

Net-Zero America - mississippi state report

2021-03-05

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.

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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 - Cumulative 5-yr (million \$2018)	0	8,123	9,222	0	0	0	0
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Sales of space heating units - Electric Heat Pump (%)	9.46	29.3	77	90.8	91.9	92	92
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of space heating units - Gas Furnace (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas Furnace (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.03	2.09	3.69	3.94	2.98	3.07
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)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	2.27	2.78	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	75.8	81	96.7	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Sales of space heating units - Electric	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Heat Pump (%)							
Sales of space heating units - Electric	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Resistance (%)							
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of water heating units - Electric	0	12.1	64	75.6	76.1	76.1	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	16.1	3.02	0.128	0	0	0
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	398	1,016	1,653	2,501	2,725	2,596
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.053	0	0.878	0	3.92	0	6.35
_units)							
Public EV charging plugs - L2 (1000 units)	0.175	0	21.1	0	94.3	0	153
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 (%)	1.54	1.81	1.26	0.402	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	3.93	15.2	46.5	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78	48.7	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.44	4.55	3.22	1.19	0.291	0.064	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.339	0.203	0.063	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.102	0.097	0.064	0.022	0.004	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	0	0	0	0	0	0	0
(billion \$2018)							
Capital invested - Biomass w/ccu allam	0	0	0	0	0.002	0	0
power plant (billion \$2018)							
Capital invested - Biomass w/ccu power	0	0	2.86	0	0	2.52	0
plant (billion \$2018)							
Capital invested - Solar PV - Base (billion	0	1.43	1.39	5.45	9.46	9.29	10.8
\$2018)							
Capital invested - Solar PV - Constrained	0	0.876	2.23	4.75	5.05	7.97	9.84
(billion \$2018)							
Capital invested - Wind - Base (billion	0	0	0	0	0	0.529	1.14
\$2018)							
Capital invested - Wind - Constrained	0	0	0	0	15.8	0	0
(billion \$2018)							
Installed (cumulative) - OffshoreWind -	0	0	0	0	0	0	0
Base land use assumptions (MW)							
Installed (cumulative) - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed (cumulative) - Solar - Base land	49.1	1,116	2,278	7,216	16,315	25,778	37,471
use assumptions (MW)							
Installed (cumulative) - Wind - Base land	0	0	0	0	0	472	1,550
use assumptions (MW)							

Table 7: E+ 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	2.37	2.37	2.37
Biomass w/ccu power plant (GWh)	0	0	3,205	3,205	3,205	6,036	6,036
Solar - Base land use assumptions (GWh)	112	2,037	2,227	9,438	17,405	18,107	22,314
Solar - Constrained land use assumptions (GWh)	103	1,616	3,640	16,087	13,275	19,277	21,094

Table 7: E+ scenario - PILLAR 2: Clean Electricity - Generation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Wind - Base land use assumptions (GWh)	0	0	0	0	0	1,363	3,140
Wind - Constrained land use assumptions	0	0	0	0	33,562	0	0
(GWh)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)	0	0	125	365	581	1,029	1,029
Conversion capital investment -	0	0	2,620	4,363	3,928	8,452	0
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	0	1	1	1
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	4	7	14	14
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	2	2	2	4	4
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	0	1	1	1
(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	3.17	13.7	18.5	30.9	31.4
Annual - BECCS (MMT)		0	3.17	8.78	13.7	24.3	24.3
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	4.93	4.83	6.52	7.04
Cumulative - All (MMT)		0	3.17	16.9	35.4	66.3	97.6
Cumulative - BECCS (MMT)		0	3.17	11.9	25.7	50	74.3
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	4.93	9.76	16.3	23.3

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	589	2,034	2,607	3,243	3,577
Cumulative investment - All (million \$2018)		0	2,939	6,495	6,986	7,602	7,791
Cumulative investment - Spur (million \$2018)		0	84.9	787	1,278	1,895	2,084
Cumulative investment - Trunk (million \$2018)		0	2,854	5,707	5,707	5,707	5,707
Spur (km)		0	103	1,060	1,633	2,269	2,604
Trunk (km)		0	487	973	973	973	973

