

Net-Zero America - Iouisiana state report

2021-03-15

These data underlie graphs and tables presented in the Princeton Net-Zero America study:

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Notes

- These data are all data from the study available at https://netzeroamerica.prince-ton.edu.
- The Net-Zero America study describes five pathways to reach net-zero emissions and one "no new policies" reference scenario. In this document, state-level results are grouped by scenario. For some scenarios, the study generated national, but not statelevel results.
- Within results for a given scenario, data tables are organized into corresponding sections of the full net-zero study (e.g., Pillar 1, Pillar 2, etc.)
- For Pillar 6 (Land sinks), values shown are maximum carbon storage potentials.

Data by category and subcategory

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		16,472	19,203				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Resistance (%)							
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric	6.12	26.1	76.9	91.1	92.2	92.2	92.2
Heat Pump (%)							
Sales of space heating units - Electric	5.02	4.5	4.79	6.09	6.39	6.41	6.42
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	88.9	69.4	18.3	2.84	1.39	1.35	1.34
(%)							
Sales of water heating units - Electric	0.147	10.7	56.3	66.5	66.9	66.9	66.9
Heat Pump (%)							
Sales of water heating units - Electric	4.15	8.12	26.9	31.1	31.3	31.3	31.3
Resistance (%)							
Sales of water heating units - Gas Furnace	93.7	79.3	15	0.631	0	0	0
(%)							
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

Table 2: E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		5.94	6.22	10.4	11.1	8.07	8.36
Cumulative 5-yr (billion \$2018)							

Table 3: E+ scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	127	128	123	117	112	111	112
Final energy use - Industry (PJ)	1,932	2,153	2,273	2,317	2,383	2,435	2,505
Final energy use - Residential (PJ)	142	136	128	117	108	103	102
Final energy use - Transportation (PJ)	598	567	515	454	397	363	350

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.78	4.86				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.6	73.7	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.4	26.3	4.49	0.226	0	0	0
Sales of space heating units - Electric	15	30.5	75.4	85.4	85.9	85.7	85.7
Heat Pump (%)							
Sales of space heating units - Electric	44.7	43.2	18.2	12.6	12.3	12.5	12.5
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.27	1.44	1.03	1.01	0.993	0.989
Sales of space heating units - Gas (%)	38	23	5.01	0.994	0.822	0.801	0.798
Sales of water heating units - Electric	0	12	63.6	75.1	75.6	75.6	75.6
Heat Pump (%)							
Sales of water heating units - Electric	56.5	60.4	29.9	23	22.7	22.7	22.7
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	25.8	4.84	0.202	0	0	0
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.71	1.71	1.72	1.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		747	1,909	3,103	4,697	5,116	4,875
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.067		1.34		5.93		9.61
units)							
Public EV charging plugs - L2 (1000 units)	0.204		32.1		143		231
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC	0.392	2.54	12.7	30.4	38.2	39.7	40
(%)							
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.7	1.95	1.32	0.424	0.077	0.013	0
Vehicle sales - Light-duty - EV (%)	3.4	13.6	44	80.8	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.8	79.8	51.3	17.5	3.42	0.594	0
Vehicle sales - Light-duty - hybrid (%)	3.92	4.18	3.04	1.15	0.276	0.059	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.348	0.215	0.068	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.109	0.105	0.07	0.025	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 6: E+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
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	4.01	0	1.27	0	0
Capital invested - Offshore Wind - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Solar PV - Constrained (billion \$2018)		12.5	1.23	0.476	0	0	0
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	0
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	90	90	180	270	270	439
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	90	90	180	270	270	439
Installed renewables - Rooftop PV (MW)	149	263	391	592	879	1,249	1,729
Installed renewables - Solar - Base land use assumptions (MW)	2,516	10,999	11,831	12,822	13,209	13,209	13,209
Installed renewables - Solar - Constrained land use assumptions (MW)	2,764	12,143	13,077	13,831	14,112	14,112	14,539
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	410	682
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	9,324	9,324	9,324

Table 7: E	aaanaania	יר מאווזח	Cloan Electrici	tv - Generation
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Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	4,506	4,506	5,927	5,927	5,927
OffshoreWind - Base land use	0	316	316	632	947	947	1,534
assumptions (GWh)							
OffshoreWind - Constrained land use	0	316	316	632	947	947	1,534
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	4,154	17,977	19,332	20,951	21,584	21,584	21,584
Solar - Constrained land use assumptions	4,549	19,843	21,368	22,600	23,061	23,061	23,757
(GWh)							
Wind - Base land use assumptions (GWh)	0	0	0	0	0	1,119	1,843
Wind - Constrained land use assumptions	0	0	0	0	23,852	23,852	23,852
(GWh)							

Table 8: E+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)		0	178	338	1,053	1,053	1,053
Conversion capital investment -		0	3,683	2,872	12,973	0	0
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	3	16	16	16
(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 - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	4	4	5	5	5
(quantity)							
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	1	1	1	1	1

Table 9: E+ scenario - PILLAR 4: CCUS - CO2 capture

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	4.5	8.25	24.6	24.7	25.1
Annual - BECCS (MMT)		0	4.46	8.14	24.5	24.6	24.6
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0.03	0.11	0.12	0.13	0.58
Cumulative - All (MMT)		0	4.5	12.8	37.4	62.1	87.2
Cumulative - BECCS (MMT)		0	4.46	12.6	37.1	61.7	86.2
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0.03	0.14	0.26	0.39	0.97

Table 10: E+ scenario - PILLAR 4: CCUS - CO2 pipelines

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	1,158	2,112	2,735	2,824	3,406
Cumulative investment - All (million \$2018)		0	5,319	8,747	9,320	9,421	9,749
Cumulative investment - Spur (million \$2018)		0	211	512	1,085	1,187	1,515
Cumulative investment - Trunk (million \$2018)		0	5,108	8,234	8,234	8,234	8,234
Spur (km)		0	337	760	1,383	1,472	2,054
Trunk (km)		0	821	1,352	1,352	1,352	1,352

Table 11: E+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	12.1	41.4	75	121	163
Injection wells (wells)		0	10	41	72	122	150
Resource characterization, appraisal, permitting costs (million \$2020)		47.3	1,162	1,837	1,837	1,837	1,837
Wells and facilities construction costs (million \$2020)		0	312	1,215	2,166	3,621	4,496

Table 12: E+ scenario - PILLAR 6: Land sinks - Agriculture

Table 12: E+ Scenario - PILLAR 6: Land Sink			0000	0005	00/0	00/5	0050
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-181
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							F /1/
Carbon sink potential - Aggressive							-5,416
deployment - Cropland measures (1000							
tCO2e/y)							(7.0
Carbon sink potential - Aggressive							-67.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,665
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,814
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-33.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,029
deployment - Total (1000 tCO2e/y)							,
Land impacted for carbon sink -							73.3
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,563
Aggressive deployment - Cropland							.,
measures (1000 hectares)							
Land impacted for carbon sink -							123
Aggressive deployment - Permanent							120
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,760
Aggressive deployment - Total (1000							1,700
hectares)							
Land impacted for carbon sink - Moderate							73.3
deployment - Corn-ethanol to energy							13.3
grasses (1000 hectares)							010
Land impacted for carbon sink - Moderate							813
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							61.7
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							948
deployment - Total (1000 hectares)							

