

Net-Zero America - Idaho data

October 29, 2021 (updated January 9, 2022)

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

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

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Table 1: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.77	0.005	0.005	0.005	0.003	0
Fuel Comb - Electric Generation - Coal			0.000	0.000	0.000	0.000	Ū
(deaths)							
Premature deaths from air nollution -		1 41	0.8	0.651	0 591	0.39	0.216
Fuel Comb - Electric Generation - Natural			0.0	0.001	0.071	0.07	0.210
Gas (deaths)							
Dremature deaths from air pollution -		1/, 1	13.5	10 5	6 15	2 Q1	1.06
Mobile On Road (deaths)		14.1	13.5	10.5	0.15	2.01	1.00
Dramatura dootha from ain pollution. Coo		0.7/.	0.4	2.02	1 0 0	0 417	0.2
Stationa (doctor)		2.14	2.0	2.03	1.23	0.017	0.3
		0.40	0.00	1 (0	0.055	0 (70	0.100
Premature deaths from air pollution -		2.49	2.22	1.63	0.955	0.473	0.188
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.136	0.124	0.087	0.046	0.022	0.01
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		0.29	0.275	0.224	0.156	0.091	0.047
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.043	0.041	0.04	0.038	0.036	0.034
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		1.7	1.58	1.24	0.806	0.448	0.213
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.257	0.209	0.166	0.128	0.092	0.06
Fuel Comh - Comm/Institutional - Oil		0.201	0.207	0.000	0.120	0.072	0.00
(deaths)							
Premature deaths from air pollution -		0 201	0 173	0 144	0 114	0.085	0.057
Fuel Comb - Comm/Institutional - Other		0.201	0.115	0.144	0.114	0.000	0.001
(deothe)							
Dramatura dootha from ain collution		0 111	0.012	0.012	0.011	0.01	0.000
Industrial Pressesses - Oast Mining		0.111	0.015	0.012	0.011	0.01	0.009
Industrial Processes - Coal Mining							
(dealins)		0.7	0.00	7.0			0.01
Premature deaths from air pollution -		8.7	8.29	7.62	6	4.5	2.81
Industrial Processes - Oli & Gas							
Production (deaths)							
Monetary damages from air pollution -		42.3	0.049	0.049	0.042	0.027	0
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		12.5	7.09	5.76	5.23	3.46	1.91
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		125	120	93.3	54.7	25	9.4
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		24.3	23	17.9	10.9	5.47	2.66
Gas Stations (million \$2019)							
Monetary damages from air pollution -		22.1	19.7	14,4	8.46	4.19	1.67
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		12	11	0 767	0 404	0 194	0.087
Fuel Comb - Residential - Oil (million				0.101	0.404	0.174	0.001
¢2010)							
Monotony domages from air pollution		0 57	0 /./.	100	1 20		0 /.14
Fuel Comb Decidential Other (million		2.01	2.44	1.77	1.30	0.805	0.410
1 061 001110 - RESIDENTIAL - UTHEL (HIIIIIUI) \$2010)							
Venetonu domograe france sin reallistics		0.070	0.0/7	0.050	0.000	0.001	0.000
Monetary damages from air pollution -		0.378	0.367	0.353	0.338	0.321	0.303
Fuel Comp - Comm/Institutional - Coal							
Monetary damages from air pollution -		15.1	14	11	7.14	3.96	1.88
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		2.27	1.85	1.47	1.13	0.817	0.533
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		1.78	1.53	1.27	1.01	0.754	0.503
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		0.98	0.118	0.108	0.095	0.086	0.083
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		77.3	73.6	67.6	53.3	39.9	25
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 2: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		143	185	130	77.8	26	64.7
By economic sector - Construction (jobs)		2,764	4,218	4,697	5,162	5,696	7,064
By economic sector - Manufacturing		829	1,233	1,234	1,158	1,071	1,172
(jobs)							
By economic sector - Mining (jobs)		581	414	265	155	83.3	39.4
By economic sector - Other (jobs)		316	454	546	676	810	1,246
By economic sector - Pipeline (jobs)		123	105	133	58.9	37.3	51.3
By economic sector - Professional (jobs)		1,446	2,404	2,739	3,337	3,950	5,122
By economic sector - Trade (jobs)		999	1,406	1,572	1,879	2,231	3,001
By economic sector - Utilities (jobs)		1,869	3,653	3,812	3,973	4,443	5,006
By resource sector - Biomass (jobs)		413	459	309	198	99.6	293
By resource sector - CO2 (jobs)		0	0	419	0	0	236
By resource sector - Coal (jobs)		2.46	0.823	0	0	0	0
By resource sector - Grid (jobs)		2,448	6,108	6,032	7,110	8,065	8,810
By resource sector - Natural Gas (jobs)		922	775	780	569	462	474
By resource sector - Nuclear (jobs)		303	298	173	0	0	0
By resource sector - Oil (iobs)		1,419	1,118	783	500	302	151
By resource sector - Solar (jobs)		1.863	1.783	2.063	2.260	2.450	4.426
By resource sector - Wind (jobs)		1,700	3.528	4,569	5.840	6.969	8.377
By education level - All sectors - High		3 835	5 896	6 282	6742	7404	9143
school diploma or less (jobs)		0,000	0,070	0,202	0,1 1	.,	7,10
By education level - All sectors -		2,795	4,443	4.840	5.301	5,933	7.360
Associates degree or some college (jobs)		_,	.,	.,	-,:	-,	.,
By education level - All sectors -		1.893	2,883	3.086	3,397	3.826	4,768
Bachelors degree (jobs)		.,	_,000	0,000	0,071	0,010	.,
By education level - All sectors - Masters		474	737	795	893	1.019	1.281
or professional degree (jobs)						.,	.,
By education level - All sectors - Doctoral		74.2	113	125	144	167	215
degree (iobs)							
Related work experience - All sectors -		1.307	2.034	2,187	2.371	2.634	3.274
None (jobs)		.,	_,		_/•··	_,	-1
Related work experience - All sectors - Up		1.850	2.828	3.023	3,271	3.606	4,495
to 1 year (jobs)		.,	_/	-/	-1	-,	.,
Related work experience - All sectors - 1		3.255	5.056	5.431	5.931	6.624	8.218
to 4 years (jobs)		-,	-,	-, -	-, -	- , -	-, -
Related work experience - All sectors - 4		2,109	3.298	3.569	3.906	4.372	5.412
to 10 years (jobs)		_,	-,	-,	-,	.,	-,
Related work experience - All sectors -		550	855	917	998	1.112	1.369
Over 10 years (jobs)						.,	.,
On-the-Job Training - All sectors - None		510	764	819	895	999	1.258
(iobs)							.,===0
On-the-Job Training - All sectors - Up to 1		5,960	9,182	9,809	10,665	11,852	14,720
year (jobs)					•		•

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

	,						
Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4		1,889	2,992	3,251	3,548	3,964	4,891
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		623	1,002	1,105	1,215	1,365	1,690
years (jobs)							
On-the-Job Training - All sectors - Over 10		88.6	132	143	153	168	208
years (jobs)							
On-Site or In-Plant Training - All sectors -		1,483	2,282	2,462	2,696	3,012	3,768
None (jobs)							
On-Site or In-Plant Training - All sectors -		5,408	8,342	8,914	9,687	10,763	13,353
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		1,466	2,311	2,503	2,727	3,040	3,752
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		636	1,011	1,110	1,217	1,364	1,686
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		76.8	125	137	150	168	207
Over 10 years (jobs)							
Wage income - All (million \$2019)		468	739	801	883	999	1,250

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		31.7	27.2	20.5	14.1	9.1	4.81
Oil consumption - Cumulative (million							629
bbls)							
Oil production - Annual (million bbls)		0.114	0.114	0.114	0.091	0.074	0.049
Natural gas consumption - Annual (tcf)		86.5	72.9	58.5	44	27.7	19.2
Natural gas consumption - Cumulative							1,761
(tcf)							
Natural gas production - Annual (tcf)		2.13	2.02	1.76	1.48	1.18	0.915

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

Item	2020	2025	2030	2035	2040	2045	2050		
Final energy use - Transportation (PJ)	150	141	124	104	85.9	74.5	69.8		
Final energy use - Residential (PJ)	71.3	68.1	65.2	58.8	51.1	45.3	41.4		
Final energy use - Commercial (PJ)	49	49.1	48.2	46	43.3	41.4	40.7		
Final energy use - Industry (PJ)	165	175	179	179	180	185	191		

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

	•		•				
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.28	1.35	2.22	2.38	2.18	2.3
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)	10.1	164	317	854	1,392	1,821	2,250			
Vehicle stocks - LDV – All others (1000	1,876	1,787	1,697	1,237	776	439	102			
units)										
Light-duty vehicle capital costs vs. REF -		361	924	1,498	2,269	2,469	2,354			
Cumulative 5-yr (million \$2018)										
Public EV charging plugs - DC Fast (1000	0.066		0.688		3.02		4.88			
units)										
Public EV charging plugs - L2 (1000 units)	0.128		16.6		72.7		118			

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	20.4	40.3	80.7	88.3	89	88.8
Heat Pump (%)							
Sales of space heating units - Electric	10.7	17	13.5	5.83	4.48	4.43	4.48
Resistance (%)							
Sales of space heating units - Gas (%)	73.4	52.1	37	7.24	1.97	1.65	1.64
Sales of space heating units - Fossil (%)	6.36	10.6	9.29	6.2	5.2	4.89	5.13
Sales of water heating units - Electric	0	0.814	11.1	33.7	37.7	38	38
Heat Pump (%)							
Sales of water heating units - Electric	21.3	36.7	43.2	57.2	59.8	59.9	59.9
Resistance (%)							
Sales of water heating units - Gas Furnace	76.7	60.4	43.6	6.97	0.411	0	0
(%)							
Sales of water heating units - Other (%)	1.97	2.09	2.1	2.1	2.1	2.1	2.1
Sales of cooking units - Electric	61.7	69.9	94.8	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	38.3	30.1	5.15	0.259	0	0	0
Residential HVAC investment in 2020s vs.		1.25	1.37				
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	3.53	8.34	31.3	81.3	90.2	90.7	90.8
Heat Pump (%)							
Sales of space heating units - Electric	3.3	3.52	4.98	8.12	8.7	8.74	8.73
Resistance (%)							
Sales of space heating units - Gas Furnace	92.1	87.9	63.7	10.6	1.11	0.511	0.508
(%)							
Sales of space heating units - Fossil (%)	1.07	0.221	0.042	0.002	0	0	0
Sales of water heating units - Electric	0.03	1.08	14.4	43.7	48.9	49.2	49.2
Heat Pump (%)							
Sales of water heating units - Electric	1.46	2.52	15.8	44.9	50.1	50.4	50.4
Resistance (%)							
Sales of water heating units - Gas Furnace	98.1	96	69.4	11.1	0.657	0	0
(%)							
Sales of water heating units - Other (%)	0.366	0.384	0.383	0.384	0.383	0.384	0.383
Sales of cooking units - Electric	41.9	54.6	83	88.6	88.9	88.9	88.9
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s -		4,239	4,716				
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)	6.2	6.2	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,069	1,069	1,069	1,091	1,488	1,136	1,577
Installed thermal - Nuclear (MW)	600	600	600	0	0	0	0
Installed renewables - Rooftop PV (MW)	393	606	810	1,055	1,347	1,687	2,089
Installed renewables - Solar - Base land	1.71	1.71	1.71	1.71	1.71	1.71	1.71
use assumptions (MW)							
Installed renewables - Wind - Base land	952	952	13,786	18,850	23,115	27,723	28,298
use assumptions (MW)							
Installed renewables - Wind - Constrained	1,034	1,034	12,987	18,481	25,008	30,182	30,390
land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		0	0	0	0	0	0
\$2018)							
Capital invested - Wind - Base (billion		0	17.1	6.28	5.04	5.17	0.609
\$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained		0.002	0	0	0	0	0
Capital invested - Wind - Constrained (billion \$2018)		0	14.8	7.01	7.45	5.78	0.297
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)	4.27	4.27	4.27	4.27	4.27	4.27	4.27
Wind - Base land use assumptions (GWh)	3,041	3,041	41,571	55,922	67,439	79,837	81,354
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Constrained land use assumptions	0	0	0	0	0	0	0
(GWh)							
Wind - Constrained land use assumptions	3,306	3,306	37,783	52,357	68,321	80,402	80,877
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	0	3
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment -		0	0	0	0	0	871
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	0	0	0	55.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	1.08
Annual - BECCS (MMT)		0	0	0	0	0	1.08
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	0	1.08
Cumulative - BECCS (MMT)		0	0	0	0	0	1.08
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	177	177	177	177
Spur (km)		0	0	0	0	0	332
All (km)		0	0	177	177	177	508
Cumulative investment - Trunk (million \$2018)		0	0	423	423	423	423
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	183
Cumulative investment - All (million \$2018)		0	0	423	423	423	606

