - Residential - Other (deaths)					7.77	52	0.00
Premature deaths from air pollution -		6.26	5.96	5.64	5.3	4.96	4.61
Fuel Comb - Comm/Institutional - Coal		0.20	5.76	3.04	0.0	4.70	4.01
(deaths)							
Premature deaths from air pollution -		58.2	56.7	54.4	49.1	40.6	30.1
Fuel Comb - Comm/Institutional - Natural		30.2	30.1	34.4	47.1	40.0	30.1
Gas (deaths)							
Premature deaths from air pollution -		5.76	5.12	4.52	3.82	3.11	2.45
Fuel Comb - Comm/Institutional - Oil		5.76	5.12	4.52	3.02	3.11	2.43
(deaths)							
		2.0	0.51	0.10	0.7/	0.07	0.00
Premature deaths from air pollution -		3.9	3.51	3.12	2.74	2.37	2.02
Fuel Comb - Comm/Institutional - Other							
(deaths)		0.05	0.000	0.007	0.005	0.001	0.07/
Premature deaths from air pollution -		2.25	0.938	0.926	0.905	0.901	0.874
Industrial Processes - Coal Mining							
(deaths)				100	10-		
Premature deaths from air pollution -		177	155	128	107	91.1	64.2
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		2,187	5.75	5.73	5.5	4.19	0.407
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		339	196	109	70.8	36.1	11.7
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		4,048	4,080	3,966	3,572	2,847	1,959
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		532	537	518	465	370	256
Gas Stations (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		782	713	637	541	417	278
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		98.3	95.2	91.1	79.2	57.8	35.5
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		93.1	94.5	94.7	88.6	72	51.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		55.4	52.8	49.9	46.9	43.9	40.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		515	502	482	435	359	267
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		51	45.3	40	33.8	27.5	21.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		34.6	31	27.6	24.2	21	17.9
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		19.9	8.28	8.17	7.98	7.95	7.71
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		1,571	1,374	1,133	947	809	570