Table 13: E+ scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-388
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tC02e/y)							7.00/
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							0.057
Carbon sink potential - High - Improve							-3,857
plantations (1000 tC02e/y)							10.001
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tC02e/y)							0//
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tC02e/y) Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							-1,331
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tC02e/y)							-5,511
Carbon sink potential - High - Restore						-	-3,779
productivity (1000 tC02e/y)							-5,117
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							-170
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tC02e/y)							-12,212
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tC02e/y)							201
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tC02e/y)							2,.00
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							, -
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							•
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-669
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-422
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-24,865
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tC02e/y)							2 2 2 2
Carbon sink potential - Mid - Reforest							-2,997
pasture (1000 tC02e/y)							2
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tCO2e/y)							

Table 13: E+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -	2020	2020	2000	2000	2040	2040	63.5
High - Accelerate regeneration (1000							00.0
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							100
(1000 hectares)							
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							0,000
hectares)							
Land impacted for carbon sink potential -							1,421
High - Improve plantations (1000							1,721
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							O
hectares)							
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							00.4
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							00.4
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							130
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							1,253
hectares)							
Land impacted for carbon sink potential -							6,840
							6,640
High - Total impacted (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							31.8
							31.0
Low - Accelerate regeneration (1000							
hectares)							176
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							1.075
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							
hectares)							711
Land impacted for carbon sink potential -							711
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 -							42.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							44.2
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							758
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,165
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							47.7
Mid - Accelerate regeneration (1000							
hectares)	1	1	1				

Tahla 12. Fx	econario -	DILLAD 6.	Land sinks -	Enrecte	(continued)
Table 15. Et	SCEIIUI 10 -	PILLAK O.	LUIIU SIIIKS -	. คบา ยอเอา	COHUHUEUT

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							182
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,481
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,069
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 -							61.4
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							66.3
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							198
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,527
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,633
Mid - Total impacted (over 30 years) (1000							
hectares)							

Table 14: E+ scenario - IMPACTS - Fossil fuel industries

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		1,342	1,131	907	683	430	298
Natural gas consumption - Cumulative (tcf)							27,326
Natural gas production - Annual (tcf)		3,393	3,208	2,794	2,362	1,873	1,455
Oil consumption - Annual (million bbls)		176	158	129	102	80	58.8
Oil consumption - Cumulative (million bbls)							3,942
Oil production - Annual (million bbls)		87.4	87.7	87.6	69.4	56.4	37.5

Table 15: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		251	0.265	0.229	0.146	0.088	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		147	87.1	48.6	42.1	22.2	11.7
Monetary damages from air pollution - Transportation (million 2019\$)		716	671	513	298	138	57.1
Premature deaths from air pollution - Coal (deaths)		28.3	0.03	0.026	0.017	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		16.6	9.84	5.48	4.76	2.51	1.32
Premature deaths from air pollution - Transportation (deaths)		80.6	75.5	57.7	33.5	15.5	6.42

Table 16: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		173	482	787	1,871	1,526	1,257
By economic sector - Construction (jobs)		18,631	15,168	15,055	13,369	11,175	10,662
By economic sector - Manufacturing		26,861	30,395	37,234	35,031	27,836	32,792
(jobs)							
By economic sector - Mining (jobs)		25,601	19,924	14,818	9,645	6,203	3,458

Table 16: E+ scenario - IMPACTS - Jobs (continued)

Table 16: E+ scenario - IMPACTS - Jobs (co	ntinueaj						
Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		1,833	950	1,134	1,222	1,186	1,381
By economic sector - Pipeline (jobs)		2,177	2,517	1,992	1,289	926	708
By economic sector - Professional (jobs)		11,016	8,780	8,765	9,077	7,722	6,909
By economic sector - Trade (jobs)		9,894	7,912	7,265	6,336	5,172	4,355
By economic sector - Utilities (jobs)		14,952	15,134	15,450	14,244	11,051	10,132
By education level - All sectors -		33,558	30,800	31,406	28,149	22,292	22,233
Associates degree or some college (jobs)							
By education level - All sectors -		25,587	22,892	22,506	19,790	15,480	14,799
Bachelors degree (jobs)							
By education level - All sectors - Doctoral		839	694	649	585	465	411
degree (jobs)							
By education level - All sectors - High		45,133	41,625	42,885	39,098	31,064	30,972
school diploma or less (jobs)							
By education level - All sectors - Masters		6,021	5,248	5,054	4,463	3,497	3,240
or professional degree (jobs)							
By resource sector - Biomass (jobs)		744	1,328	2,242	5,633	5,567	5,367
By resource sector - CO2 (jobs)		47.4	5,826	4,378	1,433	1,842	2,235
By resource sector - Coal (jobs)		641	105	8.25	7.08	6.3	5.52
By resource sector - Grid (jobs)		11,976	11,411	16,175	17,208	14,746	15,191
By resource sector - Natural Gas (jobs)		41,897	32,991	25,333	20,464	13,078	7,450
By resource sector - Nuclear (jobs)		1,128	1,110	1,093	634	0	0
By resource sector - Oil (jobs)		27,520	24,381	21,256	15,488	11,575	7,349
By resource sector - Solar (jobs)		19,783	13,691	18,105	18,417	16,667	22,253
By resource sector - Wind (jobs)		7,403	10,415	13,910	12,801	9,318	11,805
Median wages - Annual - All (\$2019 per		59,061	59,662	59,502	59,590	59,990	59,446
iob)		, , , , ,	, , , ,	,,,,		,	, -
On-Site or In-Plant Training - Total jobs - 1		17,739	16,190	16,333	14,527	11,464	11,259
to 4 years (jobs)			.		,	,	•
On-Site or In-Plant Training - Total jobs - 4		6,827	6,059	5,873	5,149	4,077	3,790
to 10 years (jobs)		-,-	-,	-,	-,	, -	
On-Site or In-Plant Training - Total jobs -		18,076	16,377	16,611	14,993	11,849	11,759
None (jobs)		-,	-,-	-,-	, -	, -	, -
On-Site or In-Plant Training - Total jobs -		850	788	804	726	580	572
Over 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		67,646	61,847	62,880	56,689	44,828	44,274
Up to 1 year (jobs)		- ,	, -	. ,	,	,	•
On-the-Job Training - All sectors - 1 to 4		22,732	20,707	20,807	18,453	14,546	14,251
years (jobs)		, -	-, -	-,		,	, -
On-the-Job Training - All sectors - 4 to 10		6,317	5,586	5,433	4,790	3,808	3,557
years (jobs)		-,-	-,	-,	, -	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
On-the-Job Training - All sectors - None		6,137	5,435	5,419	4,832	3,824	3,753
(jobs)		7,53	5, 155	3,	,,,,,,	-,	0,
On-the-Job Training - All sectors - Over 10		1,143	1,052	1,086	962	758	782
years (jobs)		.,	,,,,,,	,,,,,			
On-the-Job Training - All sectors - Up to 1		74,809	68,481	69,757	63,046	49,863	49,311
year (jobs)		,	33, 13.	07,101	00,010	,000	.,,
Related work experience - All sectors - 1		40,840	37,108	37,279	33,304	26,247	25,533
to 4 years (jobs)		.0,0 .0	0.,.00	0.,,	33,33	20,2	20,000
Related work experience - All sectors - 4		26,179	23,770	23,804	21,123	16,642	16,237
to 10 years (jobs)		20,117	20,110	20,004	21,120	10,042	10,201
Related work experience - All sectors -		15,504	14,191	14,397	13,034	10,339	10,161
None (jobs)		10,004	17,171	14,071	10,004	10,007	10,101
Related work experience - All sectors -		7,464	6,847	6,927	6,124	4,803	4,773
Over 10 years (jobs)		1,404	0,041	0,721	0,124	4,003	- ,113
Related work experience - All sectors - Up		21,151	19,344	20,094	18,498	14,767	14,949
to 1 year (jobs)		21,101	17,044	20,074	10,470	14,101	17,/7/
Wage income - All (million \$2019)		6,564	6,042	6,099	5,487	4,367	4,260
vvage income - An (infillion \$2017)		0,004	0,042	0,077	5,401	4,301	4,200