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-2,216
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-132
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,790
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-148
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,420
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-284
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-2,977
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-233
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-2,279
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-11,479
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-3,320
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-463
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-3,224
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-217
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,839
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-548
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,465
cropland (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest							-1.656
pasture (1000 tCO2e/v)							,
Carbon sink notential - Mid - Restore							-4 520
productivity (1000 tC02e/y)							4,020
Carbon sink notantial Mid All (not							01 052
cal boll slik potential - Mid - All (hot							-21,200
Carbon sink potential - High - Accelerate							-4,423
regeneration (1000 tC02e/y)							
Carbon sink potential - High - Avoid							-793
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-4,659
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-290
plantations (1000 tC02e/y)							
Carbon sink notential - High - Increase							-4 259
retention of HWP (1000 tC02e/v)							1,207
Carbon sink notential - High - Increase							
troos outsido forosts (1000 tC020/v)							-012
Combon cink notontial Uich Defenset							
Carbon Sink potential - High - Reforest							-5,953
Carbon sink potential - High - Reforest							-3,080
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-31,032
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-6,761
productivity (1000 tCO2e/y)							
Land impacted for carbon sink notential -							362
Low - Accelerate regeneration (1000							002
hertares)							
Lond imported for earbon sink potential							101
Lanu impacted for carbon sink potential -							101
Low - Avoid deforestation (over 30 years)							
Land impacted for carbon sink potential -							910
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							53.5
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							-
hectares)							
Land impacted for carbon sink notential							40.6
Low Thomas those outside forests							40.0
(1000 hostonos)							
							107
Land impacted for carbon sink potential -							197
Low - Reforest cropland (1000 nectares)							
Land impacted for carbon sink potential -							15.2
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,356
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,035
Low - Total impacted (over 30 years)							-,
(1000 hectares)							
Land impacted for carbon sink notential							5/.2
Mid - Accelerate regeneration (1000							545
hootanoo)							
IItulal'ESJ							10/
Lanu impacteu for carbon Sink potential -							104
Milu - Avoid deforestation (over 30 years)							
(IUUU 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 -							1,643
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							80.5
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 -							58.9
Mid - Increase trees outside forests (1000							
hectares							
Land impacted for carbon sink potential -							295
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink notential -							110
Mid - Reforest nasture (1000 hectares)							
Land impacted for carbon sink notential -							2 7 3 1
Mid - Restore productivity (1000							2,101
hertares)							
Land impacted for carbon sink notential -							5 565
Mid - Total impacted (over 30 years) (1000							5,505
hertares)							
Land impacted for carbon sink notential							70/
High Accolorate regeneration (1000							124
high - Acceler ale regeneration (1000							
Land impacted for carbon sink notontial							107
High Avoid defense tation (over 20 years)							107
(1000 bootonoo)							
(1000 Hectares)							0.07/
Lanu impacted for carbon sink potential -							2,376
High - Extend Polation length (1000							
							107
Land Impacted for carbon SINK potential -							107
High - Improve plantations (1000							
nectaresj							
Land impacted for carbon sink potential -							U
High - Increase retention of HWP (1000							
hectaresj							
Land impacted for carbon sink potential -							77.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							394
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							87.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,241
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,113
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-972
deployment - Cropland measures (1000							
tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-31.4
deployment - Permanent conservation							•
cover (1000 tC02e/v)							
Carbon sink potential - Moderate							-1.003
deployment - Total (1000 tCO2e/y)							,
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-1,914
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-62.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,976
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,168
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							51.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,220
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							2,284
Aggressive deployment - Cropland							
measures (1000 hectares)							10/
Land impacted for carbon sink -							104
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							0.007
Land Impacted for Carbon SINK -							2,387
Aggressive deployment - lotal (1000							
nectaresj							

Table 17: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.77	0.005	0.005	0.005	0.003	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		1.47	0.708	0.47	0.295	0.168	0.125
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		14.3	14.8	14.7	13.5	10.9	7.6
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		2.79	2.88	2.84	2.61	2.12	1.51
Stations (deaths)							
Premature deaths from air pollution -		2.5	2.39	2.23	1.99	1.62	1.18
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.138	0.144	0.13	0.105	0.083	0.06
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		0.292	0.297	0.302	0.29	0.247	0.192
Fuel Comb - Residential - Other (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		0.043	0.041	0.04	0.038	0.036	0.034
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		1.71	1.73	1.7	1.58	1.34	1.05
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.257	0.224	0.196	0.17	0.145	0.123
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.201	0.185	0.169	0.151	0.133	0.116
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.105	0.014	0.013	0.012	0.01	0.006
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		8.68	7.98	7	6.19	5.53	3.91
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		42.3	0.049	0.049	0.042	0.027	0
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		13	6.27	4.16	2.62	1.49	1.11
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		127	131	131	120	97	67.5
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		24.7	25.5	25.2	23.1	18.8	13.3
Gas Stations (million \$2019)							
Monetary damages from air pollution -		22.2	21.2	19.8	17.6	14.3	10.5
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		1.23	1.27	1.15	0.933	0.734	0.535
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		2.59	2.64	2.68	2.57	2.19	1.7
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		0.378	0.367	0.353	0.338	0.321	0.303
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		15.1	15.3	15.1	14	11.9	9.25
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		2.27	1.98	1.73	1.5	1.29	1.09
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		1.78	1.64	1.49	1.34	1.18	1.03
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		0.924	0.12	0.116	0.109	0.088	0.055
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		77.1	70.8	62.2	55	49.1	34.8
Industrial Processes - Oil & Gas							
Production (million \$2019)							

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		152	166	123	69	22.1	64.8
By economic sector - Construction (jobs)		2,751	4,286	4,527	4,930	6,275	8,122

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing		836	1,264	1,141	1,134	1,321	1,413
(jobs)							
By economic sector - Mining (jobs)		586	433	319	228	154	87
By economic sector - Other (jobs)		316	460	522	654	859	1,357
By economic sector - Pipeline (jobs)		124	104	174	73.1	59.5	90.7
By economic sector - Professional (jobs)		1,450	2,432	2,602	3,217	4,332	5,966
By economic sector - Trade (jobs)		1,001	1,443	1,542	1,866	2,477	3,486
By economic sector - Utilities (jobs)		1,809	3,670	3,472	3,562	4,952	5,794
By resource sector - Biomass (jobs)		426	403	300	190	94.1	284
By resource sector - CO2 (jobs)		0	0	719	0	0	405
By resource sector - Coal (jobs)		2.46	0.823	0	0	0	0
By resource sector - Grid (jobs)		2,314	6,161	5,080	6,266	9,012	10,130
By resource sector - Natural Gas (jobs)		922	727	715	557	523	469
By resource sector - Nuclear (jobs)		303	298	173	0	0	0
By resource sector - Oil (jobs)		1,435	1,205	1,015	815	615	380
By resource sector - Solar (jobs)		1,871	1,792	2,019	2,225	2,480	4,433
By resource sector - Wind (jobs)		1,750	3,671	4,402	5,679	7,729	10,278
By education level - All sectors - High		3,816	5,969	5,990	6,431	8,264	10,569
school diploma or less (jobs)							
By education level - All sectors -		2,775	4,503	4,602	5,037	6,599	8,518
Associates degree or some college (jobs)							
By education level - All sectors -		1,885	2,925	2,952	3,268	4,272	5,552
Bachelors degree (jobs)							
By education level - All sectors - Masters		472	746	758	857	1,132	1,490
or professional degree (jobs)							
By education level - All sectors - Doctoral		74.3	115	120	140	185	250
degree (jobs)							
Related work experience - All sectors -		1,300	2,060	2,085	2,260	2,935	3,787
None (jobs)							
Related work experience - All sectors - Up		1,844	2,864	2,881	3,126	4,015	5,192
to 1 year (jobs)							
Related work experience - All sectors - 1		3,238	5,124	5,178	5,667	7,388	9,530
to 4 years (jobs)							
Related work experience - All sectors - 4		2,096	3,344	3,404	3,727	4,872	6,281
to 10 years (jobs)							
Related work experience - All sectors -		546	867	873	953	1,243	1,591
Over 10 years (jobs)							
Un-the-Job Training - All sectors - None		508	(75	785	861	1,112	1,455
		F 00 (0.000	0.050	10.000	10.001	17.0 (0
Un-the-Job Training - All sectors - Up to 1		5,934	9,303	9,350	10,202	13,231	17,063
year (jobs)		1.075	0.000	0.005	0.071	/ / 11	
Un-the-Job Training - All Sectors - 1 to 4		1,875	3,032	3,095	3,371	4,411	5,667
Veal's (JUDS)		(10	1.015	105/	1151	1 - 11	105/
Un-the-Job Training - All Sectors - 4 to 10		618	1,015	1,054	1,151	1,511	1,954
On the Joh Training All sectors Over 10		00 /.	127	197	1/.7	107	0/.0
Voars (jobs)		00.4	154	151	147	101	242
On Site on In Dight Training All costons		1 / 70	0.010	0.951	2 5 9 0	2 250	1. 261.
Nono (johe)		1,410	2,312	2,551	2,560	3,352	4,304
On-Site or In-Diant Training - All sectors -		5 3 8 2	8 / 53	8 / 96	0.262	12 015	15 /.77
lin to 1 year (inhs)		J,J0Z	0,400	0,470	7,202	12,010	10,411
On-Site or In-Plant Training - All sectors -		1/56	2 3/12	2 2 8 2	2 502	3 384	4 3/14
1 to 4 years (inhs)		1,400	2,042	2,000	2,070	0,000	4,040
On-Site or In-Plant Training - All sectors -		631	1 በ 25	1 0 6 1	1156	1,512	1953
4 to 10 years (iobs)		001	1,020	1,001	1,100	1,010	1,700
On-Site or In-Plant Training - All sectors -		761	127	130	142	187	240
Over 10 vears (iobs)			121	.00	172	.01	270
Wage income - All (million \$2019)		465	749	763	843	1.115	1,452
					0.0	.,	., .02