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

By economic sector - Construction (jobs)   9,727   10,738   15,309   14,600   18,737   21,19	Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)   9,369   9,845   9,630   8,115   9,334   11,81 (jobs)   By economic sector - Mining (jobs)   11,117   8,400   6,419   4,900   3,590   1,98   1,98   1,940   2,942   3,17   1,98   1,940   2,942   3,17   1,98   1,644   1,056   873   705   77   1,98   1,644   1,056   873   705   77   1,98   1,644   1,056   873   705   77   1,098							1,507	3,742
By economic sector - Mining (jobs)   11,1117   8,400   6,419   4,900   3,590   1,98	By economic sector - Construction (jobs)		9,727	10,738	15,309	14,600	18,737	21,192
By economic sector - Mining (jobs)	By economic sector - Manufacturing		9,369	9,845	9,630	8,115	9,334	11,811
By economic sector - Other (jobs)	(jobs)							
By economic sector - Pipeline (jobs)   1,589   1,644   1,056   873   705   775	,		11,117			4,900	3,590	1,981
By economic sector - Professional (jobs)   5,407   5,230   7,529   7,398   11,747   16,73	By economic sector - Other (jobs)		419	552	1,899	1,940	2,942	3,175
By economic sector - Trade (jobs)   5,333   4,803   6,034   5,658   7,289   8,44	By economic sector - Pipeline (jobs)		1,589	1,644	1,056	873	705	711
By economic sector - Utilities (jobs)	By economic sector - Professional (jobs)		5,407	5,230	7,529	7,398	11,747	16,735
By resource sector - Biomass (jobs) 2,437 2,363 2,117 1,241 6,942 17,80 By resource sector - CO2 (jobs) 0 2,708 0 0 0 231 1,99 By resource sector - Coal (jobs) 1,708 217 19.6 16 12.7 9.9 By resource sector - Grid (jobs) 9,010 9,595 16,318 17,115 25,709 33,33 By resource sector - Natural Gas (jobs) 17,595 13,619 10,448 8,946 6,457 4,53 By resource sector - Nuclear (jobs) 662 651 641 631 621 61 By resource sector - Oil (jobs) 19,378 17,062 15,072 13,170 10,891 6,55 By resource sector - Solar (jobs) 1,663 2,624 11,142 10,376 15,007 14,59 By resource sector - Wind (jobs) 2,872 4,641 5,316 4,823 5,727 8,06 By education level - All sectors - High 22,915 22,456 25,865 23,660 30,212 37,28 school diploma or less (jobs) By education level - All sectors - Associates degree or some college (jobs) By education level - All sectors - Bachelors degree (jobs) By education level - All sectors - Masters 2,969 2,763 3,122 2,896 3,758 4,68 or professional degree (jobs)	By economic sector - Trade (jobs)		5,333	4,803	6,034	5,658	7,289	8,444
By resource sector - CO2 (jobs)	By economic sector - Utilities (jobs)		11,366	11,245	12,265	12,322	15,748	19,699
By resource sector - Coal (jobs) 1,708 217 19.6 16 12.7 9.9 By resource sector - Grid (jobs) 9,010 9,595 16,318 17,115 25,709 33,33 By resource sector - Natural Gas (jobs) 17,595 13,619 10,448 8,946 6,457 4,53 By resource sector - Nuclear (jobs) 662 651 641 631 621 61 By resource sector - Oil (jobs) 19,378 17,062 15,072 13,170 10,891 6,55 By resource sector - Solar (jobs) 1,663 2,624 11,142 10,376 15,007 14,59 By resource sector - Wind (jobs) 2,872 4,641 5,316 4,823 5,727 8,06 By education level - All sectors - High 22,915 22,456 25,865 23,660 30,212 37,28 school diploma or less (jobs) By education level - All sectors - 16,528 16,170 18,721 17,467 22,098 26,58 By education level - All sectors - 12,514 11,722 12,923 11,881 14,957 18,19 By education level - All sectors - Masters or professional degree (jobs)	By resource sector - Biomass (jobs)		2,437	2,363	2,117	1,241	6,942	17,800
By resource sector - Grid (jobs)         9,010         9,595         16,318         17,115         25,709         33,33           By resource sector - Natural Gas (jobs)         17,595         13,619         10,448         8,946         6,457         4,53           By resource sector - Nuclear (jobs)         662         651         641         631         621         61           By resource sector - Oil (jobs)         19,378         17,062         15,072         13,170         10,891         6,55           By resource sector - Solar (jobs)         1,663         2,624         11,142         10,376         15,007         14,59           By resource sector - Wind (jobs)         2,872         4,641         5,316         4,823         5,727         8,06           By education level - All sectors - High school diploma or less (jobs)         22,456         25,865         23,660         30,212         37,28           By education level - All sectors - Associates degree or some college (jobs)         16,528         16,170         18,721         17,467         22,098         26,58           By education level - All sectors - Masters or professional degree (jobs)         2,969         2,763         3,122         2,896         3,758         4,68	By resource sector - CO2 (jobs)		0	2,708	0	0	231	1,993
By resource sector - Natural Gas (jobs)         17,595         13,619         10,448         8,946         6,457         4,53           By resource sector - Nuclear (jobs)         662         651         641         631         621         61           By resource sector - Oil (jobs)         19,378         17,062         15,072         13,170         10,891         6,55           By resource sector - Solar (jobs)         1,663         2,624         11,142         10,376         15,007         14,59           By resource sector - Wind (jobs)         2,872         4,641         5,316         4,823         5,727         8,06           By education level - All sectors - High school diploma or less (jobs)         22,915         22,456         25,865         23,660         30,212         37,28           By education level - All sectors - Associates degree or some college (jobs)         16,528         16,170         18,721         17,467         22,098         26,58           By education level - All sectors - Bachelors degree (jobs)         12,514         11,722         12,923         11,881         14,957         18,19           By education level - All sectors - Masters or professional degree (jobs)         2,969         2,763         3,122         2,896         3,758         4,68	By resource sector - Coal (jobs)		1,708	217	19.6	16	12.7	9.92
By resource sector - Nuclear (jobs)         662         651         641         631         621         61           By resource sector - Oil (jobs)         19,378         17,062         15,072         13,170         10,891         6,55           By resource sector - Solar (jobs)         1,663         2,624         11,142         10,376         15,007         14,59           By resource sector - Wind (jobs)         2,872         4,641         5,316         4,823         5,727         8,06           By education level - All sectors - High school diploma or less (jobs)         22,915         22,456         25,865         23,660         30,212         37,28           By education level - All sectors - Associates degree or some college (jobs)         16,528         16,170         18,721         17,467         22,098         26,58           By education level - All sectors - Masters or professional degree (jobs)         12,514         11,722         12,923         11,881         14,957         18,19           By education level - All sectors - Masters or professional degree (jobs)         2,969         2,763         3,122         2,896         3,758         4,68	By resource sector - Grid (jobs)		9,010	9,595	16,318	17,115	25,709	33,331
By resource sector - Oil (jobs)   19,378   17,062   15,072   13,170   10,891   6,55	By resource sector - Natural Gas (jobs)		17,595	13,619	10,448	8,946	6,457	4,535
By resource sector - Solar (jobs)   1,663   2,624   11,142   10,376   15,007   14,597   14,597   18,198   16,630   2,872   4,641   5,316   4,823   5,727   8,068   1,663   2,872   4,641   5,316   4,823   5,727   8,068   1,663   2,872   4,641   5,316   4,823   5,727   8,068   1,663   1,663   2,872   4,641   5,316   4,823   5,727   8,068   1,663   1,663   1,663   1,663   1,663   1,663   1,664   1	By resource sector - Nuclear (jobs)		662	651	641	631	621	612
By resource sector - Wind (jobs)         2,872         4,641         5,316         4,823         5,727         8,06           By education level - All sectors - High school diploma or less (jobs)         22,915         22,456         25,865         23,660         30,212         37,28           By education level - All sectors - Associates degree or some college (jobs)         16,528         16,170         18,721         17,467         22,098         26,58           By education level - All sectors - Bachelors degree (jobs)         12,514         11,722         12,923         11,881         14,957         18,19           By education level - All sectors - Masters or professional degree (jobs)         2,969         2,763         3,122         2,896         3,758         4,68	By resource sector - Oil (jobs)		19,378	17,062	15,072	13,170	10,891	6,552
By education level - All sectors - High school diploma or less (jobs)       22,915       22,456       25,865       23,660       30,212       37,28         By education level - All sectors - Associates degree or some college (jobs)       16,528       16,170       18,721       17,467       22,098       26,58         By education level - All sectors - Bachelors degree (jobs)       12,514       11,722       12,923       11,881       14,957       18,19         By education level - All sectors - Masters or professional degree (jobs)       2,969       2,763       3,122       2,896       3,758       4,68	By resource sector - Solar (jobs)		1,663	2,624	11,142	10,376	15,007	14,591
school diploma or less (jobs)       16,528       16,170       18,721       17,467       22,098       26,58         Associates degree or some college (jobs)       12,514       11,722       12,923       11,881       14,957       18,19         By education level - All sectors - Bachelors degree (jobs)       2,969       2,763       3,122       2,896       3,758       4,68         or professional degree (jobs)       2,969       2,763       3,122       2,896       3,758       4,68	By resource sector - Wind (jobs)		2,872	4,641	5,316	4,823	5,727	8,067
By education level - All sectors -       16,528       16,170       18,721       17,467       22,098       26,58         Associates degree or some college (jobs)       12,514       11,722       12,923       11,881       14,957       18,19         Bachelors degree (jobs)       12,514       11,722       12,923       11,881       14,957       18,19         By education level - All sectors - Masters or professional degree (jobs)       2,969       2,763       3,122       2,896       3,758       4,68	By education level - All sectors - High		22,915	22,456	25,865	23,660	30,212	37,282
Associates degree or some college (jobs)       12,514       11,722       12,923       11,881       14,957       18,19         Bachelors degree (jobs)       By education level - All sectors - Masters or professional degree (jobs)       2,969       2,763       3,122       2,896       3,758       4,68	school diploma or less (jobs)							
By education level - All sectors - Bachelors degree (jobs)       12,514       11,722       12,923       11,881       14,957       18,19         By education level - All sectors - Masters or professional degree (jobs)       2,969       2,763       3,122       2,896       3,758       4,68	By education level - All sectors -		16,528	16,170	18,721	17,467	22,098	26,582
Bachelors degree (jobs)  By education level - All sectors - Masters 2,969 2,763 3,122 2,896 3,758 4,68 or professional degree (jobs)	Associates degree or some college (jobs)							
By education level - All sectors - Masters 2,969 2,763 3,122 2,896 3,758 4,68 or professional degree (jobs)	By education level - All sectors -		12,514	11,722	12,923	11,881	14,957	18,196
or professional degree (jobs)	Bachelors degree (jobs)							
	By education level - All sectors - Masters		2,969	2,763	3,122	2,896	3,758	4,682
By education level - All sectors - Doctoral 398 369 443 414 574 74								
	By education level - All sectors - Doctoral		398	369	443	414	574	748
degree (jobs)	degree (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - None (jobs)		7,897	7,685	8,805	8,123	10,391	12,794
Related work experience - All sectors - Up to 1 year (jobs)		10,630	10,399	12,171	11,065	14,418	18,229
Related work experience - All sectors - 1 to 4 years (jobs)		20,277	19,478	22,107	20,461	25,888	31,345
Related work experience - All sectors - 4 to 10 years (jobs)		12,955	12,496	14,179	13,162	16,547	19,905
Related work experience - All sectors - Over 10 years (jobs)		3,566	3,422	3,812	3,507	4,354	5,219
On-the-Job Training - All sectors - None (jobs)		3,013	2,874	3,326	3,044	3,907	4,795
On-the-Job Training - All sectors - Up to 1 year (jobs)		37,143	35,744	40,529	37,165	47,512	58,768
On-the-Job Training - All sectors - 1 to 4 years (jobs)		11,312	11,036	12,673	11,822	14,779	17,552
On-the-Job Training - All sectors - 4 to 10 years (jobs)		3,329	3,306	3,953	3,749	4,740	5,599
On-the-Job Training - All sectors - Over 10 years (jobs)		528	520	593	539	660	777
On-Site or In-Plant Training - All sectors - None (jobs)		8,803	8,497	9,770	8,991	11,568	14,278
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		33,674	32,413	36,784	33,761	43,028	53,002
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		8,836	8,616	9,891	9,205	11,524	13,726
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		3,571	3,513	4,115	3,880	4,866	5,741
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		441	440	514	483	613	745
Wage income - All (million \$2019)		3,119	3,027	3,453	3,237	4,132	5,074

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	954	894	812	747	696	637	566
Final energy use - Residential (PJ)	555	516	488	461	427	383	335
Final energy use - Commercial (PJ)	372	367	358	350	337	320	302
Final energy use - Industry (PJ)	602	620	630	637	652	659	663