Table 17: E- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		16,461	19,126				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	30.1	34.2	39	52	70.1	81.2	85
Resistance (%)							
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Sales of space heating units - Electric	6.12	16.4	22.3	39	65.1	83.1	89.8
Heat Pump (%)							
Sales of space heating units - Electric	5.02	4.5	4.54	4.7	5.12	5.78	6.22
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	88.9	79.1	73.2	56.3	29.8	11.1	4.02
(%)							
Sales of water heating units - Electric	0.147	1.96	7.14	22.1	44.9	59.9	65.1
Heat Pump (%)							
Sales of water heating units - Electric	4.15	4.5	6.61	12.8	22.2	28.4	30.5
Resistance (%)							
Sales of water heating units - Gas Furnace	93.7	91.7	84.4	63.3	31	9.9	2.58
(%)							
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

Table 18: E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.71	4.85	6.22	6.5	9.04	9.59
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	127	128	127	126	123	121	119
Final energy use - Industry (PJ)	1,932	2,153	2,275	2,325	2,395	2,445	2,512
Final energy use - Residential (PJ)	142	137	134	131	124	116	110
Final energy use - Transportation (PJ)	599	570	531	500	477	451	421

Table 20: E- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.73	4.58				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.5	67.4	70.4	78.5	89.8	96.7	99.1
Resistance (%)							
Sales of cooking units - Gas (%)	33.5	32.6	29.6	21.5	10.2	3.31	0.889
Sales of space heating units - Electric	15	21.9	27	41.8	64.3	78.9	84
Heat Pump (%)							
Sales of space heating units - Electric	44.7	48	45.1	36.7	24.2	16.2	13.4
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.62	3.47	2.83	1.88	1.28	1.07
Sales of space heating units - Gas (%)	38	26.5	24.5	18.7	9.62	3.59	1.53
Sales of water heating units - Electric	0	2.06	7.93	24.8	50.7	67.6	73.5
Heat Pump (%)							
Sales of water heating units - Electric	56.5	66.3	63	52.9	37.5	27.4	23.9
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	29.9	27.3	20.5	10.1	3.2	0.831
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.73	1.74	1.73	1.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		0	120	254	856	2,700	3,931
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.067		0.404		2.19		6.15
units)							
Public EV charging plugs - L2 (1000 units)	0.204		9.71		52.7		148
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC	0.332	0.969	2.74	7.17	15.7	26.3	34
(%)							
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.71	2.1	2.09	1.67	1.08	0.557	0.238
Vehicle sales - Light-duty - EV (%)	1.71	4.29	11	24.5	46.9	71.1	87.2
Vehicle sales - Light-duty - gasoline (%)	92.3	88.2	80.9	68.3	47.8	25.9	11.4
Vehicle sales - Light-duty - hybrid (%)	4.05	4.89	5.54	5.12	3.91	2.35	1.15
Vehicle sales - Light-duty - hydrogen FC	0.113	0.385	0.335	0.259	0.186	0.104	0.048
(%)							
Vehicle sales - Light-duty - other (%)	0.11	0.113	0.104	0.091	0.066	0.037	0.017
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen	0.166	0.485	1.37	3.58	7.86	13.2	17
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

Table 22: E- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,416
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-67.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,665
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Moderate							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,814
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-33.9
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,029
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							73.3
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,563
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							123
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							

Table 22: E- scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink -							1,760
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							73.3
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							813
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							61.7
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							948
deployment - Total (1000 hectares)							

Table 23: E- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-388
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							•
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tC02e/y)							
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-3,857
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,779
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-669
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-422
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tCO2e/y)							

Table 23: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item Carbon sink potential - Mid - All (not	2020	2025	2030	2035	2040	2045	2050 -24,865
counting overlap) (1000 tC02e/y)							-24,000
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y) Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							-2,876
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tCO2e/y)							3,72.
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							2.007
pasture (1000 tCO2e/y)							-2,997
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tCO2e/y)							2,02.
Land impacted for carbon sink potential -							63.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							0,000
hectares)							
Land impacted for carbon sink potential -							1,421
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential - High - Increase retention of HWP (1000							0
hectares)							
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares) Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							1,200
hectares)							
Land impacted for carbon sink potential -							6,840
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							
hectares) Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							110
(1000 hectares)							
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							711
Low - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							U
hectares)							

Table 23: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Low - Increase trees outside forests (1000 hectares) Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	2.3 4.2 7.4
[1000 hectares] Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) [1000 hectares] Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	7.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	7.4
Low - Reforest cropland (1000 hectares) Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	7.4
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Low - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	·58
Low - Restore productivity (1000 hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	'58
hectares) Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Low - Total impacted (over 30 years) [1000 hectares] Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
(1000 hectares) Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	165
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	
Mid - Accelerate regeneration (1000 hectares)	
hectares)	+7.7
Land imported for conton sink potential	
Land impacted for Garbon sink potential -	82
Mid - Avoid deforestation (over 30 years)	
(1000 hectares)	
Land impacted for carbon sink potential -	481
Mid - Extend rotation length (1000	
hectares)	
Land impacted for carbon sink potential -	169
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 -	1.4
Mid - Increase trees outside forests (1000	
hectares)	
Land impacted for carbon sink potential -	6.3
Mid - Reforest cropland (1000 hectares)	
Land impacted for carbon sink potential -	198
Mid - Reforest pasture (1000 hectares)	
Land impacted for carbon sink potential -	527
Mid - Restore productivity (1000	
hectares)	
Land impacted for carbon sink potential - 5,6	33
Mid - Total impacted (over 30 years) (1000	
hectares)	