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	150	142	130	120	112	103	93
Final energy use - Residential (PJ)	71.3	68.1	66.1	64.1	61.5	57.8	53.1
Final energy use - Commercial (PJ)	49	49.1	48.9	48.7	48	47.1	46.1
Final energy use - Industry (PJ)	165	176	181	184	188	193	197

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.09	1.13	1.39	1.45	2.09	2.22
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)	7.84	52.9	98.1	307	516	979	1,441
Vehicle stocks - LDV – All others (1000	1,884	1,884	1,884	1,787	1,690	1,302	915
units)							
Light-duty vehicle capital costs vs. REF -		0	58.3	123	414	1,303	1,898
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.066		0.213		1.12		3.13
units)							
Public EV charging plugs - L2 (1000 units)	0.128		5.12		27		75.3

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	19.2	21.1	27.7	43.3	62.6	73.4
Heat Pump (%)							
Sales of space heating units - Electric	10.7	17.2	16.8	15.7	12.9	9.42	7.34
Resistance (%)							
Sales of space heating units - Gas (%)	73.4	53	51.3	46.6	35.6	21.5	13.1
Sales of space heating units - Fossil (%)	6.36	10.7	10.8	9.99	8.15	6.52	6.16
Sales of water heating units - Electric	0	0.373	1.39	4.79	13	23.4	29.5
Heat Pump (%)							
Sales of water heating units - Electric	21.3	36.4	37.1	39.3	44.4	50.9	54.7
Resistance (%)							
Sales of water heating units - Gas Furnace	76.7	61.1	59.4	53.8	40.4	23.6	13.6
(%)							
Sales of water heating units - Other (%)	1.97	2.1	2.1	2.11	2.11	2.11	2.11
Sales of cooking units - Electric	61.6	62.6	66.1	75.4	88.3	96.2	99
Resistance (%)							
Sales of cooking units - Gas (%)	38.4	37.4	33.9	24.6	11.7	3.79	1.02
Residential HVAC investment in 2020s vs.		1.25	1.37				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3.53	7.33	9.61	17.1	35.2	58.2	71.6
Heat Pump (%)							
Sales of space heating units - Electric	3.3	3.45	3.58	4.06	5.22	6.69	7.54
Resistance (%)							
Sales of space heating units - Gas Furnace	92.1	89	86.6	78.7	59.5	35.1	20.8
(%)							
Sales of space heating units - Fossil (%)	1.07	0.256	0.242	0.19	0.113	0.063	0.046
Sales of water heating units - Electric	0.03	0.512	1.83	6.23	16.9	30.4	38.3
Heat Pump (%)							
Sales of water heating units - Electric	1.46	1.95	3.27	7.65	18.2	31.6	39.5
Resistance (%)							

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

Item	2020	2025	2030	2035	2040	2045	2050		
Sales of water heating units - Gas Furnace	98.1	97.2	94.5	85.7	64.5	37.6	21.8		
(%)									
Sales of water heating units - Other (%)	0.366	0.384	0.383	0.384	0.383	0.384	0.383		
Sales of cooking units - Electric	41.9	46.2	50.2	60.8	75.4	84.6	87.8		
Resistance (%)									
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2		
Commercial HVAC investment in 2020s -		4,239	4,714						
Cumulative 5-yr (million \$2018)									

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

	,	0	, ,				
Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	6.2	6.2	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,069	1,069	1,069	1,063	1,484	1,136	1,176
Installed thermal - Nuclear (MW)	600	600	600	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-2,216
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-132
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,790
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-148
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,420
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-284
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-2,977
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-233
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-2,279
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-11,479
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-3,320
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-463
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-3,224
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-217
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,839
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-548
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,465
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,656
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-4,520
productivity (1000 tCO2e/y)							04 0 = 2
Carbon sink potential - Mid - All (not							-21,253
counting overlap] (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - High - Accelerate							-4 423
regeneration (1000 tC02e/v)							7,720
Canhan aink natantial High Avoid							702
dafanastation (1000 t000s (c)							-193
deforestation (1000 tc02e/y)							
Carbon sink potential - High - Extend							-4,659
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-290
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,259
retention of HWP (1000 tCO2e/v)							
Carbon sink notential - High - Increase							-812
trace outside ferents $(1000 \pm 0020 /y)$							-012
Contrar cink notantial High Defenset							F 0F 0
Carbon sink polential - High - Reforest							-5,953
cropiand (1000 tC02e/y)							
Carbon sink potential - High - Reforest							-3,080
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-31,032
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-6.761
nroductivity (1000 tC02e/y)							-1
Land impacted for carbon sink notantial							240
							302
Low - Accelerate regeneration (1000							
hectaresj							
Land impacted for carbon sink potential -							101
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							910
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink notential							53 5
Lanu Impacteu for carbon Sink potentiar -							55.5
Low - Improve plantations (1000							
nectaresj							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.6
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink notential -							197
Low - Peforest cronland (1000 bectares)							171
Lond imposted for contain and potential							15.0
Lanu Impacteu IUr Carbon SINK potential -							15.2
LUW - REIDREST PASTURE (IUUU NECTARES)							
Land impacted for carbon sink potential -							1,356
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,035
Low - Total impacted (over 30 vears)							
(1000 hectares)							
Land impacted for carbon sink notential -			<u> </u>				543
Mid - Accelerate regeneration (1000							5-6
hostones)							
Lond imposted for early actuation							107
Lanu impacted for carbon sink potential -							104
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,643
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							80.5
Mid - Improve plantations (1000 hectares)							
				1			

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

Itom	2020	, 2025	2020	2025	204.0	2075	2050
Land impacted for carbon sink potential	2020	2025	2030	2035	2040	2045	2030
Mid - Increase retention of HWP (1000							0
hostones)							
Land impacted for carbon sink potential							<u> </u>
Mid Increase trees outside forests (1000							50.9
hostanos)							
Lond imposted for earbon sink notential							005
Lanu impacteu ior carbon sink potential - Mid Defenset enerland (1000 bestense)							295
Mid - Reforest cropiand (1000 nectares)							110
Land Impacted for carbon sink potential -							110
Mid - Reforest pasture (1000 nectares)							0 701
Land impacted for carbon sink potential -							2,731
Mia - Restore productivity (1000							
nectaresj							
Land impacted for carbon sink potential -							5,565
Mid - Total impacted (over 30 years) (1000							
hectaresj							
Land impacted for carbon sink potential -							724
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							107
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,376
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							107
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 -							77.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							394
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							87.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,241
High - Restore productivity (1000							-
hectares)							
Land impacted for carbon sink potential -							6,113
High - Total impacted (over 30 years)							•
(1000 hectares)							

Table 26: E- scenario	- PILLAR 6: Land	sinks - Agriculture
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Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-972
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-31.4
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,003
deployment - Total (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							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,914
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-62.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,976
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,168
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							51.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,220
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							2,284
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							104
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,387
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 -		4.77	0.005	0.005	0.005	0.003	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		1.28	0.659	0.364	0.285	0.169	0.088
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		14.1	13.5	10.5	6.15	2.81	1.06
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		2.74	2.6	2.03	1.23	0.617	0.3
Stations (deaths)							
Premature deaths from air pollution -		2.49	2.22	1.63	0.955	0.473	0.188
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.136	0.124	0.087	0.046	0.022	0.01
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		0.29	0.275	0.224	0.156	0.091	0.047
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.043	0.041	0.04	0.038	0.036	0.034
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		1.7	1.58	1.24	0.806	0.448	0.213
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		0.257	0.209	0.166	0.128	0.092	0.06
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.201	0.173	0.144	0.114	0.085	0.057
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.127	0.013	0.012	0.011	0.01	0.002
Industrial Processes - Coal Mining							
(deaths)							
Premature deaths from air pollution -		8.55	8.16	7.12	5.19	3.2	0.478
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		42.3	0.049	0.049	0.042	0.027	0
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		11.3	5.84	3.23	2.52	1.5	0.779
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		125	120	93.3	54.7	25	9.4
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		24.3	23	17.9	10.9	5.47	2.66
Gas Stations (million \$2019)							
Monetary damages from air pollution -		22.1	19.7	14.4	8.46	4.19	1.67
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		1.2	1.1	0.767	0.404	0.194	0.087
Fuel Comb - Residential - Oil (million							
\$2019]							
Monetary damages from air pollution -		2.57	2.44	1.99	1.38	0.805	0.416
Fuel Comb - Residential - Other (million							
\$2019]		0.070				0.001	
Monetary damages from air pollution -		0.378	0.367	0.353	0.338	0.321	0.303
Fuel Comb - Comm/Institutional - Coal							
		15.1	1/		71/		1.00
Monetary damages from air pollution -		15.1	14	TI	7.14	3.96	1.88
Fuel Comb - Comm/Institutional - Natural							
Gas (minion \$2019)		0.07	1.05	1/7	1 10	0.017	0 500
Monetary damages from air pollution -		2.27	1.85	1.47	1.13	0.817	0.533
Fuel Comp - Comm/Institutional - Oil							
(IIIIIII0II \$2019) Monotony domagon from air pollution		1 70	1 5 9	1.07	1.01	0.757	0 5 0 2
Mulletary damages mull all pullution -		1.78	1.55	1.27	1.01	0.754	0.503
(million \$2010)							
Monotony domogoo from ain pollution		1 10	0 110	0 107	0.002	0.095	0.02
Monetary damages from all policion -		1.12	0.110	0.107	0.093	0.065	0.02
(million \$2019)							
Monetary damages from air pollution		74	70 5	62.0	1.4	<u> </u>	/. วะ
Industrial Processes - Oil & Cas		10	12.0	03.2	40	20.4	4.20
Droduction (million \$2010)							

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		143	187	130	73.4	24.1	63.3
By economic sector - Construction (jobs)		2,829	4,369	5,391	7,178	8,263	11,953
By economic sector - Manufacturing		913	1,313	1,528	1,726	1,652	2,688
(jobs)							
By economic sector - Mining (jobs)		576	406	246	129	46.1	6.33
By economic sector - Other (jobs)		322	469	627	866	1,087	1,783
By economic sector - Pipeline (jobs)		121	101	71	44.8	21.9	8.7
By economic sector - Professional (jobs)		1,488	2,526	3,332	4,712	5,985	8,934