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	6.58	21.1	37.9	60.2	80.1
Injection wells (wells)		0	6	24	42	70	86
Resource characterization, appraisal,		32.8	590	935	935	935	935
permitting costs (million \$2020)							
Wells and facilities construction costs		0	181	705	1,257	2,102	2,610
(million \$2020)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-172
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-6,293
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-68.6
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-6,534
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Moderate							-172
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,250
deployment - Cropland measures (1000							
tC02e/y)							
Carbon sink potential - Moderate							-34.3
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,456
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							69.5
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,815
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							125
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,009
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							69.5
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							939
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,070
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							-746
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-50,122
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-8,378
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-15,703
retention of HWP (1000 tCO2e/y)							

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

Iable 13: <i>E+ scenario - PILLAR 6: Land sin</i> Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase	2020	2023	2030	2000	2040	2040	-809
trees outside forests (1000 tC02e/y)							007
Carbon sink potential - High - Reforest	+						-6,522
cropland (1000 tCO2e/y)							-0,022
Carbon sink potential - High - Reforest	+	+		+			-6,558
pasture (1000 tC02e/y)							-0,000
Carbon sink potential - High - Restore							-5,019
productivity (1000 tC02e/y)							-3,017
Carbon sink potential - Low - Accelerate							-374
regeneration (1000 tC02e/y)							-314
• • • • • • • • • • • • • • • • • • • •							17.071
Carbon sink potential - Low - All (not							-17,371
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-213
deforestation (1000 tC02e/y)							
Carbon sink potential - Low - Extend							-3,218
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,599
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-5,234
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-283
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,261
cropland (1000 tCO2e/y)							0,20.
Carbon sink potential - Low - Reforest							-497
pasture (1000 tCO2e/y)							.,,
Carbon sink potential - Low - Restore				+		+	-1,692
productivity (1000 tC02e/y)							-1,072
Carbon sink potential - Mid - Accelerate							-560
·							-360
regeneration (1000 tC02e/y)							00.700
Carbon sink potential - Mid - All (not							-33,702
counting overlap) (1000 tCO2e/y)							- ,,
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tCO2e/y)							•
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tC02e/y)							-,
Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tCO2e/y)							0,000
Land impacted for carbon sink potential -							122
High - Accelerate regeneration (1000							122
hectares)							
Land impacted for carbon sink potential -							173
High - Avoid deforestation (over 30 years)							113
- , , , ,							
(1000 hectares)							
Land impacted for carbon sink potential -							4,272
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -	T		T				1,882
High - Improve plantations (1000							
hectares)							

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

Thom			-	2025	207.0	207.5	2050
Item	2020	2025	2030	2035	2040	2045	
Land impacted for carbon sink potential - High - Increase retention of HWP (1000							0
· ·							
hectares)							7/ 0
Land impacted for carbon sink potential -							76.8
High - Increase trees outside forests							
(1000 hectares)							/ 01
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							107
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							4 / / /
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							
hectares)							0.007
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							
(1000 hectares)							/11
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							1/0
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000			1		1	[
hectares)							

Table 13: E+	ccanario -	DTII AD 6.	Land cinke	Enracte	(continued)
Table 13: <i>E+</i>	scenario -	PILLAR 6:	Luna sinks -	· Forests i	i continuea i

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,273
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)		446	376	302	227	143	99.1
Natural gas consumption - Cumulative		0	0	0	0	0	9,085
(tcf)							
Natural gas production - Annual (tcf)		43.4	41	35.7	30.2	24	18.6
Oil consumption - Annual (million bbls)		75.7	66.7	53.5	41	31.1	23.1
Oil consumption - Cumulative (million		0	0	0	0	0	1,650
bbls)							
Oil production - Annual (million bbls)		30.3	30.5	30.4	24.1	19.6	13