Table 24: E- scenario - IMPACTS - Health

Table 24. L Scenario Initratto riculti							
Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		251	0.265	0.229	0.146	0.088	0.003
Coal (million 2019\$)							
Monetary damages from air pollution -		142	73.6	33.7	14.6	7.17	6.75
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		727	735	719	651	521	360
Transportation (million 2019\$)							
Premature deaths from air pollution -		28.3	0.03	0.026	0.017	0.01	0
Coal (deaths)							
Premature deaths from air pollution -		16	8.3	3.8	1.65	0.809	0.762
Natural Gas (deaths)							
Premature deaths from air pollution -		81.8	82.7	80.9	73.2	58.6	40.5
Transportation (deaths)							

Table 25: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		16,472	19,203				
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric Heat Pump (%)	6.12	26.1	76.9	91.1	92.2	92.2	92.2
Sales of space heating units - Electric Resistance (%)	5.02	4.5	4.79	6.09	6.39	6.41	6.42
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	88.9	69.4	18.3	2.84	1.39	1.35	1.34
Sales of water heating units - Electric Heat Pump (%)	0.147	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	4.15	8.12	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	93.7	79.3	15	0.631	0	0	0
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

Table 26: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		5.94	6.22	10.4	11.1	8.07	8.36
Cumulative 5-yr (billion \$2018)							

Table 27: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview

142.6 _ 1.1 _ 1.1 _ 1.2 _ 0.0										
Item	2020	2025	2030	2035	2040	2045	2050			
Final energy use - Commercial (PJ)	127	128	123	117	112	111	112			
Final energy use - Industry (PJ)	1,932	2,153	2,273	2,317	2,383	2,435	2,505			
Final energy use - Residential (PJ)	142	136	128	117	108	103	102			
Final energy use - Transportation (PJ)	598	567	515	454	397	363	350			

Table 28: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.78	4.86				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.6	73.7	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.4	26.3	4.49	0.226	0	0	0
Sales of space heating units - Electric	15	30.5	75.4	85.4	85.9	85.7	85.7
Heat Pump (%)							
Sales of space heating units - Electric	44.7	43.2	18.2	12.6	12.3	12.5	12.5
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.27	1.44	1.03	1.01	0.993	0.989
Sales of space heating units - Gas (%)	38	23	5.01	0.994	0.822	0.801	0.798
Sales of water heating units - Electric	0	12	63.6	75.1	75.6	75.6	75.6
Heat Pump (%)							
Sales of water heating units - Electric	56.5	60.4	29.9	23	22.7	22.7	22.7
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	25.8	4.84	0.202	0	0	0
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.71	1.71	1.72	1.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		747	1,909	3,103	4,697	5,116	4,875
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.067		1.34		5.93		9.61
units)							
Public EV charging plugs - L2 (1000 units)	0.204		32.1		143		231
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC	0.392	2.54	12.7	30.4	38.2	39.7	40
(%)							
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.7	1.95	1.32	0.424	0.077	0.013	0
Vehicle sales - Light-duty - EV (%)	3.4	13.6	44	80.8	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.8	79.8	51.3	17.5	3.42	0.594	0
Vehicle sales - Light-duty - hybrid (%)	3.92	4.18	3.04	1.15	0.276	0.059	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.348	0.215	0.068	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.109	0.105	0.07	0.025	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 30: E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base		0.255	0.217	0	0.31	0	3.13
(billion \$2018)							
Capital invested - Solar PV - Base (billion		5	0.207	0.17	0.14	0.476	0
\$2018)							
Capital invested - Wind - Base (billion		0	0	0	0.397	0.388	26.1
\$2018)							
Installed renewables - OffshoreWind -	0	90	180	180	359	359	2,859
Base land use assumptions (MW)							
Installed renewables - OffshoreWind -	0	0	0	0	0	0	877
Constrained land use assumptions (MW)							
Installed renewables - Solar - Base land	3,945	8,318	8,520	8,700	8,858	9,426	9,426
use assumptions (MW)							
Installed renewables - Solar -	5,010	13,980	16,071	16,386	16,386	16,386	18,996
Constrained land use assumptions (MW)							
Installed renewables - Wind - Base land	0	0	0	0	336	682	25,361
use assumptions (MW)							
Installed renewables - Wind - Constrained	0	0	0	2,396	18,648	18,648	22,449
land use assumptions (MW)							

Table 31: E+RE+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	316	632	632	1,253	1,253	10,012
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	3,069
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	6,488	13,634	13,965	14,260	14,519	15,447	15,447
Solar - Constrained land use assumptions	8,259	22,928	26,350	26,867	26,867	26,867	31,079
(GWh)							
Wind - Base land use assumptions (GWh)	0	0	0	0	917	1,843	64,431

Table 31: E+RE+ scenario - PILLAR 2: Clean Electricity - Generation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Wind - Constrained land use assumptions	0	0	0	5,683	47,705	47,705	57,891
(GWh)							

Table 32: E+RE+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,416
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-67.8
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-5,665
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-181
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-2,814
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-33.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,029
deployment - Total (1000 tC02e/y)							
Land impacted for carbon sink -							73.3
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,563
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							123
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -	+						1,760
Aggressive deployment - Total (1000							,
hectares)							
Land impacted for carbon sink - Moderate							73.3
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							813
deployment - Cropland measures (1000							0.0
hectares)							
Land impacted for carbon sink - Moderate							61.7
deployment - Permanent conservation							01.1
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							948
deployment - Total (1000 hectares)							740
acproyment - rotar (1000 nectar es)							

Table 33: E+RE+ scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-388
Carbon sink potential - High - All (not counting overlap) (1000 tC02e/y)							-37,585
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,388

Table 33: E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item Conhon sink notantial High Extend	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,036
• ,							0.057
Carbon sink potential - High - Improve							-3,857
plantations (1000 tC02e/y) Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tCO2e/y)							-13,301
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tC02e/y)							-646
Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							-1,331
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tC02e/y)							-5,511
Carbon sink potential - High - Restore							-3,779
productivity (1000 tC02e/y)							-5,117
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tC02e/y)							-170
Carbon sink potential - Low - All (not						+	-12,212
counting overlap) (1000 tC02e/y)							-12,212
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tC02e/y)							-201
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tC02e/y)							2,100
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							-1,702
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							7,700
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tC02e/y)							270
Carbon sink potential - Low - Reforest							-669
cropland (1000 tC02e/y)							007
Carbon sink potential - Low - Reforest							-422
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tC02e/y)							.,
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tCO2e/y)							-/-
Carbon sink potential - Mid - All (not							-24,865
counting overlap) (1000 tCO2e/y)							2 1,000
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tC02e/y)							0.0
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y)							.,007
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							_,0.0
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tCO2e/y)							0,72.
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tC02e/y)							
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tCO2e/y)							.,
Carbon sink potential - Mid - Reforest							-2,997
pasture (1000 tCO2e/y)							_,,,,
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tC02e/y)							2,021
Land impacted for carbon sink potential -							63.5
High - Accelerate regeneration (1000							50.0
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							100
(1000 hectares)							