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		1,017	1,460	1,863	2,572	3,277	5,050
By economic sector - Utilities (jobs)		1,901	3,656	4,262	6,052	6,717	9,774
By resource sector - Biomass (jobs)		398	471	304	190	93.9	295
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		2.46	0.823	0	0	0	0
By resource sector - Grid (jobs)		2,519	6,244	7,596	11,269	12,420	18,412
By resource sector - Natural Gas (jobs)			780	665	452	379	338
By resource sector - Nuclear (jobs)		303	176	0	0	0	0
By resource sector - Oil (jobs)		1,420	1,106	755	437	160	0.805
By resource sector - Solar (jobs)		1.911	1,844	2.097	2.356	2.582	4,717
By resource sector - Wind (jobs)		1.864	3,867	6,034	8.650	11,439	16,497
By education level - All sectors - High		3.934	6,066	7.213	9,529	10,854	16,123
school diploma or less (jobs)		-, -	-,	, -		-,	-, -
By education level - All sectors -		2.873	4.582	5,588	7,542	8,766	13.035
Associates degree or some college (jobs)		,	,	-,	, -	-,	-,
By education level - All sectors -		1,941	2,965	3,575	4,814	5,683	8,464
Bachelors degree (jobs)		,	,		, -	-,	-, -
By education level - All sectors - Masters		486	758	927	1.267	1.520	2.266
or professional degree (jobs)					.,	.,	_,
By education level - All sectors - Doctoral		76	117	147	202	250	373
degree (iobs)		_			_		
Related work experience - All sectors -		1.340	2,094	2.514	3,357	3,873	5,766
None (jobs)		.,	_,			-,	
Related work experience - All sectors - Up		1,900	2,913	3,488	4,611	5,299	7,896
to 1 year (jobs)							
Related work experience - All sectors - 1		3,340	5,204	6,268	8,413	9,780	14,547
to 4 years (jobs)							
Related work experience - All sectors - 4		2,165	3,397	4,120	5,550	6,471	9,600
to 10 years (jobs)		-					
Related work experience - All sectors -		565	879	1,060	1,422	1,649	2,451
Over 10 years (jobs)					-		
On-the-Job Training - All sectors - None		522	785	944	1,257	1,468	2,190
(jobs)							
On-the-Job Training - All sectors - Up to 1		6,118	9,452	11,330	15,107	17,491	26,072
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		1,939	3,082	3,744	5,049	5,856	8,673
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		638	1,033	1,269	1,725	2,012	2,962
years (jobs)							
On-the-Job Training - All sectors - Over 10		91.3	136	164	214	246	364
years (jobs)							
On-Site or In-Plant Training - All sectors -		1,524	2,352	2,845	3,808	4,449	6,626
None (jobs)							
On-Site or In-Plant Training - All sectors -		5,551	8,584	10,291	13,728	15,878	23,656
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		1,505	2,380	2,882	3,877	4,486	6,650
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		651	1,042	1,274	1,726	2,011	2,960
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		78.9	129	159	215	249	369
Over 10 years (jobs)							
Wage income - All (million \$2019)		480	760	923	1,256	1,478	2,225

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	150	141	124	104	85.9	74.5	69.8
Final energy use - Residential (PJ)	71.3	68.1	65.2	58.8	51.1	45.3	41.4
Final energy use - Commercial (PJ)	49	49.1	48.2	46	43.3	41.4	40.7
Final energy use - Industry (PJ)	165	175	179	179	180	185	191

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

	1.		,				
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.28	1.35	2.22	2.38	2.18	2.3
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	10.1	164	317	854	1,392	1,821	2,250
Vehicle stocks - LDV – All others (1000 units)	1,876	1,787	1,697	1,237	776	439	102
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		361	924	1,498	2,269	2,469	2,354
Public EV charging plugs - DC Fast (1000 units)	0.066		0.688		3.02		4.88
Public EV charging plugs - L2 (1000 units)	0.128		16.6		72.7		118

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	20.4	40.3	80.7	88.3	89	88.8
Heat Pump (%)							
Sales of space heating units - Electric	10.7	17	13.5	5.83	4.48	4.43	4.48
Resistance (%)							
Sales of space heating units - Gas (%)	73.4	52.1	37	7.24	1.97	1.65	1.64
Sales of space heating units - Fossil (%)	6.36	10.6	9.29	6.2	5.2	4.89	5.13
Sales of water heating units - Electric	0	0.814	11.1	33.7	37.7	38	38
Heat Pump (%)							
Sales of water heating units - Electric	21.3	36.7	43.2	57.2	59.8	59.9	59.9
Resistance (%)							
Sales of water heating units - Gas Furnace	76.7	60.4	43.6	6.97	0.411	0	0
(%)							
Sales of water heating units - Other (%)	1.97	2.09	2.1	2.1	2.1	2.1	2.1
Sales of cooking units - Electric	61.7	69.9	94.8	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	38.3	30.1	5.15	0.259	0	0	0
Residential HVAC investment in 2020s vs.		1.25	1.37				
REF - Cumulative 5-yr (billion \$2018)							

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

	//						
Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3.53	8.34	31.3	81.3	90.2	90.7	90.8
Heat Pump (%)							
Sales of space heating units - Electric	3.3	3.52	4.98	8.12	8.7	8.74	8.73
Resistance (%)							
Sales of space heating units - Gas Furnace	92.1	87.9	63.7	10.6	1.11	0.511	0.508
(%)							
Sales of space heating units - Fossil (%)	1.07	0.221	0.042	0.002	0	0	0
Sales of water heating units - Electric	0.03	1.08	14.4	43.7	48.9	49.2	49.2
Heat Pump (%)							
Sales of water heating units - Electric	1.46	2.52	15.8	44.9	50.1	50.4	50.4
Resistance (%)							
Sales of water heating units - Gas Furnace	98.1	96	69.4	11.1	0.657	0	0
(%)							
Sales of water heating units - Other (%)	0.366	0.384	0.383	0.384	0.383	0.384	0.383
Sales of cooking units - Electric	41.9	54.6	83	88.6	88.9	88.9	88.9
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s -		4,239	4,716				
Cumulative 5-yr (million \$2018)							

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	6.2	6.2	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,069	1,069	1,290	1,091	1,488	1,143	1,176
Installed thermal - Nuclear (MW)	600	600	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	393	606	810	1,055	1,347	1,687	2,089
Installed renewables - Solar - Base land	1.71	1.71	1.71	1.71	1.71	1.71	1.71
use assumptions (MW)							
Installed renewables - Wind - Base land	952	952	14,294	22,314	34,448	42,003	55,310
use assumptions (MW)							
Installed renewables - Solar -	1.71	1.71	1.71	1.71	1.71	1.71	5,579
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	1,456	1,456	13,618	23,353	33,346	39,640	58,104
land use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	0	0	0
Constrained land use assumptions (MW)							
Capital invested - Wind - Base (billion		0	17.8	9.95	14.3	8.47	14.1
\$2018)							

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	4.27	4.27	4.27	4.27	4.27	4.27	4.27
Wind - Base land use assumptions (GWh)	3,041	3,041	43,012	65,295	97,655	117,079	150,061
OffshoreWind - Base land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Constrained land use assumptions	8.54	8.54	8.54	8.54	8.54	8.54	23,418
(GWh)							
Wind - Constrained land use assumptions	8,434	8,434	78,211	128,207	174,357	201,000	269,797
(GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-2,216
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-132
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,790
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-148
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,420
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-284
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-2,977
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-233
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-2,279
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-11,479
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-3,320
regeneration (1000 tCO2e/y)							

2035 2040 2045 2050 Item 2020 2025 2030 Carbon sink potential - Mid - Avoid -463 deforestation (1000 tC02e/y) Carbon sink potential - Mid - Extend -3,224 rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve -217 plantations (1000 tCO2e/y) Carbon sink potential - Mid - Increase -2,839 retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase -548 trees outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest -4,465 cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest -1,656 pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore -4,520 productivity (1000 tC02e/y) Carbon sink potential - Mid - All (not -21,253 counting overlap) (1000 tCO2e/y) Carbon sink potential - High - Accelerate -4,423 regeneration (1000 tCO2e/y) Carbon sink potential - High - Avoid -793 deforestation (1000 tC02e/v) Carbon sink potential - High - Extend -4,659 rotation length (1000 tCO2e/y) Carbon sink potential - High - Improve -290 plantations (1000 tCO2e/v) Carbon sink potential - High - Increase -4,259 retention of HWP (1000 tCO2e/y) Carbon sink potential - High - Increase -812 trees outside forests (1000 tC02e/y) Carbon sink potential - High - Reforest -5,953 cropland (1000 tCO2e/y) Carbon sink potential - High - Reforest -3,080 pasture (1000 tCO2e/y) Carbon sink potential - High - All (not -31,032 counting overlap) (1000 tCO2e/y) Carbon sink potential - High - Restore -6,761 productivity (1000 tC02e/y) Land impacted for carbon sink potential -362 Low - Accelerate regeneration (1000 hectares) Land impacted for carbon sink potential -101 Low - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential -910 Low - Extend rotation length (1000 hectares) Land impacted for carbon sink potential -53.5 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 -40.6 Low - Increase trees outside forests (1000 hectares) Land impacted for carbon sink potential -197 Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential -15.2 Low - Reforest pasture (1000 hectares)

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							1.356
Low - Restore productivity (1000							.,
hectares)							
Land impacted for carbon sink notential -							3 035
Low - Total impacted (over 30 years)							3,033
(1000 hostopos)							
Land impacted for carbon sink potential -							543
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							104
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,643
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink notential -							80.5
Mid - Improve plantations (1000 bectares)							0010
Land impacted for carbon sink potential							0
Mid Transpoor rotantian of UWD (1000							0
nectares							
Land impacted for carbon sink potential -							58.9
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							295
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							110
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,731
Mid - Restore productivity (1000							_,
hectares)							
Land impacted for carbon sink potential							5 5 6 5
Mid Total impacted (over 20 years) (1000							5,505
Milu - Total Impacteu (over 50 years) (1000							
							70/
Land impacted for carbon sink potential -							724
High - Accelerate regeneration (1000							
hectaresJ							
Land impacted for carbon sink potential -							107
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,376
High - Extend rotation length (1000							
hectares							
Land impacted for carbon sink notential -							107
High - Improve plantations (1000							101
hertares)							
Land impacted for carbon sink potential							0
High Thompson not ontion of HWD (1000							0
Land impacted for carbon sink potential -							(7.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							394
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							87.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,241
High - Restore productivity (1000							
hectares)							
l and impacted for carbon sink notential -			<u> </u>				6 113
High - Total impacted (over 30 years)							0,110
(1000 hertares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-972
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-31.4
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,003
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-1,914
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-62.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,976
deployment - Total (1000 tCO2e/y)							·
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,168
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							51.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,220
deployment - Total (1000 hectares)							-
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							2,284
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							104
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,387
Aggressive deployment - Total (1000							,
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.77	0.005	0.005	0.005	0.003	0
Fuel Comb - Electric Generation - Coal							
(deaths)							
Premature deaths from air pollution -		1.45	0.77	0.794	0.919	0.48	0.151
Fuel Comb - Electric Generation - Natural							
Gas (deaths)							
Premature deaths from air pollution -		14.1	13.5	10.5	6.15	2.81	1.06
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		2.74	2.6	2.03	1.23	0.617	0.3
Stations (deaths)							