Table 15: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		220	0.234	0.211	0.138	0.085	0.005
Coal (million 2019\$)							
Monetary damages from air pollution -		83.6	59.1	32.9	27	12.3	4.72
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		429	398	301	173	78.1	30.4
Transportation (million 2019\$)							
Premature deaths from air pollution -		24.9	0.026	0.024	0.016	0.01	0.001
Coal (deaths)							
Premature deaths from air pollution -		9.43	6.67	3.71	3.05	1.39	0.533
Natural Gas (deaths)							
Premature deaths from air pollution -		48.3	44.8	33.9	19.4	8.78	3.42
Transportation (deaths)							

Table 16: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		189	382	879	1,095	1,486	1,221
By economic sector - Construction (jobs)		5,108	6,096	10,102	12,546	13,918	17,638
By economic sector - Manufacturing		6,520	7,438	9,493	9,166	8,160	9,567
(jobs)							
By economic sector - Mining (jobs)		4,845	4,039	3,230	2,135	1,564	986
By economic sector - Other (jobs)		375	424	1,169	2,154	2,578	3,730
By economic sector - Pipeline (jobs)		557	829	869	478	423	430
By economic sector - Professional (jobs)		2,896	2,895	4,772	6,444	7,924	9,510
By economic sector - Trade (jobs)		2,569	2,375	3,189	4,098	4,721	5,977
By economic sector - Utilities (jobs)		5,944	6,784	9,692	10,212	11,514	13,573
By education level - All sectors -		8,761	9,590	13,506	15,104	16,333	19,865
Associates degree or some college (jobs)							
By education level - All sectors -		6,583	6,789	8,936	9,747	10,478	12,320
Bachelors degree (jobs)							
By education level - All sectors - Doctoral		205	204	283	339	387	453
degree (jobs)							
By education level - All sectors - High		11,912	13,109	18,563	20,775	22,486	26,929
school diploma or less (jobs)							

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

14510 101 27 000714710 17 17 71070 0050 (0071							
Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Masters		1,543	1,572	2,107	2,362	2,603	3,066
or professional degree (jobs)							
By resource sector - Biomass (jobs)		633	1,009	2,448	3,263	5,424	5,229
By resource sector - CO2 (jobs)		12.8	3,162	4,290	1,772	2,278	2,838
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		6,142	6,203	11,297	14,577	17,732	23,650
By resource sector - Natural Gas (jobs)		6,086	4,934	4,471	4,263	3,622	2,000
By resource sector - Nuclear (jobs)		727	715	704	693	402	0
By resource sector - Oil (jobs)		10,204	8,953	7,700	5,576	4,129	2,634
By resource sector - Solar (jobs)		3,340	3,975	9,403	15,361	16,457	23,050
By resource sector - Wind (jobs)		1,640	2,311	3,082	2,822	2,243	3,233
Median wages - Annual - All (\$2019 per		54,192	54,236	53,714	53,644	54,302	54,459
job)		-			-		
On-Site or In-Plant Training - Total jobs - 1		4,646	5,062	7,058	7,830	8,436	10,187
to 4 years (jobs)				-	-		•
On-Site or In-Plant Training - Total jobs - 4		1,804	1,988	2,832	3,188	3,502	4,250
to 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		4,671	5,018	7,002	7,866	8,519	10,200
None (jobs)							
On-Site or In-Plant Training - Total jobs -		228	255	365	410	449	548
Over 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		17,656	18,940	26,137	29,033	31,381	37,448
Up to 1 year (jobs)							
On-the-Job Training - All sectors - 1 to 4		5,942	6,484	9,051	10,037	10,818	13,080
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,684	1,879	2,737	3,123	3,451	4,223
years (jobs)							
On-the-Job Training - All sectors - None		1,580	1,664	2,301	2,611	2,840	3,419
(jobs)							
On-the-Job Training - All sectors - Over 10		287	314	432	474	495	597
years (jobs)							
On-the-Job Training - All sectors - Up to 1		19,511	20,922	28,874	32,083	34,684	41,314
year (jobs)							
Related work experience - All sectors - 1		10,647	11,395	15,661	17,356	18,744	22,368
to 4 years (jobs)							
Related work experience - All sectors - 4		6,809	7,309	10,039	11,088	11,956	14,336
to 10 years (jobs)							
Related work experience - All sectors -		4,088	4,461	6,275	7,027	7,660	9,197
None (jobs)							
Related work experience - All sectors -		1,903	2,027	2,730	2,967	3,149	3,761
Over 10 years (jobs)							
Related work experience - All sectors - Up		5,558	6,070	8,690	9,888	10,778	12,970
to 1 year (jobs)							
Wage income - All (million \$2019)		1,572	1,696	2,331	2,593	2,840	3,411