Table 33: E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050 3,588
High - Extend rotation length (1000							3,300
hectares)							
Land impacted for carbon sink potential -							1,421
High - Improve plantations (1000							
hectares)							0
Land impacted for carbon sink potential - High - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							00.4
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,840
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							
hectares)							47/
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							
(1000 hectares) Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							1,313
hectares)							
Land impacted for carbon sink potential -							711
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 -							42.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							44.2
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							750
Land impacted for carbon sink potential - Low - Restore productivity (1000							758
hectares)							
Land impacted for carbon sink potential -							3,165
Low - Total impacted (over 30 years)							3,103
(1000 hectares)							
Land impacted for carbon sink potential -							47.7
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							182
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,481
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,069
Mid - Improve plantations (1000 hectares)	1		I		[

Table 33: E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							61.4
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							66.3
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							198
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,527
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,633
Mid - Total impacted (over 30 years) (1000							
hectares)							

Table 34: E+RE+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		251	0.265	0.229	0.146	0.088	0.003
Coal (million 2019\$)							
Monetary damages from air pollution -		141	83.8	38.3	26.8	8.47	4.42
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		716	671	513	298	138	57.1
Transportation (million 2019\$)							
Premature deaths from air pollution -		28.3	0.03	0.026	0.017	0.01	0
Coal (deaths)							
Premature deaths from air pollution -		15.9	9.46	4.32	3.03	0.956	0.499
Natural Gas (deaths)							
Premature deaths from air pollution -		80.6	75.5	57.7	33.5	15.5	6.42
Transportation (deaths)							

Table 35: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		16,472	19,203				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Resistance (%)							
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric	6.12	26.1	76.9	91.1	92.2	92.2	92.2
Heat Pump (%)							
Sales of space heating units - Electric	5.02	4.5	4.79	6.09	6.39	6.41	6.42
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	88.9	69.4	18.3	2.84	1.39	1.35	1.34
(%)							
Sales of water heating units - Electric	0.147	10.7	56.3	66.5	66.9	66.9	66.9
Heat Pump (%)							
Sales of water heating units - Electric	4.15	8.12	26.9	31.1	31.3	31.3	31.3
Resistance (%)							
Sales of water heating units - Gas Furnace	93.7	79.3	15	0.631	0	0	0
_(%)							
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

Table 36: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		5.94	6.22	10.4	11.1	8.07	8.36
Cumulative 5-yr (billion \$2018)							

Table 37: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	127	128	123	117	112	111	112
Final energy use - Industry (PJ)	1,932	2,153	2,273	2,317	2,383	2,435	2,505
Final energy use - Residential (PJ)	142	136	128	117	108	103	102
Final energy use - Transportation (PJ)	598	567	515	454	397	363	350

Table 38: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.78	4.86				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.6	73.7	95.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	33.4	26.3	4.49	0.226	0	0	0
Sales of space heating units - Electric	15	30.5	75.4	85.4	85.9	85.7	85.7
Heat Pump (%)							
Sales of space heating units - Electric	44.7	43.2	18.2	12.6	12.3	12.5	12.5
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.27	1.44	1.03	1.01	0.993	0.989
Sales of space heating units - Gas (%)	38	23	5.01	0.994	0.822	0.801	0.798
Sales of water heating units - Electric	0	12	63.6	75.1	75.6	75.6	75.6
Heat Pump (%)							
Sales of water heating units - Electric	56.5	60.4	29.9	23	22.7	22.7	22.7
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	25.8	4.84	0.202	0	0	0
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.71	1.71	1.72	1.72

Table 39: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -		747	1,909	3,103	4,697	5,116	4,875
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.067		1.34		5.93		9.61
units)							
Public EV charging plugs - L2 (1000 units)	0.204		32.1		143		231
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC	0.392	2.54	12.7	30.4	38.2	39.7	40
(%)							
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.7	1.95	1.32	0.424	0.077	0.013	0
Vehicle sales - Light-duty - EV (%)	3.4	13.6	44	80.8	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.8	79.8	51.3	17.5	3.42	0.594	0
Vehicle sales - Light-duty - hybrid (%)	3.92	4.18	3.04	1.15	0.276	0.059	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.348	0.215	0.068	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.109	0.105	0.07	0.025	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0

Table 39: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)

	•	-	•	•	-		
Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 40: E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion \$2018)		0.255	0	0	0.156	0	0
Capital invested - Solar PV - Base (billion \$2018)		6.52	0.356	0.17	0	0	0
Capital invested - Solar PV - Constrained (billion \$2018)		5.33	0.495	0.403	0	0.151	0
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	1.07
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	90	90	90	180	180	180
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	6,758	12,456	12,804	12,984	12,984	12,984	12,984
Installed renewables - Solar - Constrained land use assumptions (MW)	2,606	7,272	7,755	8,183	8,183	8,362	8,362
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	1,008

Table 41: E+RE- scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use	0	316	316	316	632	632	632
assumptions (GWh)							
OffshoreWind - Constrained land use	0	0	0	0	0	0	0
assumptions (GWh)							
Solar - Base land use assumptions (GWh)	11,065	20,363	20,930	21,225	21,225	21,225	21,225
Solar - Constrained land use assumptions	4,300	11,917	12,712	13,413	13,413	13,706	13,706
(GWh)							
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions	0	0	0	0	0	0	2,390
(GWh)							

Table 42: E+RE- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,416
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-67.8
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-5,665
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-181
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							

Table 42: E+RE- scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-2,814
deployment - Cropland measures (1000 tCO2e/y)							
Carbon sink potential - Moderate							-33.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,029
deployment - Total (1000 tC02e/y)							70.0
Land impacted for carbon sink -							73.3
Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,563
Aggressive deployment - Cropland							1,505
measures (1000 hectares)							
Land impacted for carbon sink -							123
Aggressive deployment - Permanent							120
conservation cover (1000 hectares)							
Land impacted for carbon sink -							1,760
Aggressive deployment - Total (1000							•
hectares)							
Land impacted for carbon sink - Moderate							73.3
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							813
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							61.7
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							948
deployment - Total (1000 hectares)							

Table 43: E+RE- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-388
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-3,857
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,779
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tCO2e/y)							

Table 43: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							,
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tCO2e/y)							2,0
Carbon sink potential - Low - Reforest							-669
cropland (1000 tCO2e/y)							007
Carbon sink potential - Low - Reforest							-422
pasture (1000 tCO2e/y)							-422
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							-1,214
							000
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tCO2e/y)							0/ 0/5
Carbon sink potential - Mid - All (not							-24,865
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-2,997
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							63.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							100
(1000 hectares)							
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							3,300
hectares)							
Land impacted for carbon sink potential -							1,421
High - Improve plantations (1000							1,421
hectares)							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							
hectares)							

Table 43: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,840
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							31.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							17
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,37
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							7
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							42.
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							44.
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							75
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,16
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							47
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							18
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,48
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,06
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							61.
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							66.
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							19
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,52
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,63