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

Itom	2020	2025	2020	2025	204.0	2075	2050
	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		2.49	2.22	1.63	0.955	0.473	0.188
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.136	0.124	0.087	0.046	0.022	0.01
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		0.29	0.275	0.224	0.156	0.091	0.047
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.043	0.041	0.04	0.038	0.036	0.034
Fuel Comb - Comm/Institutional - Coal					0.000	0.000	0.001
(deaths)							
Dramatura daetha fram air pallution		17	1 5 0	10/	0.00/	0.440	0.010
Premature deaths from air poliution -		1.6	1.58	1.24	0.806	0.448	0.213
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.257	0.209	0.166	0.128	0.092	0.06
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.201	0.173	0.144	0.114	0.085	0.057
Fuel Comb - Comm/Institutional - Other							
(deaths)							
Premature deaths from air pollution -		0.095	0.013	0.012	0.011	0.01	0.002
Industrial Processes - Coal Mining		0.070	0.010	0.012	0.011	0.01	0.002
(dootho)							
		0.01			7.00	(17	
Premature deaths from air pollution -		8.81	8.64	8.55	7.32	6.17	4.63
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		42.3	0.049	0.049	0.042	0.027	0
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		12.8	6.82	7.04	8.14	4.25	1.34
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		125	120	93.3	54.7	25	94
Mohile - On-Poad (million \$2010)		120	120	70.0	04.1	20	7.4
Monotony domagoe from ain pollution		04.0		170	10.0	E / 7	0.//
Monetary damages from air poliution -		24.3	23	17.9	10.9	5.47	2.00
Gas Stations (million \$2019)							
Monetary damages from air pollution -		22.1	19.7	14.4	8.46	4.19	1.67
Fuel Comb - Residential - Natural Gas							
(million \$2019)							
Monetary damages from air pollution -		1.2	1.1	0.767	0.404	0.194	0.087
Fuel Comb - Residential - Oil (million							
\$2019)							
Monetary damages from air pollution -		2.57	2.44	1.99	1.38	0.805	0.416
Fuel Comh - Residential - Other (million		-					
\$2019)							
Monetary damages from air pollution -		0.378	0.367	0 353	0 338	0 321	0 303
Fuel Comb. Comm/Institutional. Coal		0.510	0.001	0.000	0.000	0.521	0.000
(million #0010)							
		15.1			74/		1.00
Monetary damages from air pollution -		15.1	14	11	7.14	3.96	1.88
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		2.27	1.85	1.47	1.13	0.817	0.533
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		1.78	1.53	1.27	1.01	0.754	0.503
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary demages from air pollution			0 114	0 10 9	0.00/	0.007	0.00
Industrial Drossesses Cool Mining		0.031	0.110	0.100	0.074	0.001	0.02
muusinai Processes - Goal Mining							
(mmon \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		78.2	76.7	75.9	65	54.8	41.1

	Table 39:	E+RE-	scenario	- IMPACTS - Jobs
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Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		149	169	121	71.7	24.9	65.8
By economic sector - Construction (jobs)		2,771	3,442	3,657	3,775	3,581	4,532
By economic sector - Manufacturing		887	990	961	929	674	741
(iobs)							
By economic sector - Mining (jobs)		586	422	283	176	106	66.2
By economic sector - Other (jobs)		314	386	428	520	574	926
By economic sector - Pipeline (jobs)		126	110	194	78.6	60.5	102
By economic sector - Professional (jobs)		1.428	1.868	1.830	2.138	2.212	2,794
By economic sector - Trade (iohs)		989	1160	1133	1280	1.327	1756
By economic sector - Utilities (inhs)		1938	2 918	3 033	3 044	2 659	2954
By resource sector - Biomass (jobs)		402	403	296	193	100	2,704
By resource sector - CO2 (jobs)				813	0	0	458
By resource sector - Coal (jobs)		246	0.823	010	0	0	0
By resource sector - Ord (jobs)		2.40	/, 630	/, 215	5 3 8 3	/, 596	/, 737
By resource sector - Natural Cas (jobs)		2,500	4,037 8/./.	94,213	7/./.	4,370	4,131
By resource sector - Natural das (jobs)		202	202	172	144	004	022
By resource sector - Nuclear (jobs)		1 / 10	270	702	<u> </u>	0	
By resource sector - Oil (JUDS)		1,419	1,110	10/1	0.1/1	310	209
By resource sector - Solar (Jobs)		1,915	1,157	1,961	2,161	2,320	4,332
By resource sector - wind (Jobs)		1,614	2,404	2,531	3,030	3,222	3,289
By education level - All sectors - High		3,891	4,833	4,909	5,007	4,600	5,731
school diploma or less (Jobs)		0.00(0.700	0.0/7		. 510
By education level - All sectors -		2,836	3,602	3,728	3,867	3,628	4,513
Associates degree or some college (jobs)		1.010			0 (10		
By education level - All sectors -		1,910	2,344	2,326	2,419	2,292	2,825
Bachelors degree (jobs)							
By education level - All sectors - Masters		477	595	588	624	602	745
or professional degree (jobs)							
By education level - All sectors - Doctoral		73.8	90.6	88.3	96.4	96.8	122
degree (jobs)							
Related work experience - All sectors -		1,325	1,662	1,699	1,745	1,624	2,029
None (jobs)							
Related work experience - All sectors - Up		1,873	2,314	2,333	2,400	2,223	2,790
to 1 year (jobs)							
Related work experience - All sectors - 1		3,297	4,117	4,169	4,314	4,041	5,010
to 4 years (jobs)							
Related work experience - All sectors - 4		2,135	2,678	2,736	2,828	2,656	3,280
to 10 years (jobs)							
Related work experience - All sectors -		557	694	703	725	675	827
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		514	626	628	649	613	774
(jobs)							
On-the-Job Training - All sectors - Up to 1		6,038	7,490	7,533	7,776	7,240	8,995
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		1,916	2,429	2,512	2,591	2,425	2,997
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		630	812	856	885	836	1,040
years (jobs)							
On-the-Job Training - All sectors - Over 10		89.7	108	111	112	104	130
years (jobs)							
On-Site or In-Plant Training - All sectors -		1,500	1,857	1,881	1,946	1,835	2,298
None (jobs)							
On-Site or In-Plant Training - All sectors -		5,479	6,806	6,857	7,075	6,582	8,172
Up to 1 year (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors -		1,487	1,879	1,935	1,996	1,863	2,306
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		643	821	861	885	835	1,035
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		78	101	106	110	103	127
Over 10 years (jobs)							
Wage income - All (million \$2019)		474	602	615	642	607	757

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	150	141	124	104	85.9	74.5	69.8
Final energy use - Residential (PJ)	71.3	68.1	65.2	58.8	51.1	45.3	41.4
Final energy use - Commercial (PJ)	49	49.1	48.2	46	43.3	41.4	40.7
Final energy use - Industry (PJ)	165	175	179	179	180	185	191

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.28	1.35	2.22	2.38	2.18	2.3
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)	10.1	164	317	854	1,392	1,821	2,250
Vehicle stocks - LDV – All others (1000	1,876	1,787	1,697	1,237	776	439	102
units)							
Light-duty vehicle capital costs vs. REF -		361	924	1,498	2,269	2,469	2,354
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.066		0.688		3.02		4.88
units)							
Public EV charging plugs - L2 (1000 units)	0.128		16.6		72.7		118

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

	//						
Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	20.4	40.3	80.7	88.3	89	88.8
Heat Pump (%)							
Sales of space heating units - Electric	10.7	17	13.5	5.83	4.48	4.43	4.48
Resistance (%)							
Sales of space heating units - Gas (%)	73.4	52.1	37	7.24	1.97	1.65	1.64
Sales of space heating units - Fossil (%)	6.36	10.6	9.29	6.2	5.2	4.89	5.13
Sales of water heating units - Electric	0	0.814	11.1	33.7	37.7	38	38
Heat Pump (%)							
Sales of water heating units - Electric	21.3	36.7	43.2	57.2	59.8	59.9	59.9
Resistance (%)							
Sales of water heating units - Gas Furnace	76.7	60.4	43.6	6.97	0.411	0	0
(%)							
Sales of water heating units - Other (%)	1.97	2.09	2.1	2.1	2.1	2.1	2.1
Sales of cooking units - Electric	61.7	69.9	94.8	99.7	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	38.3	30.1	5.15	0.259	0	0	0
Residential HVAC investment in 2020s vs.		1.25	1.37				
REF - Cumulative 5-yr (billion \$2018)							

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

		111001011					
Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3.53	8.34	31.3	81.3	90.2	90.7	90.8
Heat Pump (%)							
Sales of space heating units - Electric	3.3	3.52	4.98	8.12	8.7	8.74	8.73
Resistance (%)							
Sales of space heating units - Gas Furnace	92.1	87.9	63.7	10.6	1.11	0.511	0.508
(%)							
Sales of space heating units - Fossil (%)	1.07	0.221	0.042	0.002	0	0	0
Sales of water heating units - Electric	0.03	1.08	14.4	43.7	48.9	49.2	49.2
Heat Pump (%)							
Sales of water heating units - Electric	1.46	2.52	15.8	44.9	50.1	50.4	50.4
Resistance (%)							
Sales of water heating units - Gas Furnace	98.1	96	69.4	11.1	0.657	0	0
(%)							
Sales of water heating units - Other (%)	0.366	0.384	0.383	0.384	0.383	0.384	0.383
Sales of cooking units - Electric	41.9	54.6	83	88.6	88.9	88.9	88.9
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s -		4,239	4,716				
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)	6.2	6.2	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,170	1,170	1,170	789	1,189	837	1,057
Installed thermal - Nuclear (MW)	600	600	600	0	0	0	0
Installed renewables - Rooftop PV (MW)	393	606	810	1,055	1,347	1,687	2,089
Installed renewables - Solar - Base land	1.71	1.71	1.71	1.71	1.71	1.71	1.71
use assumptions (MW)							
Installed renewables - Wind - Base land	952	1,820	10,104	13,951	19,089	20,990	20,990
use assumptions (MW)							
Installed renewables - Solar -	1.71	1.71	1.71	1.71	1.71	223	838
Constrained land use assumptions (MW)							
Installed renewables - Wind - Constrained	1,317	2,486	11,110	13,021	18,974	22,030	22,030
land use assumptions (MW)							
Installed renewables - Offshore Wind -	0	0	0	0	0	0	0
Constrained land use assumptions (MW)							
Capital invested - Solar PV - Base (billion		0	0	0	0	0	0
\$2018)							
Capital invested - Wind - Base (billion		1.28	11	4.77	6.07	2.13	0
\$2018)							
Capital invested - Solar PV - Constrained		0	0	0	0	0.217	0.57
(billion \$2018)							
Capital invested - Wind - Constrained		1.72	11.5	2.37	7.03	3.43	0
(billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	4.27	4.27	4.27	4.27	4.27	4.27	4.27
Wind - Base land use assumptions (GWh)	3,041	5,811	30,893	42,045	56,581	61,738	61,738
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	4.27	4.27	4.27	4.27	4.27	470	1,775
Wind - Constrained land use assumptions (GWh)	4,217	7,876	32,710	37,875	53,612	61,273	61,273
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-2.216
regeneration (1000 tC02e/v)							_,
Carbon sink notential - Low - Avoid							_132
deforestation (1000 tC02e/v)							-132
Carbon sink potential Low Extend							1700
rotation longth (1000 t0020 (v)							-1,790
Carbon Sink potential - Low - Improve							-148
plantations (1000 tC02e/y)							
Carbon sink potential - Low - Increase							-1,420
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-284
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-2,977
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-233
pasture (1000 tCO2e/v)							
Carbon sink notential - Low - Restore							-2 279
productivity (1000 tC02e/y)							2,217
Carbon sink notential - Low - All (not							_11 /.70
cal bolt sink potential - Low - All (not coupting evenler) (1000 \pm CO2e(y)							-11,419
Counting over apj (1000 1002e/y)							0.000
Carbon sink potential - Mid - Accelerate							-3,320
regeneration (1000 tC02e/y)							
Carbon sink potential - Mid - Avoid							-463
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-3,224
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-217
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2.839
retention of HWP (1000 tC02e/v)							,
Carbon sink notential - Mid - Increase							-548
trees outside forests (1000 tC02e/v)							040
Carbon sink notential - Mid - Peforest							_/_/_65
cal boll Sillk potential - Mid - Reforest							-4,405
							1/5/
Carbon Sink potential - Mid - Reforest							-1,656
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-4,520
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-21,253
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-4,423
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-793
deforestation (1000 tC02e/v)							
Carbon sink notential - High - Extend							-4.659
rotation length (1000 tC02e/v)							.,,
Carbon sink notential - High - Improve							
plantations (1000 tC020/y)							-270
Carbon sink petential Uigh Increase							()50
Carbon Sink potential - High - Increase							-4,239
retention of HWP (1000 tc02e/y)							
Carbon sink potential - High - Increase							-812
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,953
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-3,080
pasture (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-31,032
counting overlap) (1000 tC02e/v)							-
Carbon sink potential - High - Restore	+						-6.761
productivity (1000 tCO2e/v)							-,
		1			1	1	