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		5.04	5.08	6.88	7.14	11.1	11.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	41.9	304	566	1,780	2,994	5,681	8,368
Vehicle stocks - LDV – All others (1000 units)	10,939	10,939	10,939	10,376	9,813	7,562	5,311
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	338	712	2,404	7,567	11,023
Public EV charging plugs - DC Fast (1000 units)	0.326		1.12		5.95		16.6
Public EV charging plugs - L2 (1000 units)	1.06		27		143		400

Table 54: E-B+ scenario	- PTI I AR 1. Efficiency	//Flectrification .	- Residential
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Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	5.51	11.2	14.4	24.6	46.6	71.6	85.5
Heat Pump (%)							
Sales of space heating units - Electric	15.4	21.8	21.1	19.1	14.6	9.52	6.85
Resistance (%)							
Sales of space heating units - Gas (%)	74	58.2	56	48.7	33.1	15.1	4.95
Sales of space heating units - Fossil (%)	5.05	8.79	8.51	7.56	5.72	3.8	2.74
Sales of water heating units - Electric	0	0.549	2.08	6.92	17.2	28.8	35.3
Heat Pump (%)							
Sales of water heating units - Electric	32.2	48.8	49	50.1	53.4	57.7	60.3
Resistance (%)							
Sales of water heating units - Gas Furnace	67.7	50.5	48.8	42.8	29.2	13.3	4.31
(%)							
Sales of water heating units - Other (%)	0.083	0.169	0.17	0.171	0.17	0.17	0.17
Sales of cooking units - Electric	61.7	62.7	66.2	75.4	88.3	96.2	99
Resistance (%)							
Sales of cooking units - Gas (%)	38.3	37.3	33.8	24.6	11.7	3.78	1.02
Residential HVAC investment in 2020s vs.		9.67	12.6				-
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	1.41	6.26	9.41	19.5	41.8	67.8	82.5
Heat Pump (%)							
Sales of space heating units - Electric	4.39	3.42	3.62	4.32	6.06	8.25	9.52
Resistance (%)							
Sales of space heating units - Gas (%)	88.8	87.3	84.2	74.1	51.1	23.6	7.9
Sales of space heating units - Fossil (%)	5.44	2.99	2.75	2.06	1.03	0.337	0.088
Sales of water heating units - Electric	0.454	1.05	3.02	9.27	22.8	38.3	47
Heat Pump (%)							
Sales of water heating units - Electric	4.26	3.81	5.35	10.5	22.3	36.6	44.8
Resistance (%)							
Sales of water heating units - Gas (%)	95	94.9	91.4	80	54.7	25	8.07
Sales of water heating units - Other (%)	0.252	0.187	0.187	0.189	0.188	0.188	0.189
Sales of cooking units - Electric	41	45.8	49.8	60.5	75.4	84.5	87.7
Resistance (%)							
Sales of cooking units - Gas (%)	59	54.2	50.2	39.5	24.6	15.5	12.3
Commercial HVAC investment in 2020s -		36,676	40,057				
Cumulative 5-yr (million \$2018)							

## Table 56: E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	7,904	1,455	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,672	13,088	12,776	12,232	8,132	6,136	4,715
Installed thermal - Nuclear (MW)	1,312	1,312	1,312	1,312	1,312	1,312	1,312
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0

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

	· · · · · · · · · · · · · · · · · · ·						
Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0.179	0.179
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	0	1	1
(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	23	65
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	2
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	1	2
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	1
Conversion capital investment -		0	0	0	0	19,240	37,955
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	0	0	1,897	5,611

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	24.7	72.9
Annual - BECCS (MMT)		0	0	0	0	24.7	72.9
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	24.7	97.6
Cumulative - BECCS (MMT)		0	0	0	0	24.7	97.6
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	477	477	477	477	477
Spur (km)		0	0	0	0	932	2,589
All (km)		0	477	477	477	1,409	3,066
Cumulative investment - Trunk (million \$2018)		0	1,555	1,555	1,555	1,934	1,934
Cumulative investment - Spur (million \$2018)		0	0	0	0	1,080	3,054
Cumulative investment - All (million \$2018)		0	1,555	1,555	1,555	3,014	4,988

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

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

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

Table 62: E-B+ scenario - PILLAR 6: Land s	sınks - Fores	ets					
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-90.3
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-522
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,319
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-112
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,583
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-672
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-583
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-349
pasture (1000 tCO2e/y)							0.7
Carbon sink potential - Low - Restore							-698
productivity (1000 tCO2e/y)							0,0
Carbon sink potential - Low - All (not							-5,927
counting overlap) (1000 tCO2e/y)							0,721
Carbon sink potential - Mid - Accelerate							-135
regeneration (1000 tCO2e/y)							100
Carbon sink potential - Mid - Avoid		-					-1,826
deforestation (1000 tCO2e/y)							-1,020
Carbon sink potential - Mid - Extend							-2,377
rotation length (1000 tCO2e/y)							-2,311
Carbon sink potential - Mid - Improve							-163
·							-103
plantations (1000 tCO2e/y)  Carbon sink potential - Mid - Increase							0.1//
· ·							-3,166
retention of HWP (1000 tC02e/y)							1.007
Carbon sink potential - Mid - Increase							-1,296
trees outside forests (1000 tC02e/y)							07/
Carbon sink potential - Mid - Reforest							-874
cropland (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-2,477
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-1,384
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-13,699
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-180
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-3,130
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-3,434
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-219
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,749
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-1,920
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,166
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-4,605
pasture (1000 tCO2e/y)							,
Carbon sink potential - High - All (not							-21,474
counting overlap) (1000 tCO2e/y)							,,
Carbon sink potential - High - Restore							-2,070
productivity (1000 tC02e/y)							_,0.0
p. 3233017107 (1333 13020/7)							

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 -							14.7
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							398
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							671
Low - Extend rotation length (1000							
hectares)  Land impacted for carbon sink potential -							40.4
							40.4
Low - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							96
Low - Increase trees outside forests							, ,
(1000 hectares)							
Land impacted for carbon sink potential -							38.5
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							22.7
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							415
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,696
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							22.1
Mid - Accelerate regeneration (1000							
hectares)							411
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years)							411
(1000 hectares)							
Land impacted for carbon sink potential -							1,211
Mid - Extend rotation length (1000							1,211
hectares)							
Land impacted for carbon sink potential -							60.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							139
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							57.8
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							164
Mid - Reforest pasture (1000 hectares)							001
Land impacted for carbon sink potential -							836
Mid - Restore productivity (1000							
hectares)							2,902
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000							2,902
hectares)							
Land impacted for carbon sink potential -							29.5
High - Accelerate regeneration (1000							27.0
hectares)							
Land impacted for carbon sink potential -							424
High - Avoid deforestation (over 30 years)							-72-7
5	1						

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							1,751
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							80.7
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							182
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							77.1
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							131
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							686
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,362
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-1,772
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,589
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-96.4
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							_
(1000 tCO2e/y)							
Carbon sink potential - Moderate							-4,458
deployment - Total (1000 tCO2e/y)							,
Carbon sink potential - Aggressive		+					-1,772
deployment - Corn-ethanol to energy							.,
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive		+					-4,907
deployment - Cropland measures (1000							.,
tCO2e/y)							
Carbon sink potential - Aggressive							-193
deployment - Permanent conservation							.,,
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							Ū
crops (1000 tC02e/y)							
Carbon sink potential - Aggressive	+	+		+			0
deployment - Pasture to energy crops							U
(1000 tCO2e/y)							
Carbon sink potential - Aggressive				-			-6,872
deployment - Total (1000 tCO2e/y)							-0,012
deployment - Total (1000 to02e/y)							