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	8,119	9,209	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	43.5	47.1	51.3	61.6	76.1	85	88
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Sales of space heating units - Electric	9.46	20.2	25.6	41.4	66.1	83.2	89.6
Heat Pump (%)							
Sales of space heating units - Electric	4.72	4.61	4.65	4.77	5.23	5.91	6.33
Resistance (%)							
Sales of space heating units - Fossil (%)	0	3.34	3.16	2.39	1.19	0.387	0.102
Sales of space heating units - Gas Furnace	85.8	71.8	66.6	51.4	27.5	10.5	3.93
(%)							

Table 17: E- scenario -	DILLAR 1. Efficience	//Electrification -	Commercial	continued
Table II. E- Scellul IO -	PILLAK I. EIIILIEIIL	// EIECH 111CUHUH -	CUITITIETCIULT	Continueur

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric	0.153	1.96	7.08	21.8	44.4	59.2	64.3
Heat Pump (%)							
Sales of water heating units - Electric	5.64	6.47	8.38	14.4	23.5	29.5	31.6
Resistance (%)							
Sales of water heating units - Gas Furnace	92.7	90	83	62.2	30.5	9.74	2.53
(%)							
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.69	1.71	2.12	2.18	3.13	3.3
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)	70.6	70.8	69.9	68.7	66.7	64.8	63.6
Final energy use - Industry (PJ)	201	207	209	208	209	207	206
Final energy use - Residential (PJ)	99.2	93.3	89.2	84.7	79.1	73.1	68.2
Final energy use - Transportation (PJ)	351	326	298	275	258	238	214

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	2.25	2.65	0	0	0	0
Sales of cooking units - Electric Resistance (%)	75.7	76.4	78.6	84.4	92.6	97.6	99.4
Sales of cooking units - Gas (%)	24.3	23.6	21.4	15.6	7.42	2.39	0.644
Sales of space heating units - Electric Heat Pump (%)	29.5	38.3	42.3	54.1	71.8	83.3	87.2
Sales of space heating units - Electric Resistance (%)	28.6	30.1	28.3	23	15.1	10.1	8.37
Sales of space heating units - Fossil (%)	11.7	12.9	12.1	9.17	5.03	2.44	1.57
Sales of space heating units - Gas (%)	30.2	18.6	17.3	13.8	8.07	4.19	2.84
Sales of water heating units - Electric Heat Pump (%)	0	2.08	7.99	25	51.1	68.1	74
Sales of water heating units - Electric Resistance (%)	67.2	76.8	72.5	59.6	40.1	27.4	23
Sales of water heating units - Gas Furnace (%)	29.2	18.6	17	12.9	6.35	2.02	0.528
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.51	2.49	2.49

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	0	63.7	135	456	1,438	2,094
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.053	0	0.263	0	1.45	0	4.06
units)							
Public EV charging plugs - L2 (1000 units)	0.175	0	6.32	0	34.8	0	97.8
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 (%)	1.56	1.97	2.06	1.64	1.05	0.537	0.23