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 -							362
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink notential -							101
Low - Avoid deforestation (over 30 years)							101
(1000 bectares)							
Lond imposted for carbon sink notantial							010
Lanu impacted for carbon sink potential -							910
nectares							
Land impacted for carbon sink potential -							53.5
Low - Improve plantations (1000							
hectaresj							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.6
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							197
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							15.2
Low - Reforest nasture (1000 hectares)							
Land impacted for carbon sink notential -							1 3 5 6
Low - Pestore productivity (1000							1,000
hostanos)							
Lond imposted for earbon sink notantial							2.025
Lanu impacted for carbon sink potential -							3,035
Low - Total Impacted (over 30 years)							
Land impacted for carbon sink potential -							543
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							104
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,643
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							80.5
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink notential -							0
Mid - Increase retention of HWP (1000							Ũ
hectares)							
Land impacted for carbon sink notential							58.0
Mid Thompson thoos outside fenests (1000							50.7
hastones)							
Lond imposted for contant cink notential							005
Lanu impacteu for carbon sink potential -							295
Mid - Reforest cropiand (1000 nectares)							
Land impacted for carbon sink potential -							110
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,731
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,565
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							724
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink notential -							107
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
<pre></pre>							

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 -							2,376
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							107
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 -							77.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							394
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							87.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,241
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,113
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-972
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-31.4
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,003
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,914
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-62.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,976
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,168
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							51.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,220
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							2,284
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							104
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,387
Aggressive deployment - Total (1000							
hectares)							

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		4.77	0.005	0.005	0.005	0.003	0
Fuel Comb - Electric Generation - Coal							
(deaths)		1.0.0					
Premature deaths from air pollution -		1.39	0.682	0.497	0.416	0.267	0.174
Fuel Comb - Electric Generation - Natural							
Gas (deaths)		1/ 0	1/ 0	1/ 7	10 5	10.0	7/
Premature deaths from air pollution -		14.3	14.8	14.7	13.5	10.9	1.6
Dromature deaths from air pollution. Cas		2.70	200	2.07	2.61	0 10	1 51
Stations (deaths)		2.17	2.00	2.04	2.01	2.12	1.01
Premature deaths from air pollution -		25	2 39	2.23	199	1.62	1 18
Fuel Comb - Residential - Natural Gas		2.0	2.07	2.20	1.77	1.02	1.10
(deaths)							
Premature deaths from air pollution -		0.138	0.144	0.13	0.105	0.083	0.06
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		0.292	0.297	0.302	0.29	0.247	0.192
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.043	0.041	0.04	0.038	0.036	0.034
Fuel Comb - Comm/Institutional - Coal							
(deaths)							
Premature deaths from air pollution -		1.71	1.73	1.7	1.58	1.34	1.05
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.257	0.224	0.196	0.17	0.145	0.123
Fuel Comb - Comm/Institutional - Oil							
[deaths]							
Premature deaths from air pollution -		0.201	0.185	0.169	0.151	0.133	0.116
Fuel Comb - Comm/Institutional - Other							
[Utaliis]		0.11	0.01/	0.012	0.012	0.011	0.01
Industrial Drassassa, Coal Mining		0.11	0.014	0.013	0.012	0.011	0.01
(deathe)							
Premature deaths from air pollution -		8.68	798	7	6 19	5 5 3	3 91
Industrial Processes - Oil & Gas		0.00	1.70		0.17	0.00	0.71
Production (deaths)							
Monetary damages from air pollution -		42.3	0.049	0.049	0.042	0.027	0
Fuel Comb - Electric Generation - Coal				0.0.1	0.0.1	0.02.	· ·
(million \$2019)							
Monetary damages from air pollution -		12.3	6.04	4.41	3.69	2.37	1.54
Fuel Comb - Electric Generation - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		127	131	131	120	97	67.5
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		24.7	25.5	25.2	23.1	18.8	13.3
Gas Stations (million \$2019)							

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		22.2	21.2	19.8	17.6	14.3	10.5
Fuel Comb - Residential - Natural Gas							
(million \$2019)						0.70/	
Monetary damages from air pollution -		1.23	1.27	1.15	0.933	0.734	0.535
Fuel Comb - Residential - UII (million							
\$2019]					0.57		
Monetary damages from air pollution -		2.59	2.64	2.68	2.57	2.19	1.7
Fuel Comb - Residential - Other (million \$2019)							
Monetary damages from air pollution -		0.378	0.367	0.353	0.338	0.321	0.303
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		15.1	15.3	15.1	14	11.9	9.25
Fuel Comb - Comm/Institutional - Natural							
Gas (million \$2019)							
Monetary damages from air pollution -		2.27	1.98	1.73	1.5	1.29	1.09
Fuel Comb - Comm/Institutional - Oil							
(million \$2019)							
Monetary damages from air pollution -		1.78	1.64	1.49	1.34	1.18	1.03
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		0.973	0.119	0.116	0.11	0.101	0.092
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution -		77.1	70.8	62.2	55	49.1	34.8
Industrial Processes - Oil & Gas							
Production (million \$2019)							

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		147	166	122	70.9	22.6	73.9
By economic sector - Construction (jobs)		2,765	4,329	4,391	4,271	5,054	6,679
By economic sector - Manufacturing		839	1,275	1,062	903	1,001	1,200
(jobs)							
By economic sector - Mining (jobs)		584	433	320	237	154	82.3
By economic sector - Other (jobs)		317	464	509	587	729	1,180
By economic sector - Pipeline (jobs)		123	104	177	75.4	58.5	89.6
By economic sector - Professional (jobs)		1,460	2,469	2,505	2,725	3,387	4,687
By economic sector - Trade (jobs)		1,007	1,461	1,494	1,620	1,981	2,787
By economic sector - Utilities (jobs)		1,815	3,694	3,322	2,993	3,880	4,736
By resource sector - Biomass (jobs)		419	403	300	198	101	365
By resource sector - CO2 (jobs)		0	0	738	0	0	416
By resource sector - Coal (jobs)		2.46	0.823	0	0	0	0
By resource sector - Grid (jobs)		2,330	6,163	4,816	5,192	6,994	8,138
By resource sector - Natural Gas (jobs)		911	757	674	564	509	536
By resource sector - Nuclear (jobs)		303	298	173	0	0	0
By resource sector - Oil (jobs)		1,436	1,205	1,015	849	619	360
By resource sector - Solar (jobs)		1,869	1,790	1,991	2,164	2,383	4,417
By resource sector - Wind (jobs)		1,789	3,778	4,196	4,515	5,662	7,284
By education level - All sectors - High		3,828	6,021	5,780	5,531	6,602	8,693
school diploma or less (jobs)							
By education level - All sectors -		2,787	4,547	4,433	4,306	5,243	6,946
Associates degree or some college (jobs)							
By education level - All sectors -		1,893	2,955	2,845	2,794	3,383	4,482
Bachelors degree (jobs)							
By education level - All sectors - Masters		474	755	731	732	894	1,196
or professional degree (jobs)						<u> </u>	
By education level - All sectors - Doctoral		74.7	116	115	120	146	199
degree (jobs)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors -		1,304	2,079	2,011	1,941	2,340	3,102
None (jobs)							
Related work experience - All sectors - Up		1,850	2,890	2,780	2,685	3,203	4,258
to 1 year (jobs)							
Related work experience - All sectors - 1		3,250	5,173	4,991	4,855	5,874	7,761
to 4 years (jobs)							
Related work experience - All sectors - 4		2,105	3,377	3,281	3,188	3,866	5,103
to 10 years (jobs)							
Related work experience - All sectors -		549	875	841	813	985	1,292
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		510	783	758	741	888	1,188
(jobs)				0.010		10 0	10.000
On-the-Job Training - All sectors - Up to 1		5,955	9,390	9,012	8,744	10,522	13,920
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		1,883	3,062	2,983	2,884	3,505	4,617
years (jobs)		(01	1.005	1 010		1.000	1 500
Un-the-Job Training - All sectors - 4 to 10		621	1,025	1,018	988	1,203	1,592
years (jobs)		007	105	100	10 (1/0	100
Un-the-Job Training - All sectors - Uver IU		88.7	135	132	126	149	198
year's (JODS)		1/0/	0.007	0.07	0.000	0.(.(0 5 5 0
Un-Site of In-Plant Training - All sectors -		1,484	2,336	2,267	2,209	2,664	3,553
None (Jobs)		F (00	0 500	0.100	70/0	0.550	10 / 01
Un-Sile of In-Plant If along - All sectors -		5,402	8,532	8,190	7,940	9,558	12,631
Op Cite on In Plant Training All costons		1470	0.0/5	0.007	0.000	0 (0 0	2.547
1 to (woone (isba)		1,462	2,300	2,291	2,220	2,092	3,546
On Site on In Plant Training All costons		(2)	1.025	1.00/	000	1.005	1 500
(to 10 years (jobs)		634	1,035	1,024	992	1,205	1,590
4 to 10 years (jobs)		74 5	100	107	100	1/.0	104
Over 10 years (icha)		70.5	120	120	122	140	190
Wage income All (million \$2010)		1.67	75/	705	700	005	1100
waye mouthe - All (minuth \$2018)		407	(30	(35	(22	000	1,180

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	150	142	130	120	112	103	93
Final energy use - Residential (PJ)	71.3	68.1	66.1	64.1	61.5	57.8	53.1
Final energy use - Commercial (PJ)	49	49.1	48.9	48.7	48	47.1	46.1
Final energy use - Industry (PJ)	165	176	181	184	188	193	197