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate							903
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,674
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							175
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							166
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							129
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							3,047
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							903
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							7,832
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							351
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							166
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							129
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							9,381
Aggressive deployment - Total (1000							
hectares)							

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		630	419	367	341	330	310
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		32.4	37.8	48.5	50.8	48	41.5
Premature deaths from air pollution - Mobile - On-Road (deaths)		455	465	475	489	502	516
Premature deaths from air pollution - Gas Stations (deaths)		59.9	61.2	62.2	63.8	65.2	66.5
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		87.6	80.6	74.7	70.9	68.7	66.5
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		10.7	9.16	6.55	4.04	2.01	0.911
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		10.1	10.2	10.5	10.7	10.6	10.4
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		6.54	6.52	6.47	6.4	6.32	6.21

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

Table 04. NET beenand Inn Note Treatin (con	itiilacaj					
	2020 2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -	58.7	57.6	52.8	46.7	43	42.3
Fuel Comb - Comm/Institutional - Natural						
Gas (deaths)						
Premature deaths from air pollution -	5.91	5.59	5.13	4.61	4.26	4.08
Fuel Comb - Comm/Institutional - Oil						
(deaths)						
Premature deaths from air pollution -	4.08	4.16	4.24	4.31	4.38	4.46
Fuel Comb - Comm/Institutional - Other						
(deaths)						
Premature deaths from air pollution -	4.75	3.29	2.65	2.49	2.38	2.21
Industrial Processes - Coal Mining						
(deaths)						
Premature deaths from air pollution -	178	188	191	181	179	169
Industrial Processes - Oil & Gas						
Production (deaths)						
Monetary damages from air pollution -	5,585	3,709	3,254	3,020	2,928	2,745
Fuel Comb - Electric Generation - Coal						
(million \$2019)						
Monetary damages from air pollution -	287	334	430	450	426	367
Fuel Comb - Electric Generation - Natural						
Gas (million \$2019)						
Monetary damages from air pollution -	4,043	4,133	4,226	4,344	4,463	4,584
Mobile - On-Road (million \$2019)	1,010	1,100	1,220	.,	1, 100	1,001
Monetary damages from air pollution -	530	542	551	565	578	589
Gas Stations (million \$2019)		542	331	303	310	307
Monetary damages from air pollution -	777	715	662	629	609	589
Fuel Comb - Residential - Natural Gas	'''	113	002	027	007	307
(million \$2019)						
Monetary damages from air pollution -	95.1	81.2	58.1	35.8	17.8	8.07
Fuel Comb - Residential - Oil (million	75.1	01.2	30.1	33.0	11.0	0.01
\$2019)						
Monetary damages from air pollution -	89.9	90.8	93	95	94.2	92.3
	89.9	90.8	93	95	94.2	92.3
Fuel Comb - Residential - Other (million \$2019)						
	570	F77	57.0	F / 7	F./	
Monetary damages from air pollution -	57.9	57.7	57.3	56.7	56	55
Fuel Comb - Comm/Institutional - Coal						
(million \$2019)	510	510		//10	201	07/
Monetary damages from air pollution -	519	510	467	413	381	374
Fuel Comb - Comm/Institutional - Natural						
Gas (million \$2019)						
Monetary damages from air pollution -	52.3	49.5	45.4	40.8	37.7	36.1
Fuel Comb - Comm/Institutional - Oil						
(million \$2019)						
Monetary damages from air pollution -	36.1	36.8	37.6	38.2	38.8	39.5
Fuel Comb - Comm/Institutional - Other						
(million \$2019)						
Monetary damages from air pollution -	41.9	29	23.4	21.9	21	19.5
Industrial Processes - Coal Mining						
(million \$2019)						
Monetary damages from air pollution -	1,582	1,668	1,699	1,607	1,590	1,498
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)		994	988	988	978	978	981
By economic sector - Construction (jobs)		9,773	9,868	11,384	11,559	11,875	11,903
By economic sector - Manufacturing		7,237	7,337	7,693	7,878	7,503	7,008
(jobs)							
By economic sector - Mining (jobs)		11,767	9,602	7,983	6,443	5,365	4,218