Table 44: E+RE- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		251	0.265	0.229	0.146	0.088	0.003
Coal (million 2019\$)							
Monetary damages from air pollution -		157	95.2	107	88.8	37.3	9.73
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		716	671	513	298	138	57.1
Transportation (million 2019\$)							
Premature deaths from air pollution -		28.3	0.03	0.026	0.017	0.01	0
Coal (deaths)							
Premature deaths from air pollution -		17.7	10.7	12.1	10	4.21	1.1
Natural Gas (deaths)							
Premature deaths from air pollution -		80.6	75.5	57.7	33.5	15.5	6.42
Transportation (deaths)							

Table 45: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		16,461	19,126				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	30.1	34.2	39	52	70.1	81.2	85
Resistance (%)							
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Sales of space heating units - Electric	6.12	16.4	22.3	39	65.1	83.1	89.8
Heat Pump (%)							
Sales of space heating units - Electric	5.02	4.5	4.54	4.7	5.12	5.78	6.22
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace	88.9	79.1	73.2	56.3	29.8	11.1	4.02
(%)							
Sales of water heating units - Electric	0.147	1.96	7.14	22.1	44.9	59.9	65.1
Heat Pump (%)							
Sales of water heating units - Electric	4.15	4.5	6.61	12.8	22.2	28.4	30.5
Resistance (%)							
Sales of water heating units - Gas Furnace	93.7	91.7	84.4	63.3	31	9.9	2.58
(%)							
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

Table 46: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		4.71	4.85	6.22	6.5	9.04	9.59
Cumulative 5-yr (billion \$2018)							

Table 47: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	127	128	127	126	123	121	119
Final energy use - Industry (PJ)	1,932	2,153	2,275	2,325	2,395	2,445	2,512
Final energy use - Residential (PJ)	142	137	134	131	124	116	110
Final energy use - Transportation (PJ)	599	570	531	500	477	451	421

Table 48: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.73	4.58				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.5	67.4	70.4	78.5	89.8	96.7	99.1
Resistance (%)							
Sales of cooking units - Gas (%)	33.5	32.6	29.6	21.5	10.2	3.31	0.889
Sales of space heating units - Electric	15	21.9	27	41.8	64.3	78.9	84
Heat Pump (%)							

Table 48: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric	44.7	48	45.1	36.7	24.2	16.2	13.4
Resistance (%)							
Sales of space heating units - Fossil (%)	2.28	3.62	3.47	2.83	1.88	1.28	1.07
Sales of space heating units - Gas (%)	38	26.5	24.5	18.7	9.62	3.59	1.53
Sales of water heating units - Electric	0	2.06	7.93	24.8	50.7	67.6	73.5
Heat Pump (%)							
Sales of water heating units - Electric	56.5	66.3	63	52.9	37.5	27.4	23.9
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	29.9	27.3	20.5	10.1	3.2	0.831
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.73	1.74	1.73	1.72

Table 49: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation

		0000	0005	00/0	0015	0050
2020	2025	2030	2035	2040	2045	2050
	0	120	254	856	2,700	3,931
0.067		0.404		2.19		6.15
0.204		9.71		52.7		148
97.4	96	91.3	79.8	58.2	32.1	13.7
0.498	1.45	4.11	10.8	23.6	39.5	51
0.228	0.236	0.239	0.225	0.179	0.109	0.051
0.083	0.094	0.104	0.107	0.092	0.06	0.03
0.332	0.969	2.74	7.17	15.7	26.3	34
1.5	1.28	1.46	1.95	2.25	1.96	1.14
1.71	2.1	2.09	1.67	1.08	0.557	0.238
1.71	4.29	11	24.5	46.9	71.1	87.2
92.3	88.2	80.9	68.3	47.8	25.9	11.4
4.05	4.89	5.54	5.12	3.91	2.35	1.15
0.113	0.385	0.335	0.259	0.186	0.104	0.048
0.11	0.113	0.104	0.091	0.066	0.037	0.017
64.8	62.2	57.7	49.4	35.6	19.6	8.37
0.664	1.94	5.49	14.3	31.4	52.6	68
33.8	34.7	34.7	31.9	24.4	14.2	6.33
0.363	0.418	0.464	0.478	0.414	0.275	0.141
0.166	0.485	1.37	3.58	7.86	13.2	17
0.253	0.266	0.279	0.286	0.258	0.184	0.102
	0.498 0.228 0.083 0.332 1.5 1.71 1.71 92.3 4.05 0.113 0.11 64.8 0.664 33.8 0.363 0.166	0.204 96 97.4 96 0.498 1.45 0.228 0.236 0.083 0.094 0.332 0.969 1.5 1.28 1.71 2.1 1.71 4.29 92.3 88.2 4.05 4.89 0.113 0.385 0.11 0.113 64.8 62.2 0.664 1.94 33.8 34.7 0.363 0.418 0.166 0.485	0.067 0.404 0.204 9.71 97.4 96 91.3 0.498 1.45 4.11 0.228 0.236 0.239 0.083 0.094 0.104 0.332 0.969 2.74 1.5 1.28 1.46 1.71 2.1 2.09 1.71 4.29 11 92.3 88.2 80.9 4.05 4.89 5.54 0.113 0.385 0.335 0.11 0.113 0.104 64.8 62.2 57.7 0.664 1.94 5.49 33.8 34.7 34.7 0.363 0.418 0.464 0.166 0.485 1.37	0.067 0.404 0.204 9.71 97.4 96 91.3 79.8 0.498 1.45 4.11 10.8 0.228 0.236 0.239 0.225 0.083 0.094 0.104 0.107 0.332 0.969 2.74 7.17 1.5 1.28 1.46 1.95 1.71 2.1 2.09 1.67 1.71 4.29 11 24.5 92.3 88.2 80.9 68.3 4.05 4.89 5.54 5.12 0.113 0.385 0.335 0.259 0.11 0.113 0.104 0.091 64.8 62.2 57.7 49.4 0.664 1.94 5.49 14.3 33.8 34.7 34.7 31.9 0.363 0.418 0.464 0.478 0.166 0.485 1.37 3.58	0.067 0.404 2.19 0.204 9.71 52.7 97.4 96 91.3 79.8 58.2 0.498 1.45 4.11 10.8 23.6 0.228 0.236 0.239 0.225 0.179 0.083 0.094 0.104 0.107 0.092 0.332 0.969 2.74 7.17 15.7 1.5 1.28 1.46 1.95 2.25 1.71 2.1 2.09 1.67 1.08 1.71 4.29 11 24.5 46.9 92.3 88.2 80.9 68.3 47.8 4.05 4.89 5.54 5.12 3.91 0.113 0.385 0.335 0.259 0.186 0.11 0.113 0.104 0.091 0.066 64.8 62.2 57.7 49.4 35.6 0.664 1.94 5.49 14.3 31.4 33.8 34.7<	0.067 0.404 2.19 0.204 9.71 52.7 97.4 96 91.3 79.8 58.2 32.1 0.498 1.45 4.11 10.8 23.6 39.5 0.228 0.236 0.239 0.225 0.179 0.109 0.083 0.094 0.104 0.107 0.092 0.06 0.332 0.969 2.74 717 15.7 26.3 1.5 1.28 1.46 1.95 2.25 1.96 1.71 2.1 2.09 1.67 1.08 0.557 1.71 4.29 11 24.5 46.9 71.1 92.3 88.2 80.9 68.3 47.8 25.9 4.05 4.89 5.54 5.12 3.91 2.35 0.113 0.385 0.335 0.259 0.186 0.104 0.11 0.113 0.104 0.091 0.066 0.037 64.8 <