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

	-	-	-				
Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.09	1.13	1.39	1.45	2.09	2.22
Cumulative 5-yr (billion \$2018)							

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

	- //			-			
Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	7.84	52.9	98.1	307	516	979	1,441
Vehicle stocks - LDV – All others (1000	1,884	1,884	1,884	1,787	1,690	1,302	915
units)							
Light-duty vehicle capital costs vs. REF -		0	58.3	123	414	1,303	1,898
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.066		0.213		1.12		3.13
units)							
Public EV charging plugs - L2 (1000 units)	0.128		5.12		27		75.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	9.46	19.2	21.1	27.7	43.3	62.6	73.4
Sales of space heating units - Electric Resistance (%)	10.7	17.2	16.8	15.7	12.9	9.42	7.34
Sales of space heating units - Gas (%)	73.4	53	51.3	46.6	35.6	21.5	13.1
Sales of space heating units - Fossil (%)	6.36	10.7	10.8	9.99	8.15	6.52	6.16
Sales of water heating units - Electric Heat Pump (%)	0	0.373	1.39	4.79	13	23.4	29.5
Sales of water heating units - Electric Resistance (%)	21.3	36.4	37.1	39.3	44.4	50.9	54.7
Sales of water heating units - Gas Furnace (%)	76.7	61.1	59.4	53.8	40.4	23.6	13.6
Sales of water heating units - Other (%)	1.97	2.1	2.1	2.11	2.11	2.11	2.11
Sales of cooking units - Electric Resistance (%)	61.6	62.6	66.1	75.4	88.3	96.2	99
Sales of cooking units - Gas (%)	38.4	37.4	33.9	24.6	11.7	3.79	1.02
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.25	1.37				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3.53	7.33	9.61	17.1	35.2	58.2	71.6
Heat Pump (%)							
Sales of space heating units - Electric	3.3	3.45	3.58	4.06	5.22	6.69	7.54
Resistance (%)							
Sales of space heating units - Gas Furnace	92.1	89	86.6	78.7	59.5	35.1	20.8
(%)							
Sales of space heating units - Fossil (%)	1.07	0.256	0.242	0.19	0.113	0.063	0.046
Sales of water heating units - Electric	0.03	0.512	1.83	6.23	16.9	30.4	38.3
Heat Pump (%)							
Sales of water heating units - Electric	1.46	1.95	3.27	7.65	18.2	31.6	39.5
Resistance (%)							
Sales of water heating units - Gas Furnace	98.1	97.2	94.5	85.7	64.5	37.6	21.8
(%)							
Sales of water heating units - Other (%)	0.366	0.384	0.383	0.384	0.383	0.384	0.383
Sales of cooking units - Electric	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Commercial HVAC investment in 2020s -		4,239	4,714				
Cumulative 5-yr (million \$2018)							

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

	,		0 1 7				
Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	6.2	6.2	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,069	1,069	901	1,063	1,484	1,132	1,627
Installed thermal - Nuclear (MW)	600	600	600	0	0	0	0
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)		0	0	0	0	0	0.041
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0.096

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	107

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass w/ccu allam power plant (GWh)		0	0	0	0	0	40.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	0	0	1
(quantity)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	1
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	0	0	0	2
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	0	0	1
(quantity)							
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment -		0	0	0	0	0	1,084
Cumulative 5-yr (million \$2018)							
Biomass purchases (million \$2018/y)		0	0	0	0	0	78.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	1.16
Annual - BECCS (MMT)		0	0	0	0	0	1.16
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	0	1.16
Cumulative - BECCS (MMT)		0	0	0	0	0	1.16
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	177	177	177	177
Spur (km)		0	0	0	0	0	262
All (km)		0	0	177	177	177	439
Cumulative investment - Trunk (million \$2018)		0	0	423	423	423	423
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	150
Cumulative investment - All (million \$2018)		0	0	423	423	423	573

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - Low - Accelerate							-2 216
regeneration (1000 tCO2e/v)							2,210
Carbon sink notantial Low Avoid							120
defense tation (1000 tC020 (v)							-132
Oenhon sink notential Low Extend							1700
Carbon sink potential - Low - Extend							-1,790
rotation length (1000 tC02e/y)							
Carbon sink potential - Low - Improve							-148
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,420
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-284
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-2.977
cropland (1000 tCO2e/v)							•
Carbon sink notential - Low - Reforest							-233
$p_{asture} (1000 \pm 0.02 e/v)$							200
Carbon sink potential Low Bestone							0.070
Calibuli Silk potential - Low - Restore							-2,219
Carbon sink potential - Low - All (not							-11,479
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-3,320
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-463
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-3.224
rotation length (1000 tCO2e/v)							-,
Carbon sink notential - Mid - Improve							
nlantations (1000 tC02e/v)							-211
Conhan sink notantial Mid Inchaso							0.000
							-2,039
Carbon sink potential - Mid - Increase							-548
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-4,465
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,656
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-4,520
productivity (1000 tCO2e/y)							
Carbon sink notential - Mid - All (not							-21 253
counting overlap) (1000 tC02e/v)							21,200
Carbon sink notential - High - Accelerate							_/, /,23
non-point sink potential - Thigh - Accelerate							-4,423
							700
Carbon sink potential - Hign - Avoid							-793
deforestation (1000 tC02e/y)							
Carbon sink potential - High - Extend							-4,659
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-290
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-4,259
retention of HWP (1000 tCO2e/v)							
Carbon sink notential - High - Increase							-812
trees outside forests (1000 tC02e/v)							0.2
Carhon sink notential - High - Deforest							- 5 0 5 2
oronland (1000 +0020/v)							0,700
Opphan aink notantial Uinh Defensel							
Garbon Sink potential - High - Reforest							-3,080
Carbon sink potential - High - All (not							-31,032
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-6,761
productivity (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							362
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink notential -							101
Low - Avoid deforestation (over 30 years)							101
(1000 bectares)							
Land impacted for earbon sink notantial							010
Lanu impacteu ior carbon sink potential -							910
nectares							
Land impacted for carbon sink potential -							53.5
Low - Improve plantations (1000							
hectaresj							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.6
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							197
Low - Reforest cronland (1000 hectares)							.,,
Land impacted for carbon sink notential -							15.2
$L_{\rm ow}$ = Peforest pasture (1000 bectares)							10.2
Low - Reforest pasture (1000 field es)							105/
Land Impacted for carbon sink potential -							1,356
Low - Restore productivity (1000							
hectaresj							
Land impacted for carbon sink potential -							3,035
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							543
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							104
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1.643
Mid - Extend rotation length (1000							.,
hectares)							
Land impacted for carbon sink notential -							80.5
Mid Improve plantations (1000 bestanes)							00.0
Land impacted for earlier sink retential							
Lanu impacted for darbon Sink potential -							U
Mid - Increase recention of HWP (1000							
nectares							
Land impacted for carbon sink potential -							58.9
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							295
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							110
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,731
Mid - Restore productivity (1000							-
hectares)							
Land impacted for carbon sink notential -							5 565
Mid - Total impacted (over 30 years) (1000							0,000
hertares)							
Land imported for earbon sink notantial							707
Lanu inipatieu for Garboni Sink potential -							(24
Land impacted for carbon sink potential -							107
Hign - Avoid deforestation (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							2,376
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							107
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 -							77.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							394
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							87.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,241
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,113
High - Total impacted (over 30 years)							
(1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-972
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-31.4
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Moderate							-1,003
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,913
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-62.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Aggressive							-1,976
deployment - Total (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate					20.0		0
deployment - Corn-ethanol to energy							C C
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							1,168
deployment - Cropland measures (1000							,
hectares)							
Land impacted for carbon sink - Moderate							51.8
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							0.25
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							4.37
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							1,224
deployment - Total (1000 hectares)							
Land impacted for carbon sink -							0
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							5,638
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							104
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							0.25
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							4.37
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							5,746
Aggressive deployment - Total (1000							
hectares							

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		7.93	5.22	2.58	2.03	1.87	1.75
Fuel Comb - Electric Generation - Coal							
Dremature deaths from air pollution -		156	1 /.9	163	10	1 1 2	0.061
Fuel Comb - Electric Generation - Natural		1.50	1.42	1.00	1.2	1.10	0.701
Gas (deaths)							
Premature deaths from air pollution -		14.3	15	15.6	16.3	17.1	17.8
Mobile - On-Road (deaths)							
Premature deaths from air pollution - Gas		2.78	2.91	3.02	3.15	3.26	3.38
Stations (deaths)							
Premature deaths from air pollution -		2.49	2.4	2.33	2.31	2.33	2.37
Fuel Comb - Residential - Natural Gas							
(deaths)							
Premature deaths from air pollution -		0.138	0.134	0.103	0.067	0.047	0.037
Fuel Comb - Residential - Oil (deaths)							
Premature deaths from air pollution -		0.288	0.296	0.31	0.327	0.335	0.343
Fuel Comb - Residential - Other (deaths)							
Premature deaths from air pollution -		0.045	0.045	0.046	0.046	0.046	0.046
Fuel Comb - Comm/Institutional - Coal							
(deaths)							

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

		,	0000	0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		1.72	1.75	1.67	1.57	1.53	1.58
Fuel Comb - Comm/Institutional - Natural							
Gas (deaths)							
Premature deaths from air pollution -		0.268	0.264	0.264	0.264	0.266	0.269
Fuel Comb - Comm/Institutional - Oil							
(deaths)							
Premature deaths from air pollution -		0.21	0.22	0.229	0.238	0.247	0.255
Fuel Comh - Comm/Institutional - Other		0.2.	0.22	0.227	0.200	0.2	0.200
(deaths)							
Dramatura deaths from air collution		0.200	0.105	0.15	0.1/.	0 122	0 100
Industrial Deserves - Osal Mining		0.299	0.195	0.15	0.14	0.155	0.122
Industrial Processes - Coal Mining							
[deaths]							
Premature deaths from air pollution -		8.73	9.33	9.67	9.36	9.39	8.89
Industrial Processes - Oil & Gas							
Production (deaths)							
Monetary damages from air pollution -		70.3	46.3	22.9	18	16.5	15.5
Fuel Comb - Electric Generation - Coal							
(million \$2019)							
Monetary damages from air pollution -		12.8	12.6	1/, 5	10.6	10	8 51
Fuel Comb. Floatnic Concretion. Natural		13.0	12.0	14.5	10.0	10	0.01
Gas (million \$2019)			10.0	100		170	
Monetary damages from air pollution -		127	133	139	145	152	158
Mobile - On-Road (million \$2019)							
Monetary damages from air pollution -		24.6	25.7	26.7	27.8	28.9	29.9
Gas Stations (million \$2019)							
Monetary damages from air pollution -		22.1	21.3	20.6	20.4	20.7	21
Fuel Comh - Residential - Natural Gas							
(million \$2019)							
Monotany damages from air pollution		1 0 0	1 10	0.01/.	0 505	0 /.16	0 22/.
Munetary utiliages in unital pullution -		1.22	1.19	0.914	0.595	0.410	0.324
\$2019]							
Monetary damages from air pollution -		2.55	2.62	2.75	2.89	2.97	3.04
Fuel Comb - Residential - Other (million							
\$2019)							
Monetary damages from air pollution -		0.395	0.401	0.405	0.408	0.409	0.409
Fuel Comb - Comm/Institutional - Coal							
(million \$2019)							
Monetary damages from air pollution -		15.3	15.5	14.8	13.9	13.6	14
Fuel Comb - Comm/Institutional - Natural		10.0	1010	1.10	1017	10.0	
Cae (million \$2010)							
Manatany domagon from air collution		0.07	0.07	0.07	0.07	0.05	0.00
Monetary damages from air poliution -		2.37	2.34	2.34	2.34	2.35	2.38
Fuel Comb - Comm/Institutional - Uil							
(million \$2019)							
Monetary damages from air pollution -		1.86	1.95	2.03	2.11	2.18	2.26
Fuel Comb - Comm/Institutional - Other							
(million \$2019)							
Monetary damages from air pollution -		2.64	1.72	1.32	1.24	1.17	1.08
Industrial Processes - Coal Mining							
(million \$2019)							
Monetary damages from air pollution	++	77 5	000	05.0	021	027.	70.0
Industrial Drossesses Oil 9 Occ		(1.5	02.0	00.0	03.1	03.4	10.7
Industrial Processes - Ull & Gas							
Production (million \$2019)							