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	1.89	4.69	11.9	25.9	48.4	72.1	87.6
Vehicle sales - Light-duty - gasoline (%)	91.7	87.4	79.6	66.6	46.2	24.8	11
Vehicle sales - Light-duty - hybrid (%)	4.6	5.4	6.07	5.52	4.14	2.44	1.18
Vehicle sales - Light-duty - hydrogen FC	0.113	0.38	0.326	0.249	0.176	0.098	0.045
(%)							
Vehicle sales - Light-duty - other (%)	0.103	0.106	0.096	0.084	0.061	0.033	0.015
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							-172
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,293
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-68.6
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,534
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-172
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,250
deployment - Cropland measures (1000							•
tCO2e/y)							
Carbon sink potential - Moderate							-34.3
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,456
deployment - Total (1000 tC02e/y)							-,
Land impacted for carbon sink -							69.5
Aggressive deployment - Corn-ethanol to							-
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,815
Aggressive deployment - Cropland							.,0
measures (1000 hectares)							
Land impacted for carbon sink -							125
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,009
Aggressive deployment - Total (1000							2,007
hectares)							
Land impacted for carbon sink - Moderate							69.5
deployment - Corn-ethanol to energy							07.0
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							939
deployment - Cropland measures (1000							737
hectares)							/0 /
Land impacted for carbon sink - Moderate							62.4
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 - Moderate							1,070
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							-746
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-50,122
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-8,378
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							·
Carbon sink potential - High - Increase							-15,703
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-809
trees outside forests (1000 tCO2e/y)							007
Carbon sink potential - High - Reforest							-6,522
cropland (1000 tCO2e/y)							0,022
Carbon sink potential - High - Reforest			-				-6,558
pasture (1000 tC02e/y)							-0,000
Carbon sink potential - High - Restore							-5,019
•							-5,019
productivity (1000 tC02e/y)							07/
Carbon sink potential - Low - Accelerate							-374
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-17,371
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-213
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-3,218
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,599
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-5,234
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-283
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,261
cropland (1000 tCO2e/y)							0,201
Carbon sink potential - Low - Reforest							-497
pasture (1000 tCO2e/y)							771
Carbon sink potential - Low - Restore			+				-1,692
productivity (1000 tC02e/y)							-1,072
Carbon sink potential - Mid - Accelerate							-560
							-360
regeneration (1000 tC02e/y)							00.700
Carbon sink potential - Mid - All (not							-33,702
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tCO2e/y)							0.500
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tCO2e/y)							0.057
Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tC02e/y)							100
Land impacted for carbon sink potential -							122
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							173
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							4,272
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,882
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 -							76.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							701
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							100
Land impacted for carbon sink potential -							1,664
							1,004
High - Restore productivity (1000							
hectares)							8,807
Land impacted for carbon sink potential -							0,007
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -			-				32.3
Low - Reforest pasture (1000 hectares)							02.0
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							1,007
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,273
Mid - Total impacted (over 30 years) (1000							
hectares)							

Table 24: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		220	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution -		78.8	47.2	20.4	7.86	2.97	2.04
Natural Gas (million 2019\$)						,.	
Monetary damages from air pollution - Transportation (million 2019\$)		436	438	424	380	301	205
Premature deaths from air pollution - Coal (deaths)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Natural Gas (deaths)		8.9	5.33	2.31	0.888	0.335	0.23
Premature deaths from air pollution - Transportation (deaths)		49	49.2	47.7	42.8	33.9	23.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	8,123	9,222	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Sales of space heating units - Electric	9.46	29.3	77	90.8	91.9	92	92
Heat Pump (%)							
Sales of space heating units - Electric	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Resistance (%)							
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0