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

By economic sector - Potentie (jobs)   343   379   488   5-3   573   683   683   By economic sector - Professional (jobs)   1,640   1,727   1,760   1,658   1,672   1,646   By economic sector - Professional (jobs)   5,538   4,990   5,239   5,286   5,242   5,007   Sy economic sector - Trade (jobs)   1,2720   1,613   13,688   13,974   14,129   13,303   1,520   1,613   13,688   13,974   14,129   13,303   1,520   1,613   13,688   13,974   14,129   13,303   1,520   1,613   13,688   13,974   14,129   13,303   1,520   1,613   13,688   13,974   14,129   13,303   1,520   1,613   13,688   13,974   14,129   13,303   1,520   1,777   704   647   325   1,645   1,613	Table 65: REF SCETTUTTO - IMPAGTS - JUDS (C	continueuj						
By economic sector - Pipeline (jobs)   1,640   1,727   1,760   1,658   1,672   1,645   By economic sector - Professional (jobs)   5,538   4,990   5,239   5,286   5,242   5,070   By economic sector - Trade (jobs)   5,674   4,859   4,760   4,575   4,422   4,167   4,422   4,422   4,422   4,422   4,422   4,422   4,422   4,422   4,422   4,422   4,422   4,422   4,422		2020						2050
By economic sector - Professional (jobs)   5,538   4,990   5,239   5,286   5,242   5,070   By economic sector - Utilities (jobs)   12,720   11,613   13,888   13,941   14,129   13,303   By resource sector - Biomass (jobs)   2,417   2,342   2,272   2,202   2,161   2,124   By resource sector - Coal (jobs)   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0								683
Sy economic sector - Trade [Jobs   5.674   4.859   4.760   4.575   4.422   4.167   Sy economic sector - Biomass (jobs)   12,720   1.1613   13.688   13.941   14,129   13.303   By resource sector - Biomass (jobs)   2.417   2.342   2.272   2.202   2.161   2.124   By resource sector - C02 (jobs)   0   0   0   0   0   0   0   0   By resource sector - Grid (jobs)   3.300   1.520   777   704   647   325   By resource sector - Rid (jobs)   11,033   9,047   13,499   13,708   13,925   13,439   By resource sector - Ride (jobs)   18,166   18,705   19,033   18,525   18,454   17,161   By resource sector - Nuclear (jobs)   662   651   641   631   621   612   By resource sector - Nuclear (jobs)   19,437   17,227   15,483   14,057   12,987   11,451   By resource sector - Wind (jobs)   19,437   17,227   15,483   14,057   12,987   11,451   By resource sector - Wind (jobs)   661   1,037   1,202   1,938   1,823   1,823   1,824   By education level - All sectors - High   23,075   21,421   22,737   22,365   22,1015   20977   School diploma or less (jobs)   22,421   22,737   22,365   22,1015   20977   Sp education level - All sectors - Masters   16,637   15,452   16,500   16,284   16,033   15,215   By education level - All sectors - Masters   12,564   11,407   11,615   11,198   10,799   10,024   By education level - All sectors - Masters   12,564   11,407   11,615   11,198   10,799   10,024   By education level - All sectors - Doctoral   402   363   363   349   337   314   By education level - All sectors - Doctoral   402   363   363   349   337   314   By education level - All sectors - Up   10,619   9,811   10,348   10,168   9,970   9,502   By education level - All sectors - 10   10,619   9,811   10,348   10,168   9,970   9,502   By education level - All sectors - 10   10,619   9,811   10,348   10,168   9,970   9,502   By education level - All sectors - 10   10,619   9,811   10,348   10,168   9,970   9,502   By education level - All sectors - 10   10,619   9,811   10,348   10,168   9,970   9,502   By education level - All sectors			'					1,645
By enonmic sector - Utilities [jobs]   12,720   11,618   13,688   13,941   14,129   13,303   By resource sector - Co2 (jobs)   0   0   0   0   0   0   0   0   0								
By resource sector - Display   Sector - Sector - Point   Sector - Display   Sector - Sector - Point   S								
By resource sector - C02 (jobs)								
By resource sector - Coal (jobs)   3,300   1,520   777   704   647   325   3499   13,708   13,929   13,708   13,929   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,708   13,929   13,439   13,928   13,923   14,615   13,929   14,615				2,342	2,272	2,202	2,161	2,124
By resource sector - Natural Gas (jobs)   11,033   9,047   13,499   13,708   13,925   13,439   13,008   13,925   13,439   13,008   13,925   13,439   13,008   13,925   13,439   13,008   13,00			- 1	-	-	-	-	0
By resource sector - Nuclear (jobs)   18,156   18,705   19,033   18,526   18,454   17,161   By resource sector - Nuclear (jobs)   662   662   641   631   621   612   By resource sector - Vuclear (jobs)   19,437   17,227   15,483   14,057   12,987   11,451   By resource sector - Vind (jobs)   19,437   17,227   15,483   14,057   12,987   11,451   By resource sector - Vind (jobs)   681   1,037   1,202   1,093   1,120   1,980   By resource sector - Hide (jobs)   681   1,037   1,202   1,938   1,823   1,824   By education level - All sectors - High school diploma or less (jobs)   7,421   22,737   22,366   22,015   20,977   Sasociates degree or some college (jobs)   7,421   22,737   22,366   22,015   20,977   Sasociates degree or some college (jobs)   7,421   22,737   22,366   22,015   20,977   Sasociates degree or some college (jobs)   7,421   7,								
By resource sector - Nuclear (jobs)   662   651   641   631   621   612								
By resource sector - Oil (jobs)   19,437   17,227   15,483   14,057   12,987   11,451   14,057   1,998   11,451   14,057   1,095   1,140   1,980   1					-			
By resource sector - Solar (jobs)   833   1,072   1,095   1,140   1,986								612
By resource sector - Wind (jobs)   681   1,037   1,202   1,938   1,823   1,824   By education level - All sectors - High   23,075   21,421   22,737   22,366   22,015   20,977   Syeducation level - All sectors -   16,637   15,452   16,500   16,284   16,038   15,215   Associates degree or some college (jobs)   12,564   11,407   11,615   11,198   10,799   10,024   By education level - All sectors -   12,564   11,407   11,615   11,198   10,799   10,024   By education level - All sectors - Wasters   3,008   2,718   2,766   2,664   2,570   2,385   Or professional degree (jobs)   2,718   2,766   2,664   2,570   2,385   Dy education level - All sectors - Doctoral   402   363   363   349   337   314   degree (jobs)   3,796   3,392   3,831   3,700   7,575   7,193   Related work experience - All sectors -   10,619   9,811   10,348   10,168   9,970   9,502   To 1year (jobs)   10,619   9,811   10,348   10,168   9,970   9,502   To 1year (jobs)   10,619   12,401   12,42   11,443   To 10 years (jobs)   13,054   12,053   12,669   12,401   12,142   11,443   To 10 years (jobs)   13,054   12,053   12,669   12,401   12,142   11,443   To 10 years (jobs)   13,054   12,053   12,669   12,401   12,142   11,443   To 10 years (jobs)   13,054			19,437					
By education level - All sectors - High school diploma or less (jobs)   Sty education level - All sectors - 16,637   15,452   16,500   16,284   16,038   15,215   16,500   16,284   16,038   16,284   16,284   16,284   16,284   16,284   16,284   16,284   16,284   16,284   16,284   16,284   16,284   1								1,980
School diploma or less (jobs)   By education level - All sectors - Associates degree or some college (jobs)   16,637   15,452   16,500   16,284   16,038   15,215								1,824
By education level - All sectors -   16,637   15,452   16,500   16,284   16,038   15,215   Associates degree or some college (jobs)   By education level - All sectors -   12,564   11,407   11,615   11,198   10,799   10,024   10,024   10,024   11,407   11,615   11,198   10,799   10,024   10,024   11,407   11,615   11,198   10,799   10,024   10,024   11,407   11,615   11,198   10,799   10,024   10,024   10,024   11,407   11,615   11,198   10,799   10,024   10,024   10,024   11,407   11,615   11,198   10,799   10,024   10,024   11,615   11,198   10,799   10,024   11,615   11,198   10,799   10,024   11,615   11,198   10,799   10,024   11,615   11,198   10,799   10,024   12,766   2,664   2,570   2,385   2,385   2,766   2,664   2,570   2,385   2,385   2,669   2,664   2,570   2,385   2,385   2,669   2,664   2,570   2,385   2,385   2,669   2,664   2,570   2,385   2,669   2,664   2,570   2,385   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,664   2,570   2,585   2,669   2,675   2,522   2,669   2,664   2,570   2,675   2,522   2,669   2,675   2,675   2,522   2,669   2,675   2,675   2,624   2,756   2,675			23,075	21,421	22,737	22,366	22,015	20,977
Associates degree or some college (jobs) By education level - All sectors - Bachelors degree (jobs) By education level - All sectors - Masters or professional degree (jobs) By education level - All sectors - Masters or professional degree (jobs) By education level - All sectors - Doctoral degree (jobs) Related work experience - All sectors - Type (jobs) Related work experience - All sectors - Up to 1 (year (jobs)) Related work experience - All sectors - Up to 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 2 (year (jobs)) Related work experience - All sectors - 3 (year (jobs)) Related work experience - All sectors - 3 (year (jobs)) Related work experience - All sectors - 3 (year (jobs)) Related work experience - All sectors - 3 (year (jobs)) Related work experience - All sectors - 3 (year (jobs)) Related work experience - All sectors - 3 (year (jobs)) Related work experience - All sectors - 3 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)) Related work experience - All sectors - 1 (year (jobs)								