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		145	141	140	133	133	136
By economic sector - Construction (jobs)		1,372	2,312	2,543	3,337	3,189	3,845
By economic sector - Manufacturing		544	676	814	912	745	761
(jobs)							
By economic sector - Mining (jobs)		593	478	389	318	271	230

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		74.1	287	346	461	502	841
By economic sector - Pipeline (jobs)		126	129	130	124	126	126
By economic sector - Professional (jobs)		828	1,176	1,320	1,823	1,801	2,241
By economic sector - Trade (jobs)		649	842	907	1,178	1,195	1,563
By economic sector - Utilities (jobs)		1,554	1,688	1,969	2,700	2,321	2,149
By resource sector - Biomass (jobs)		405	387	370	350	348	346
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		2.46	2.32	0.808	0	0	0
By resource sector - Grid (jobs)		1,931	2,109	2,472	4,329	3,737	3,339
By resource sector - Natural Gas (jobs)		943	995	1,192	952	1,008	1,003
By resource sector - Nuclear (jobs)		303	298	293	180	14	0
By resource sector - Oil (jobs)		1,448	1,235	1,088	1,008	963	931
By resource sector - Solar (jobs)			1,648	1,901	2,083	2,254	4,232
By resource sector - Wind (jobs)		854	1,056	1,240	2,082	1,960	2,039
By education level - All sectors - High		2,466	3,283	3,625	4,625	4,323	4,979
school diploma or less (jobs)							
By education level - All sectors -		1,770	2,383	2,671	3,476	3,261	3,781
Associates degree or some college (jobs)		, -	,	, -	-, -	-, -	-, -
By education level - All sectors -		1,284	1,602	1,754	2,230	2,082	2,403
Bachelors degree (jobs)			,	, -	,	,	,
By education level - All sectors - Masters		318	400	440	568	535	624
or professional degree (jobs)				_			-
By education level - All sectors - Doctoral		46.5	61.6	67.2	86.8	83.5	102
degree (jobs)				_			
Related work experience - All sectors -		851	1,121	1,245	1,599	1.502	1,740
None (jobs)			,		, -	,	, -
Related work experience - All sectors - Up		1,171	1,575	1,737	2,214	2,075	2,424
to 1 year (jobs)					-	-	
Related work experience - All sectors - 1		2,133	2,775	3,070	3,945	3,693	4,265
to 4 years (jobs)							
Related work experience - All sectors - 4		1,369	1,792	1,989	2,565	2,400	2,762
to 10 years (jobs)							
Related work experience - All sectors -		362	466	517	662	613	699
Over 10 years (jobs)							
On-the-Job Training - All sectors - None		326	433	474	600	564	670
(jobs)							
On-the-Job Training - All sectors - Up to 1		3,920	5,080	5,608	7,162	6,697	7,737
year (jobs)							
On-the-Job Training - All sectors - 1 to 4		1,204	1,610	1,798	2,334	2,184	2,510
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		382	532	596	786	743	861
years (jobs)							
On-the-Job Training - All sectors - Over 10		53.4	74.6	82.3	103	95.6	112
years (jobs)							
On-Site or In-Plant Training - All sectors -		946	1,257	1,391	1,776	1,666	1,954
None (jobs)							
On-Site or In-Plant Training - All sectors -		3,555	4,613	5,093	6,512	6,087	7,025
Up to 1 year (jobs)							
On-Site or In-Plant Training - All sectors -		937	1,251	1,393	1,805	1,689	1,942
1 to 4 years (jobs)							
On-Site or In-Plant Training - All sectors -		398	544	606	793	748	863
4 to 10 years (jobs)							
On-Site or In-Plant Training - All sectors -		48.6	65.8	74.3	98	92.3	106
Over 10 years (jobs)							
Wage income - All (million \$2019)		314	405	453	589	557	643

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	150	142	131	124	124	127	132

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	71.3	68.6	67.8	67.5	68	68.9	69.7
Final energy use - Commercial (PJ)	49	50.1	51.1	51.5	51.9	53.3	55.8
Final energy use - Industry (PJ)	165	182	194	206	220	239	257

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.18	1.23	1.36	1.42	1.52	1.58
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	8.94	22	22.3	22.8	23.5	24.2	24.8
Heat Pump (%)							
Sales of space heating units - Electric	10.9	16.6	16.4	16.3	16.1	15.6	14.8
Resistance (%)							
Sales of space heating units - Gas (%)	73.8	51.2	50.9	50.7	51.1	51.4	51
Sales of space heating units - Fossil (%)	6.39	10.3	10.4	10.2	9.34	8.82	9.31
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	21.3	36.2	36.3	36.3	36.4	36.4	36.5
Resistance (%)							
Sales of water heating units - Gas Furnace	76.7	61.7	61.6	61.6	61.5	61.4	61.4
(%)							
Sales of water heating units - Other (%)	1.97	2.1	2.11	2.11	2.12	2.12	2.12
Sales of cooking units - Electric	61.2	61.2	61.2	61.2	61.2	61.2	61.2
Resistance (%)							
Sales of cooking units - Gas (%)	38.8	38.8	38.8	38.8	38.8	38.8	38.8
Residential HVAC investment in 2020s vs.		1.22	1.24				
REF - Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	3.53	14.1	47	73.9	78.3	78.8	78.8
Heat Pump (%)							
Sales of space heating units - Electric	3.3	4.34	8.76	15.7	20	20.6	20.7
Resistance (%)							
Sales of space heating units - Gas Furnace	92.1	81.3	44.1	10.4	1.72	0.57	0.509
(%)							
Sales of space heating units - Fossil (%)	1.07	0.24	0.141	0.039	0.005	0	0
Sales of water heating units - Electric	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Heat Pump (%)							
Sales of water heating units - Electric	1.46	1.47	1.47	1.48	1.47	1.48	1.47
Resistance (%)							
Sales of water heating units - Gas Furnace	98.1	98.1	98.1	98.1	98.1	98.1	98.1
(%)							
Sales of water heating units - Other (%)	0.366	0.384	0.383	0.384	0.383	0.384	0.383
Sales of cooking units - Electric	41.9	44.7	44.7	44.6	44.4	44.5	44.6
Resistance (%)							
Sales of cooking units - Gas (%)	58.1	55.3	55.3	55.4	55.6	55.5	55.4
Commercial HVAC investment in 2020s -		4,185	4,377				
Cumulative 5-yr (million \$2018)							

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

	,		5				
Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	6.2	6.2	6.2	0	0	0	0
Installed thermal - Natural gas (MW)	1,069	1,069	1,069	1,283	1,303	952	1,034

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	600	600	600	600	50	0	0
Installed renewables - Rooftop PV (MW)	393	606	810	1,055	1,347	1,687	2,089
Installed renewables - Solar - Base land	1.71	1.71	1.71	1.71	1.71	1.71	1.71
Installed renewables - Wind - Base land	952	952	952	952	8 628	12 410	12 410
use assumptions (MW)	,02	,02	,02	,02	0,020	12, 110	12, 110
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	40.5	40.5

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

	,						
Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	4.27	4.27	4.27	4.27	4.27	4.27	4.27
Wind - Base land use assumptions (GWh)	3,041	3,041	3,041	3,041	26,585	37,730	37,730
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)	-22		4.29				1.23
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-1.16		-2.41				-2.53
Business-as-usual carbon sink - Total (Mt CO2e/y)	-23.1		1.88				-1.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate							-2,216
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-132
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-1,790
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-148
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-1,420
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-284
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-2,977
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-233
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-2,279
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-11,479
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-3,320
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-463
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-3,224
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-217
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-2,839
retention of HWP (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink notential - Mid - Increase							-548
trees outside forests (1000 tC02e/v)							0-10
Carbon sink notantial Mid Beforest							/. /.45
cal boll Silk potential - Mid - Reforest							-4,405
Carbon sink petential Mid Defenset							1/5/
Carbon Sink polential - Miu - Reforest							-1,000
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-4,520
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-21,253
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Accelerate							-4,423
regeneration (1000 tCO2e/y)							
Carbon sink notential - High - Avoid							-793
deforestation (1000 tC02e/v)							
Carbon sink notential - High - Extend							-/1 659
rotation length (1000 tC02e/v)							4,007
Carbon sink notantial High Improvo							200
cal boll Silk potential - High - Hiph ove							-290
Carbon sink potential - Hign - Increase							-4,259
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-812
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,953
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-3,080
nasture (1000 tC02e/v)							
Carbon sink notential - High - All (not							-31 0.32
counting overlap) (1000 tC02e/v)							01,002
Carbon sink notantial High Postano							6 761
productivity (1000 ±000 c/y)							-0,101
Lond imported for earbor cink potential							
Land Impacted for carbon sink potential -							362
Low - Accelerate regeneration (1000							
nectaresj							
Land impacted for carbon sink potential -							101
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							910
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							53.5
Low - Improve plantations (1000							
hertares)							
Land impacted for carbon sink notential							0
Land impacted for car bon sink potential -							U
Land impacted for carbon sink potential -							40.6
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							197
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							15.2
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,356
Low - Restore productivity (1000							,
hectares)							
Land impacted for carbon sink potential							3 032
Lanu impacted for carbon Slifk Potential -							3,030
(1000 bootonoo)							
Land impacted for carbon sink potential -							543
Mid - Accelerate regeneration (1000							
nectaresJ							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							104
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1.643
Mid - Extend rotation length (1000							.,010
hectares)							
Land impacted for carbon sink potential -							80.5
Mid - Improve plantations (1000 hectares)							0010
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							-
hectares)							
Land impacted for carbon sink potential -							58.9
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							295
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							110
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,731
Mid - Restore productivity (1000							, -
hectares)							
Land impacted for carbon sink potential -							5,565
Mid - Total impacted (over 30 years) (1000							
hectares)							
Land impacted for carbon sink potential -							724
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							107
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,376
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							107
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 -							77.2
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							394
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							87.5
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,241
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,113
High - Total impacted (over 30 years)							
(1000 hectares)							