Table 25: <i>E+RE+</i>	scenario -	PTIIAR 1.	Efficiency/	Flectrification -	Commercial	(continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas Furnace (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.03	2.09	3.69	3.94	2.98	3.07
Cumulative 5-yr (billion \$2018)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	2.27	2.78	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	75.8	81	96.7	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Sales of space heating units - Electric	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Heat Pump (%)							
Sales of space heating units - Electric	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Resistance (%)							
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of water heating units - Electric	0	12.1	64	75.6	76.1	76.1	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	16.1	3.02	0.128	0	0	0
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	398	1,016	1,653	2,501	2,725	2,596
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.053	0	0.878	0	3.92	0	6.35
units)							
Public EV charging plugs - L2 (1000 units)	0.175	0	21.1	0	94.3	0	153
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
(%)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.54	1.81	1.26	0.402	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	3.93	15.2	46.5	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78	48.7	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.44	4.55	3.22	1.19	0.291	0.064	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.339	0.203	0.063	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.102	0.097	0.064	0.022	0.004	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 - Solar PV - Base (billion \$2018)	0	2.71	4.34	7.5	19.5	24.7	31.9
Capital invested - Wind - Base (billion \$2018)	0	0	0	0	0.242	1.56	33.8
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Solar - Base land use assumptions (MW)	49.1	2,076	5,698	12,500	31,216	56,368	90,754
Installed (cumulative) - Wind - Base land use assumptions (MW)	0	0	0	0	205	1,597	33,504

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	3,884	6,936	12,999	35,844	48,167	65,840
Solar - Constrained land use assumptions (GWh)	112	4,268	6,159	16,432	41,750	59,587	66,320
Wind - Base land use assumptions (GWh)	0	0	0	0	582	4,057	80,459
Wind - Constrained land use assumptions (GWh)	0	0	0	7,525	26,037	0	3,615

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-172
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,293
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-68.6
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,534
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-172
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,250
deployment - Cropland measures (1000							
tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate							-34.3
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,456
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							69.5
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,815
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							125
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,009
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							69.5
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							939
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,070
deployment - Total (1000 hectares)							

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)							-746
Carbon sink potential - High - All (not counting overlap) (1000 tC02e/y)							-50,122
Carbon sink potential - High - Avoid deforestation (1000 tC02e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tC02e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - Restore productivity (1000 tC02e/y)							-5,019
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-374
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-17,371
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218

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

			 -	2045	2050
					-2,599
		-			E 00/
					-5,234
					-283
					-200
					-3,261
					-3,201
					-497
					7/1
					-1,692
					-1,072
					-560
					500
					-33,702
					-33,102
					-746
					140
					-5,798
					0,1 70
					-3,809
					0,007
+					-10,469
					-10,409
					-546
					-540
					-4,891
					-4,071
					-3,528
					-5,520
					-3,356
					-5,550
					122
					122
+					173
					110
					4,272
					4,212
					1,882
					1,002
					0
					O
					76.8
					10.0
					431
					401
+	+		+		186
					100
	+	+			1,664
					1,004
					0 007
					8,807

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

Table 55. E+KE+ SCEITUTIO - PILLAR 6. LUII		•		0005	0010	2015	2050
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests							10.1
(1000 hectares)							
Land impacted for carbon sink potential -						+	216
Low - Reforest cropland (1000 hectares)							210
Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares)							32.3
							1.007
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							
hectares)							/ 00/
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							020
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							20-7
Land impacted for carbon sink potential -			-				2,027
Mid - Restore productivity (1000							2,021
hectares)							
Land impacted for carbon sink potential -							7,273
Mid - Total impacted (over 30 years) (1000							1,213
hectares)							
Hedrar'esj							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		220	0.234	0.211	0.138	0.085	0.005

Table 34: F+RF+ scen	ario - IMDACTS.	- Health (con	tinuodl

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Natural Gas (million 2019\$)		89.4	62.1	33.1	21	5.74	2.37
Monetary damages from air pollution - Transportation (million 2019\$)		429	398	301	173	78.1	30.4
Premature deaths from air pollution - Coal (deaths)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Natural Gas (deaths)		10.1	7.01	3.73	2.37	0.648	0.267
Premature deaths from air pollution - Transportation (deaths)		48.3	44.8	33.9	19.4	8.78	3.42