Table 50: E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
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	10.5	12.5	0	0

Table 51: 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 allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	11,774	25,838	25,838	25,838

Table 50: E Di	coopanio	מאוז יכי מא ו וזמ	n fuels - Bioenerav
TADIC UZ. C-DT	SCEIIUI IU -	PILLAR J. GIEU	II IUEIS - DIUEIIEI UV

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)		0	0	799	2,743	2,743	2,743
Conversion capital investment -		0	0	10,894	24,876	0	0
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	0	0	0
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	1	16	16	16
(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 - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	9	20	20	20
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	1	1	1	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

Table 53: E-B+ scenario - PILLAR 4: CCUS - CO2 capture

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	13.4	44.5	44.5	44.5
Annual - BECCS (MMT)		0	0	13.3	44.4	44.4	44.3
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0.14	0.11	0.09	0.17
Cumulative - All (MMT)		0	0	13.4	57.9	102	147
Cumulative - BECCS (MMT)		0	0	13.3	57.6	102	146
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0.14	0.25	0.34	0.51

Table 54: E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	845	2,391	3,748	3,748	4,168
Cumulative investment - All (million \$2018)		0	5,578	10,341	14,944	14,944	15,240
Cumulative investment - Spur (million \$2018)		0	12.7	714	1,786	1,786	2,082
Cumulative investment - Trunk (million \$2018)		0	5,565	9,626	13,158	13,158	13,158
Spur (km)		0	23.9	934	1,822	1,822	2,242
Trunk (km)		0	821	1,456	1,926	1,926	1,926

Table 55: E-B+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	19.4	87.8	173	240	252
Injection wells (wells)		0	16	65	116	194	240
Resource characterization, appraisal,		47.3	1,958	3,115	3,115	3,115	3,115
permitting costs (million \$2020)							
Wells and facilities construction costs		0	499	1,946	3,468	5,799	7,199
(million \$2020)							

Table 56: E-B+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-527
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							

Table 56: E-B+ scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-4,958
deployment - Cropland measures (1000							
tCO2e/y) Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							U
crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Aggressive							-59.9
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-5,545
deployment - Total (1000 tC02e/y) Carbon sink potential - Moderate							-527
deployment - Corn-ethanol to energy							-527
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-2,572
deployment - Cropland measures (1000							,-
tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tC02e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops (1000 tCO2e/y)							
Carbon sink potential - Moderate							-29.9
deployment - Permanent conservation							-27.7
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,129
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							217
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							3,538
Aggressive deployment - Cropland measures (1000 hectares)							
Land impacted for carbon sink -							56.5
Aggressive deployment - Cropland to							50.5
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							240
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							109
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							/. 1/1
Land impacted for carbon sink - Aggressive deployment - Total (1000							4,161
hectares)							
Land impacted for carbon sink - Moderate							217
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							744
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							56.5
deployment - Cropland to woody energy							
crops (1000 hectares)							07:0
Land impacted for carbon sink - Moderate							240
deployment - Pasture to energy crops	l l	I	I	1			

Table 56: E-B+ scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							54.5
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,312

Table 57: E-B+ scenario - PILLAR 6: Land sinks - Forests

Table 57: E-B+ scenario - PILLAR 6: Land	sinks - Fores	sts					
Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-388
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,388
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-7,036
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-3,857
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-13,381
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-846
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-1,337
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-5,571
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-3,779
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-195
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-12,212
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-231
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-2,703
rotation length (1000 tCO2e/y)							•
Carbon sink potential - Low - Improve							-1,962
plantations (1000 tCO2e/y)							•
Carbon sink potential - Low - Increase							-4,460
retention of HWP (1000 tCO2e/y)							•
Carbon sink potential - Low - Increase							-296
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-669
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-422
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,274
productivity (1000 tCO2e/y)							•
Carbon sink potential - Mid - Accelerate							-292
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-24,865
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-810
deforestation (1000 tC02e/y)							
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tCO2e/y)							•
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tCO2e/y)							,
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tCO2e/y)							•

Table 57: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item Canbon sink notantial, Mid. Inches	2020	2025	2030	2035	2040	2045	2050 -57
Carbon sink potential - Mid - Increase							-57
trees outside forests (1000 tC02e/y)							1.000
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tC02e/y)							0.00
Carbon sink potential - Mid - Reforest							-2,997
pasture (1000 tC02e/y)							0.50
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tC02e/y) Land impacted for carbon sink potential -							63.5
,							63.5
High - Accelerate regeneration (1000							
hectares)							100
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							
(1000 hectares)							0.500
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							
hectares)							1 / 0/
Land impacted for carbon sink potential -							1,42
High - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							C
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							80.4
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							6,840
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							71
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							C
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							42.3
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							44.2
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							758
Low - Restore productivity (1000							
hectares)							

Table 57: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,165
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							47.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							182
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,481
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,069
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							61.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							66.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							198
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,527
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,633

Table 58: E-B+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		251	0.265	0.229	0.146	0.088	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		146	74.1	41.8	28.8	17.1	10.8
Monetary damages from air pollution - Transportation (million 2019\$)		727	735	719	651	521	360
Premature deaths from air pollution - Coal (deaths)		28.3	0.03	0.026	0.017	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		16.5	8.37	4.72	3.25	1.93	1.22
Premature deaths from air pollution - Transportation (deaths)		81.8	82.7	80.9	73.2	58.6	40.5

Table 59: REF scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -		16,112	16,910				
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	30.1	32.3	32.3	32.3	32.3	32.3	32.3
Resistance (%)							
Sales of cooking units - Gas (%)	69.9	67.7	67.7	67.7	67.7	67.7	67.7
Sales of space heating units - Electric	6.12	28.9	70.9	79.1	79.5	79.5	79.5
Heat Pump (%)							
Sales of space heating units - Electric	5.02	6.38	12.2	15.9	18.7	19.1	19.1
Resistance (%)							
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0

Table CO. DCC assessia	DILLAD 1. Efficiency /Floorwiff continue	0
Table 59: REE Scenorio	- PTLLAR 1 [,] Efficiency/Flectrification -	Commerciai I continuea i

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace	88.9	64.7	17	5	1.82	1.39	1.34
Sales of water heating units - Electric	0.147	0.132	0.129	0.132	0.131	0.129	0.129
Heat Pump (%)							
Sales of water heating units - Electric	4.15	3.75	3.71	3.72	3.75	3.73	3.74
Resistance (%)							
Sales of water heating units - Gas Furnace	93.7	94.3	94.3	94.3	94.3	94.3	94.3
(%)							
Sales of water heating units - Other (%)	1.99	1.82	1.81	1.82	1.83	1.82	1.83