By education level - All sectors -   12,564   11,407   11,615   11,198   10,799   10,024			16,637	15,452	16,500	16,284	16,038	15,215
Bachelors degree (jobs)   By education level - All sectors - Masters or professional degree (jobs)   By education level - All sectors - Doctoral degree (jobs)   By education level - All sectors - Doctoral degree (jobs)   By education level - All sectors - Doctoral degree (jobs)   By education level - All sectors - Doctoral degree (jobs)   By education level - All sectors - Doctoral degree (jobs)   By education level - All sectors - Doctoral degree (jobs)   By education level - All sectors - Ty66   7,392   7,831   7,700   7,575   7,193   7,000   7,000								
By education level - All sectors - Masters or professional degree (jobs)   2,718   2,766   2,664   2,570   2,385   2,385   3   2,385   3   3   3   3   3   3   3   3   3			12,564	11,407	11,615	11,198	10,799	10,024
or professional degree (jobs)         402         363         363         349         337         314           degree (jobs)         402         363         363         349         337         314           degree (jobs)         7,966         7,392         7,831         7,700         7,575         7,193           Related work experience - All sectors - Up to 1 year (jobs)         10,619         9,811         10,348         10,168         9,970         9,502           Related work experience - All sectors - 1 to 4 years (jobs)         20,497         18,832         19,717         19,262         18,830         17,738           Related work experience - All sectors - 1 to 4 years (jobs)         13,054         12,053         12,669         12,401         12,142         11,443           10 years (jobs)         10 years (jobs)         3,549         3,274         3,415         3,329         3,240         3,040           On-the-Job Training - All sectors - None (jobs)         3,016         2,756         2,841         2,756         2,675         2,522           (jobs)         3,016         2,756         2,841         2,756         2,675         2,522           (jobs)         3,017         3,4257         35,787         34,974         34,14	=							
By education level - All sectors - Doctoral degree (jobs)   363   363   349   337   314     degree (jobs)   7,966   7,392   7,831   7,700   7,575   7,193     Related work experience - All sectors - Up (jobs)   10,619   9,811   10,348   10,168   9,970   9,502     to 1 year (jobs)   Related work experience - All sectors - 1   20,497   18,832   19,717   19,262   18,830   17,738     to 4 years (jobs)   Related work experience - All sectors - 4   13,054   12,053   12,669   12,401   12,142   11,443     to 10 years (jobs)   Related work experience - All sectors - 4   13,054   12,053   12,669   12,401   12,142   11,443     to 10 years (jobs)   3,274   3,415   3,329   3,240   3,040     Over 10 years (jobs)   00-the-Job Training - All sectors - None (jobs)   00-the-Job Training - All sectors - 1 to 4   11,437   10,632   11,325   11,140   10,969   10,392     years (jobs)   00-the-Job Training - All sectors - 1 to 4   11,437   10,632   11,325   11,140   10,969   10,392     years (jobs)   00-the-Job Training - All sectors - 0 ver 10   3,440   3,237   3,526   3,500   3,494   3,349     years (jobs)   00-the-Job Training - All sectors - 0 ver 10   510   481   501   491   479   454     years (jobs)   00-site or In-Plant Training - All sectors - 1   8,925   8,289   8,815   8,667   8,527   8,079     On-Site or In-Plant Training - All sectors - 1   8,925   8,289   8,815   8,667   8,527   8,079     On-Site or In-Plant Training - All sectors - 1   8,925   8,289   8,815   8,667   8,527   8,079     On-Site or In-Plant Training - All sectors - 1   8,925   8,289   8,815   8,667   8,527   8,079     On-Site or In-Plant Training - All sectors - 1   8,925   8,289   8,815   8,667   8,527   8,079     On-Site or In-Plant Training - All sectors - 1   8,925   8,289   8,815   8,667   8,527   8,079     On-Site or In-Plant Training - All sectors - 1   8,925   8,289   8,815   8,667   8,527   8,079     On-Site or In-Plant Training - All sectors - 1   8,925   8,289   8,815   8,667   8,527   8,079     On-Site or In-Plant Training - All sectors - 1			3,008	2,718	2,766	2,664	2,570	2,385
Related work experience - All sectors - None (jobs)   Related work experience - All sectors - Up to 1 year (jobs)   10,619   9,811   10,348   10,168   9,970   9,502   10 year (jobs)   10,619   9,811   10,348   10,168   9,970   9,502   10 year (jobs)   10,619   9,811   10,348   10,168   9,970   9,502   10 year (jobs)   10,619   9,811   10,348   10,168   9,970   9,502   10 year (jobs)   10,619   9,811   10,348   10,168   9,970   9,502   10 year (jobs)   10,619   9,811   10,348   10,168   9,970   9,502   10 year (jobs)   10,619   13,054   12,053   12,669   12,401   12,142   11,443   10 years (jobs)   12,401   12,142   11,443   10,109   12,401   12,142   11,443   10,109   10,415   10,619   10,415								
Related work experience - All sectors - None (jobs)   T,831   T,700   T,575   T,193			402	363	363	349	337	314
None (jobs)   Related work experience - All sectors - Up to 1 year (jobs)   Related work experience - All sectors - 1   20,497   18,832   19,717   19,262   18,830   17,738   10,498   10,168   19,717   19,262   18,830   17,738   10,498   10,168   10,498								
Related work experience - All sectors - Up to 1 year (jobs)  Related work experience - All sectors - 1 to 4 years (jobs)  Related work experience - All sectors - 1 to 4 years (jobs)  Related work experience - All sectors - 4 to 10 years (jobs)  Related work experience - All sectors - 4 to 10 years (jobs)  On-the-Job Training - All sectors - Up to 1 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 0 to 10 years (jobs)  On-the-Job Training - All sectors - 0 to 10 years (jobs)  On-the-Job Training - All sectors - 2 to 10 years (jobs)  On-the-Job Training - All sectors - 2 to 10 years (jobs)  On-the-Job Training - All sectors - 4 to 10 years (jobs)  On-the-Job Training - All sectors - 3 3,840  On-the-Job Training - All sectors - 4 to 10 years (jobs)  On-the-Job Training - All sectors - 3 3,840  On-the-Job Training - 4 3,840  On-the-Job Training - 4 3,840  On-the-Job Training - 4 3,840  On-the-Job Training - 5 3,840  On-the-Job Training - 6 3,840  On-the-Job Trainin			7,966	7,392	7,831	7,700	7,575	7,193
To 1 year (jobs)   Related work experience - All sectors - 1 to 4 years (jobs)   To 10 years (j			12 (12		12.21.2	10.110		
Related work experience - All sectors - 1 to 4 years (jobs)  Related work experience - All sectors - 4 to 10 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 1 to 4 years (jobs)  On-the-Job Training - All sectors - 2 to 10 years (jobs)  On-the-Job Training - 3 to 2 to 3 to 3 to 3 to 3 to 3 to 3 to			10,619	9,811	10,348	10,168	9,970	9,502
Table   Tabl			00.407	10.000	40.747	10.070	10.000	47700
Related work experience - All sectors - 4 to 10 years (jobs)  Related work experience - All sectors - 3,549 3,274 3,415 3,329 3,240 3,040			20,497	18,832	19,717	19,262	18,830	17,738
to 10 years (jobs)  Related work experience - All sectors -			10.057	10.050	10 / / 0	10 / 01	10.17.0	11 / / 0
Related work experience - All sectors - Over 10 years (jobs)         3,549         3,274         3,415         3,329         3,240         3,040           On-the-Job Training - All sectors - None (jobs)         3,016         2,756         2,841         2,756         2,675         2,522           (jobs)         37,284         34,257         35,787         34,974         34,141         32,198           On-the-Job Training - All sectors - 1 to 4 years (jobs)         11,437         10,632         11,325         11,140         10,969         10,392           On-the-Job Training - All sectors - 4 to 10 years (jobs)         3,440         3,237         3,526         3,500         3,494         3,349           On-site or In-Plant Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454           On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         3,677         3,450         3,717         3,673         3,651         3,4	· ·		13,054	12,053	12,669	12,401	12,142	11,443
Over 10 years (jobs)         3,016         2,756         2,841         2,756         2,675         2,522           (jobs)         3,016         2,756         2,841         2,756         2,675         2,522           (jobs)         0n-the-Job Training - All sectors - Up to 1 year (jobs)         37,284         34,257         35,787         34,974         34,141         32,198           0n-the-Job Training - All sectors - 1 to 4 years (jobs)         11,437         10,632         11,325         11,140         10,969         10,392           0n-the-Job Training - All sectors - 4 to 10 years (jobs)         3,440         3,237         3,526         3,500         3,494         3,349           0n-the-Job Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454           0n-Site or In-Plant Training - All sectors - None (jobs)         8,768         8,083         8,436         8,245         8,043         7,591           0n-Site or In-Plant Training - All sectors - Up to 1 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322           0n-Site or In-Plant Training - All sectors - 3,677         3,673         3,667         8,527         8,079           1 to 4 years (jobs)         0n-Site o			2.5/.0	2.07/	2 / 15	2 200	2.0/.0	2.0/.0