Table 35: 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)	0	8,123	9,222	0	0	0	0
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Sales of space heating units - Electric Heat Pump (%)	9.46	29.3	77	90.8	91.9	92	92
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of space heating units - Gas Furnace (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas Furnace (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.03	2.09	3.69	3.94	2.98	3.07
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)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	2.27	2.78	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	75.8	81	96.7	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Sales of space heating units - Electric	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Heat Pump (%)							
Sales of space heating units - Electric	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Resistance (%)							

Table 20. F. DF seemanie	- PTLLAR 1: Efficiency/Electrifica	tion Docidontial (continued)
Table 38: F+RF-Scenorio	· PII I AR I' EMICIENCY/FIECTCITICN	tion - Resinential Icontinueal

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of water heating units - Electric	0	12.1	64	75.6	76.1	76.1	76.1
Heat Pump (%)							
Sales of water heating units - Electric	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	16.1	3.02	0.128	0	0	0
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	398	1,016	1,653	2,501	2,725	2,596
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.053	0	0.878	0	3.92	0	6.35
units)							
Public EV charging plugs - L2 (1000 units)	0.175	0	21.1	0	94.3	0	153
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 (%)	1.54	1.81	1.26	0.402	0.074	0.013	0
Vehicle sales - Light-duty - EV (%)	3.93	15.2	46.5	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78	48.7	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.44	4.55	3.22	1.19	0.291	0.064	0
Vehicle sales - Light-duty - hydrogen FC	0.11	0.339	0.203	0.063	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.102	0.097	0.064	0.022	0.004	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 40: E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion \$2018)		0.952	0.805	1.37	3.54	4.8	0
Capital invested - Solar PV - Constrained (billion \$2018)		3.09	2.54	2.21	6.75	2.85	0.089
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	0.445

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	1,365	1,294	2,372	6,500	9,325	0
Solar - Constrained land use assumptions (GWh)	112	4,420	4,066	3,851	12,490	5,560	185
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	1,052

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-172
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-6,293
deployment - Cropland measures (1000							-,
tCO2e/y)							
Carbon sink potential - Aggressive							-68.6
deployment - Permanent conservation							00.0
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,534
deployment - Total (1000 tCO2e/y)							0,004
Carbon sink potential - Moderate							-172
deployment - Corn-ethanol to energy							-112
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,250
deployment - Cropland measures (1000							-3,250
tCO2e/y)							0/ 0
Carbon sink potential - Moderate							-34.3
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,456
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							69.5
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							1,815
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							125
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							2,009
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							69.5
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							939
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							62.4
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,070
deployment - Total (1000 hectares)							.,0.0
	1						

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-746
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-50,122
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-8,378
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-15,703
retention of HWP (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 - High - Increase							-809
trees outside forests (1000 tC02e/y)							, 50
Carbon sink potential - High - Reforest cropland (1000 tC02e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-374
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,37
Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,26
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-49
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,69
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-56
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,70
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-74
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,79
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,80
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,46
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-54
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,89
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,35
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							12
and impacted for carbon sink potential - High - Avoid deforestation (over 30 years)							17
(1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000 nectares)							4,27
Land impacted for carbon sink potential - High - Improve plantations (1000 nectares)							1,88

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 - Increase retention of HWP (1000							0
hectares)							
Land impacted for carbon sink potential -							76.8
High - Increase trees outside forests							
(1000 hectares)							/ 01
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							107
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							1,004
hectares)							
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							5,55.
(1000 hectares)							
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests (1000 hectares)							
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							210
Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares)							02.0
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							.,00.
hectares)							
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							0.057
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000							
hectares) Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							1,410
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000							50.0