Table 60: REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		6.34	6.66	9.85	10.5	8.17	8.47
Cumulative 5-yr (billion \$2018)							

Table 61: REF scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	127	130	131	133	135	141	150
Final energy use - Industry (PJ)	1,933	2,162	2,297	2,357	2,441	2,510	2,595
Final energy use - Residential (PJ)	142	137	138	141	145	151	156
Final energy use - Transportation (PJ)	599	570	535	514	514	526	543

Table 62: REF scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.		3.65	3.76				
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	66.2	66.2	66.2	66.2	66.2	66.2	66.2
Resistance (%)							
Sales of cooking units - Gas (%)	33.8	33.8	33.8	33.8	33.8	33.8	33.8
Sales of space heating units - Electric	12.3	40.8	42	44	45.9	48.4	52.1
Heat Pump (%)							
Sales of space heating units - Electric	46.3	37.2	36.6	35.6	34.3	32	28.2
Resistance (%)							
Sales of space heating units - Fossil (%)	2.33	2.13	2.16	2.14	2.1	2.11	2.11
Sales of space heating units - Gas (%)	39.1	19.9	19.2	18.2	17.7	17.5	17.6
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	56.5	67.6	67.7	67.7	67.5	67.5	67.5
Resistance (%)							
Sales of water heating units - Gas Furnace	41.3	30.7	30.5	30.6	30.8	30.7	30.8
(%)							
Sales of water heating units - Other (%)	2.21	1.75	1.73	1.74	1.75	1.75	1.76

Table 63: REF scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - diesel (%)	98.1	98.2	97.9	97	95.6	93.5	91.6
Vehicle sales - Heavy-duty - EV (%)	0	0	0	0	0	0	0
Vehicle sales - Heavy-duty - gasoline (%)	0.229	0.242	0.257	0.274	0.294	0.317	0.343
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.096	0.112	0.13	0.15	0.174	0.202
Vehicle sales - Heavy-duty - hydrogen FC	0.119	0.138	0.16	0.186	0.216	0.25	0.29
(%)							
Vehicle sales - Heavy-duty - other (%)	1.51	1.31	1.57	2.37	3.69	5.71	7.57
Vehicle sales - Light-duty - diesel (%)	1.71	2.1	2.21	2.06	1.86	1.73	1.65
Vehicle sales - Light-duty - EV (%)	3.05	4.94	5.66	6.92	8.47	9.91	11.1
Vehicle sales - Light-duty - gasoline (%)	91.1	87.7	85.8	84.1	82.2	80.2	78.6
Vehicle sales - Light-duty - hybrid (%)	3.94	4.81	5.91	6.48	7.09	7.74	8.29

Table 63: REF scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - hydrogen FC	0.112	0.382	0.355	0.318	0.316	0.318	0.329
(%)							
Vehicle sales - Light-duty - other (%)	0.109	0.113	0.11	0.11	0.11	0.109	0.112
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7
Vehicle sales - Medium-duty - hybrid (%)	0.365	0.427	0.496	0.577	0.674	0.793	0.929
Vehicle sales - Medium-duty - hydrogen	0.175	0.208	0.242	0.285	0.339	0.409	0.487
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.255	0.271	0.298	0.345	0.42	0.528	0.671

Table 64: REF scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate	2020	2020	2000	2000	2040	2040	-388
regeneration (1000 tC02e/y) Carbon sink potential - High - All (not							-37,585
counting overlap) (1000 tC02e/y) Carbon sink potential - High - Avoid deforestation (1000 tC02e/y)							-1,388
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,036
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,857
Carbon sink potential - High - Increase retention of HWP (1000 tC02e/y)							-13,381
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-846
Carbon sink potential - High - Reforest cropland (1000 tC02e/y)							-1,337
Carbon sink potential - High - Reforest pasture (1000 tC02e/y)							-5,571
Carbon sink potential - High - Restore productivity (1000 tC02e/y)							-3,779
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-195
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-12,212
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-231
Carbon sink potential - Low - Extend rotation length (1000 tC02e/y)							-2,703
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,962
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-4,460
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-296
Carbon sink potential - Low - Reforest cropland (1000 tC02e/y)							-669
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-422
Carbon sink potential - Low - Restore productivity (1000 tC02e/y)							-1,274
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-292
Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)							-24,865
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-810

Table 64: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend							-4,869
rotation length (1000 tC02e/y)							0.07/
Carbon sink potential - Mid - Improve							-2,876
plantations (1000 tC02e/y)							0.001
Carbon sink potential - Mid - Increase							-8,921
retention of HWP (1000 tC02e/y)							
Carbon sink potential - Mid - Increase							-571
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-1,003
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-2,997
pasture (1000 tCO2e/y)							
Carbon sink potential - Mid - Restore							-2,527
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							63.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							188
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							3,588
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,421
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 -							80.4
High - Increase trees outside forests							00.1
(1000 hectares)							
Land impacted for carbon sink potential -							88.4
High - Reforest cropland (1000 hectares)							00.4
Land impacted for carbon sink potential -							158
High - Reforest pasture (1000 hectares)							100
Land impacted for carbon sink potential -							1,253
High - Restore productivity (1000							1,200
hectares)							
Land impacted for carbon sink potential -							6,840
·							0,040
High - Total impacted (over 30 years) (1000 hectares)							
•							21.0
Land impacted for carbon sink potential -							31.8
Low - Accelerate regeneration (1000							
hectares)							17/
Land impacted for carbon sink potential -							176
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							1.075
Land impacted for carbon sink potential -							1,375
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							711
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 -							42.3
Low - Increase trees outside forests							
(1000 hectares)							

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Table 04.	KEF SURIIUI	U - PILLAK O.	. Luliu Siliks -	FULESIS I	CUITLITIUEUT

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							44.2
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							27.4
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							758
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							3,165
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							47.7
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							182
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,481
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,069
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 -							61.4
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							66.3
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							198
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,527
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							5,633
Mid - Total impacted (over 30 years) (1000							
hectares)							

Table 65: REF scenario - PILLAR 6: Land sinks - Forests - REF only

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural	-31.8		-11.5				-9.34
uptake (Mt CO2e/y)							
Business-as-usual carbon sink - Retained	-3.64		-6.07				-6.39
in Hardwood Products (Mt CO2e/y)							
Business-as-usual carbon sink - Total (Mt	-35.4		-17.6				-15.7
CO2e/y)							

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		1,342	802	417	333	300	298
Monetary damages from air pollution - Natural Gas (million 2019\$)		161	168	189	148	144	125
Monetary damages from air pollution - Transportation (million 2019\$)		727	747	767	791	816	841
Premature deaths from air pollution - Coal (deaths)		152	90.6	47	37.6	33.9	33.7
Premature deaths from air pollution - Natural Gas (deaths)		18.2	19	21.4	16.7	16.3	14.1

Table 66: REF scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution -		81.8	84	86.3	89	91.8	94.6
Transportation (deaths)							