On-the-Job Training - All sectors - None (jobs)         3,016         2,756         2,841         2,756         2,675         2,522 (jobs)           On-the-Job Training - All sectors - Up to 1 year (jobs)         37,284         34,257         35,787         34,974         34,141         32,198 (jobs)           On-the-Job Training - All sectors - 1 to 4 years (jobs)         11,437         10,632         11,325         11,140         10,969         10,392 (jobs)           On-the-Job Training - All sectors - 4 to 10 years (jobs)         3,440         3,237         3,526         3,500         3,494         3,349 (jobs)           On-the-Job Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454 (jobs)           On-Site or In-Plant Training - All sectors - None (jobs)         8,768         8,083         8,436         8,245         8,043         7,591 (jobs)           On-Site or In-Plant Training - All sectors - 10 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322 (jobs)           On-Site or In-Plant Training - All sectors - 10 year (jobs)         8,925         8,289         8,815         8,667         8,527         8,079 (jobs)           On-Site or In-Plant Training - All sectors - 3,677         3,450         3,717         3,67			3,549	3,214	3,415	3,329	3,240	3,040
Contens   Cont			2 014	2.754	2 0 /.1	2754	2 475	2 522
On-the-Job Training - All sectors - Up to 1 year (jobs)         37,284         34,257         35,787         34,974         34,141         32,198           On-the-Job Training - All sectors - 1 to 4 years (jobs)         11,437         10,632         11,325         11,140         10,969         10,392           On-the-Job Training - All sectors - 4 to 10 years (jobs)         3,440         3,237         3,526         3,500         3,494         3,349           On-the-Job Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454           On-Site or In-Plant Training - All sectors - None (jobs)         8,768         8,083         8,436         8,245         8,043         7,591           On-Site or In-Plant Training - All sectors - 10 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322           On-Site or In-Plant Training - All sectors - 10 year (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           On-Site or In-Plant Training - All sectors - 3,677         3,450         3,717         3,673         3,651         3,484	_		3,010	2,130	2,041	2,130	2,013	2,322
year (jobs)         Jon-the-Job Training - All sectors - 1 to 4 years (jobs)         11,437         10,632         11,325         11,140         10,969         10,392           On-the-Job Training - All sectors - 4 to 10 years (jobs)         3,440         3,237         3,526         3,500         3,494         3,349           On-the-Job Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454           On-Site or In-Plant Training - All sectors - None (jobs)         8,768         8,083         8,436         8,245         8,043         7,591           On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         3,677         3,450         3,717         3,673         3,651         3,484			37.29/	37, 257	35 797	3/, 07/,	2/, 1/,1	32 100
On-the-Job Training - All sectors - 1 to 4 years (jobs)         11,437         10,632         11,325         11,140         10,969         10,392 years (jobs)           On-the-Job Training - All sectors - 4 to 10 years (jobs)         3,440         3,237         3,526         3,500         3,494         3,349 years (jobs)           On-the-Job Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454 years (jobs)           On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322 years (jobs)           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         3,677         3,450         3,717         3,673         3,651         3,484	•		31,204	34,231	33,161	34,714	34,141	32,170
years (jobs)         3,440         3,237         3,526         3,500         3,494         3,349           years (jobs)         0n-the-Job Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454           On-Site or In-Plant Training - All sectors - None (jobs)         8,768         8,083         8,436         8,245         8,043         7,591           On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         3,677         3,450         3,717         3,673         3,651         3,484			11 / 27	10 632	11 325	11 1/. 0	10 969	10 392
On-the-Job Training - All sectors - 4 to 10 years (jobs)         3,440         3,237         3,526         3,500         3,494         3,349 years (jobs)           On-the-Job Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454 years (jobs)           On-Site or In-Plant Training - All sectors - None (jobs)         8,768         8,083         8,436         8,245         8,043         7,591 years (jobs)           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         33,868         31,117         32,551         31,816         31,078         29,322 years (jobs)           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         3,677         3,450         3,717         3,673         3,651         3,484			11,431	10,032	11,020	11,140	10,707	10,072
years (jobs)         510         481         501         491         479         454           years (jobs)         9         8,768         8,083         8,436         8,245         8,043         7,591           None (jobs)         9         8,768         8,083         8,436         8,245         8,043         7,591           None (jobs)         9         9         9         9         9         9         9         9         9         9         9,322         9         9,322         9         9,322         9         8,815         8,667         8,527         8,079         10         4 years (jobs)         9         9,815         8,667         8,527         8,079         9			3 / / / 0	3 237	3 526	3 500	3 /19/1	3 3/.0
On-the-Job Training - All sectors - Over 10 years (jobs)         510         481         501         491         479         454           On-Site or In-Plant Training - All sectors - None (jobs)         8,768         8,083         8,436         8,245         8,043         7,591           On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           On-Site or In-Plant Training - All sectors - 3,677         3,450         3,717         3,673         3,651         3,484			3,440	3,231	3,320	3,300	3,474	3,347
years (jobs)         8,768         8,083         8,436         8,245         8,043         7,591           None (jobs)         0n-Site or In-Plant Training - All sectors - Up to 1 year (jobs)         33,868         31,117         32,551         31,816         31,078         29,322           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)         3,677         3,450         3,717         3,673         3,651         3,484			510	481	501	<b>491</b>	<b>479</b>	454
On-Site or In-Plant Training - All sectors - None (jobs)       8,768       8,083       8,436       8,245       8,043       7,591         On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)       33,868       31,117       32,551       31,816       31,078       29,322         On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)       8,925       8,289       8,815       8,667       8,527       8,079         On-Site or In-Plant Training - All sectors - 2,677       3,673       3,673       3,673       3,484	=		0.0	701	001	771	717	404
None (jobs)       33,868       31,117       32,551       31,816       31,078       29,322         Up to 1 year (jobs)       0n-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)       8,925       8,289       8,815       8,667       8,527       8,079         On-Site or In-Plant Training - All sectors - 2 site or In-Plant Training - All sectors - 3,677       3,450       3,717       3,673       3,651       3,484			8 768	8 083	8 436	8 245	8 043	7,591
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)       33,868       31,117       32,551       31,816       31,078       29,322         On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)       8,925       8,289       8,815       8,667       8,527       8,079         On-Site or In-Plant Training - All sectors - 3,677       3,450       3,717       3,673       3,651       3,484			0,100	0,000	0,400	0,240	0,040	1,071
Up to 1 year (jobs)         8,925         8,289         8,815         8,667         8,527         8,079           1 to 4 years (jobs)         0n-Site or In-Plant Training - All sectors -         3,677         3,450         3,717         3,673         3,651         3,484			33 868	31 117	32 551	31 816	31 078	29 322
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)       8,925       8,289       8,815       8,667       8,527       8,079         On-Site or In-Plant Training - All sectors - 3,677       3,450       3,717       3,673       3,651       3,484	_		00,000	0.,	02,00.	0.,0.0	0.,0.0	_,,
1 to 4 years (jobs)       3,677       3,450       3,717       3,673       3,651       3,484			8 925	8 289	8 815	8 667	8 527	8,079
On-Site or In-Plant Training - All sectors -         3,677         3,450         3,717         3,673         3,651         3,484			3,723	0,207	5,5.5	3,33.	0,02.	5,5.7
			3.677	3.450	3.717	3.673	3.651	3.484
4 LU 10 VEGI 3 HUNSI	4 to 10 years (jobs)		2,3	-,	3,	-,0.0	-,55.	-,
			447	423	461	461	459	439
Over 10 years (jobs)								
	Wage income - All (million \$2019)		3,164	2,951	3,132	3,098	3,072	2,931

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

••							
Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	953	894	818	774	775	799	830

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

The state of the s							
Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	555	517	496	481	472	466	461
Final energy use - Commercial (PJ)	372	372	369	360	351	351	360
Final energy use - Industry (PJ)	602	634	654	668	689	709	731

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		5.42	5.51	10.6	11.3	10.6	11.1
Cumulative 5-yr (billion \$2018)							

#### Table 68: REF scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	4.34	15.8	16.3	17.1	17.8	18.6	19.7
Heat Pump (%)							
Sales of space heating units - Electric	15.7	20.7	20.5	20.2	19.5	18.6	17.7
Resistance (%)							
Sales of space heating units - Gas (%)	74.7	55.6	55.9	55.8	55.7	55.8	55.7
Sales of space heating units - Fossil (%)	5.21	7.94	7.37	6.96	6.98	7	6.99
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	32.2	48.7	48.5	48.4	48.4	48.3	48.2
Resistance (%)							
Sales of water heating units - Gas Furnace	67.7	51.2	51.4	51.4	51.5	51.6	51.6
(%)							
Sales of water heating units - Other (%)	0.083	0.169	0.171	0.171	0.171	0.172	0.172
Sales of cooking units - Electric	61.3	61.3	61.3	61.3	61.3	61.3	61.3
Resistance (%)							
Sales of cooking units - Gas (%)	38.7	38.7	38.7	38.7	38.7	38.7	38.7
Residential HVAC investment in 2020s vs.		9.28	9.99				
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	1.41	12.6	44.7	71.1	75.4	75.9	75.9
Heat Pump (%)							
Sales of space heating units - Electric	4.39	4.3	8.91	17.1	22.8	23.6	23.7
Resistance (%)							
Sales of space heating units - Gas (%)	88.8	80.4	45	11.5	1.77	0.436	0.356
Sales of space heating units - Fossil (%)	5.44	2.76	1.39	0.243	0.027	0.001	0
Sales of water heating units - Electric	0.454	0.344	0.348	0.348	0.342	0.344	0.345
Heat Pump (%)							
Sales of water heating units - Electric	4.26	3.24	3.2	3.21	3.19	3.18	3.18
Resistance (%)							
Sales of water heating units - Gas (%)	95	96.2	96.3	96.3	96.3	96.3	96.3
Sales of water heating units - Other (%)	0.252	0.187	0.187	0.189	0.188	0.188	0.189
Sales of cooking units - Electric	41	44.2	44.3	44.3	44.3	44.4	44.5
Resistance (%)							
Sales of cooking units - Gas (%)	59	55.8	55.7	55.7	55.7	55.6	55.5
Commercial HVAC investment in 2020s -		36,280	37,607				
Cumulative 5-yr (million \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	7,904	5,820	1,455	1,455	1,455	1,455	0
Installed thermal - Natural gas (MW)	13,672	13,364	12,776	14,044	13,055	16,912	16,758
Installed thermal - Nuclear (MW)	1,312	1,312	1,312	1,312	1,312	1,312	1,312
Installed renewables - Rooftop PV (MW)	152	228	303	401	518	653	807

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

	•						
Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Solar - Base land use assumptions (MW)	552	552	552	552	552	552	552
Installed renewables - Wind - Base land use assumptions (MW)	821	821	821	894	1,121	1,156	1,156
Installed renewables - Wind - Constrained land use assumptions (MW)	6	6	6	6	6	6	6

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	1,454	1,454	1,454	1,454	1,454	1,454	1,454
Wind - Base land use assumptions (GWh)	2,973	2,973	2,973	3,209	3,937	4,045	4,045
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 uptake (Mt CO2e/y)	0.94		-7.03				-6.29
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-1.29		-2.32				-2.42
Business-as-usual carbon sink - Total (Mt CO2e/y)	-0.352		-9.35				-8.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-90.3
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-522
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,319
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-112
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,583
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-672
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-583
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-349
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-698
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,927
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-135
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-1,826
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-2,377
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-163
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-3,166
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-1,296
trees outside forests (1000 tCO2e/y)							

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

Item Carbon sink potential - Mid - Reforest	2020	2025	2030	2035	2040	2045	2050 -874
cropland (1000 tCO2e/y)							-874
Carbon sink potential - Mid - Reforest							-2,477
pasture (1000 tCO2e/y)							-2,411
Carbon sink potential - Mid - Restore							-1,384
productivity (1000 tCO2e/y)							-1,304
Carbon sink potential - Mid - All (not							-13,699
counting overlap) (1000 tC02e/y)							-13,099
Carbon sink potential - High - Accelerate							-180
regeneration (1000 tCO2e/y)							-100
Carbon sink potential - High - Avoid							-3,130
deforestation (1000 tCO2e/y)							-3,130
Carbon sink potential - High - Extend							-3,434
·							-3,434
rotation length (1000 tC02e/y)							-219
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-219
Carbon sink potential - High - Increase							-4,749
							-4,749
retention of HWP (1000 tC02e/y)							1000
Carbon sink potential - High - Increase							-1,920
trees outside forests (1000 tC02e/y)							11//
Carbon sink potential - High - Reforest							-1,166
cropland (1000 tC02e/y)							/ / 05
Carbon sink potential - High - Reforest							-4,605
pasture (1000 tC02e/y)							01 /7/
Carbon sink potential - High - All (not							-21,474
counting overlap) (1000 tC02e/y)							0.070
Carbon sink potential - High - Restore							-2,070
productivity (1000 tCO2e/y)							4/ 7
Land impacted for carbon sink potential -							14.7
Low - Accelerate regeneration (1000							
hectares)							000
Land impacted for carbon sink potential -							398
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							/=/
Land impacted for carbon sink potential -							671
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							96
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							38.5
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							22.7
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							415
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,696
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							22.1
Mid - Accelerate regeneration (1000							
hectares)							

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

lable 73: REF Scenario - PILLAR 6: Lana Si							
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							411
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,211
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							60.8
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							139
Mid - Increase trees outside forests (1000							107
hectares)							
-							F7.0
Land impacted for carbon sink potential -							57.8
Mid - Reforest cropland (1000 hectares)							4//
Land impacted for carbon sink potential -							164
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							836
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							2,902
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							29.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							424
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,751
High - Extend rotation length (1000							1,131
hectares)							80.7
Land impacted for carbon sink potential -							80.7
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							182
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							77.1
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							131
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							686
High - Restore productivity (1000							550
hectares)							
Land impacted for carbon sink potential -							3,362
							3,362
High - Total impacted (over 30 years)							
(1000 hectares)							