Table 43: E+RE-	cconario	DTIIAD	6. Land sinks	Enrocte	(continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,273
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		220	0.234	0.211	0.138	0.085	0.005
Coal (million 2019\$)							
Monetary damages from air pollution -		84.9	54.3	50.1	40.1	15	4.65
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		429	398	301	173	78.1	30.4
Transportation (million 2019\$)							
Premature deaths from air pollution -		24.9	0.026	0.024	0.016	0.01	0.001
Coal (deaths)							
Premature deaths from air pollution -		9.59	6.13	5.65	4.53	1.69	0.525
Natural Gas (deaths)							
Premature deaths from air pollution -		48.3	44.8	33.9	19.4	8.78	3.42
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 - Cumulative 5-yr (million \$2018)	0	8,119	9,209	0	0	0	0
Sales of cooking units - Electric Resistance (%)	43.5	47.1	51.3	61.6	76.1	85	88
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Sales of space heating units - Electric Heat Pump (%)	9.46	20.2	25.6	41.4	66.1	83.2	89.6
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.65	4.77	5.23	5.91	6.33
Sales of space heating units - Fossil (%)	0	3.34	3.16	2.39	1.19	0.387	0.102
Sales of space heating units - Gas Furnace (%)	85.8	71.8	66.6	51.4	27.5	10.5	3.93
Sales of water heating units - Electric Heat Pump (%)	0.153	1.96	7.08	21.8	44.4	59.2	64.3
Sales of water heating units - Electric Resistance (%)	5.64	6.47	8.38	14.4	23.5	29.5	31.6
Sales of water heating units - Gas Furnace (%)	92.7	90	83	62.2	30.5	9.74	2.53
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.69	1.71	2.12	2.18	3.13	3.3
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)	70.6	70.8	69.9	68.7	66.7	64.8	63.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	201	207	209	208	209	207	206
Final energy use - Residential (PJ)	99.2	93.3	89.2	84.7	79.1	73.1	68.2
Final energy use - Transportation (PJ)	351	326	298	275	258	238	214

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	2.25	2.65	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	75.7	76.4	78.6	84.4	92.6	97.6	99.4
Resistance (%)							
Sales of cooking units - Gas (%)	24.3	23.6	21.4	15.6	7.42	2.39	0.644
Sales of space heating units - Electric	29.5	38.3	42.3	54.1	71.8	83.3	87.2
Heat Pump (%)							
Sales of space heating units - Electric	28.6	30.1	28.3	23	15.1	10.1	8.37
Resistance (%)							
Sales of space heating units - Fossil (%)	11.7	12.9	12.1	9.17	5.03	2.44	1.57
Sales of space heating units - Gas (%)	30.2	18.6	17.3	13.8	8.07	4.19	2.84
Sales of water heating units - Electric	0	2.08	7.99	25	51.1	68.1	74
Heat Pump (%)							
Sales of water heating units - Electric	67.2	76.8	72.5	59.6	40.1	27.4	23
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	18.6	17	12.9	6.35	2.02	0.528
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.51	2.49	2.49

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	0	63.7	135	456	1,438	2,094
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.053	0	0.263	0	1.45	0	4.06
units)							
Public EV charging plugs - L2 (1000 units)	0.175	0	6.32	0	34.8	0	97.8
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 (%)	1.56	1.97	2.06	1.64	1.05	0.537	0.23
Vehicle sales - Light-duty - EV (%)	1.89	4.69	11.9	25.9	48.4	72.1	87.6
Vehicle sales - Light-duty - gasoline (%)	91.7	87.4	79.6	66.6	46.2	24.8	11
Vehicle sales - Light-duty - hybrid (%)	4.6	5.4	6.07	5.52	4.14	2.44	1.18
Vehicle sales - Light-duty - hydrogen FC	0.113	0.38	0.326	0.249	0.176	0.098	0.045
(%)							
Vehicle sales - Light-duty - other (%)	0.103	0.106	0.096	0.084	0.061	0.033	0.015
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 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	10.1	11.5	24	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	11,378	24,305	51,189	51,189	51,189

Table 52: E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)	0	0	701	1,498	3,156	3,563	3,563
Conversion capital investment -	0	0	9,299	10,565	21,971	4,675	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	0	0	5	5
(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	9	19	40	40	40
(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	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	11.3	24.1	50.7	56.7	57
Annual - BECCS (MMT)		0	11.3	24	50.6	56.7	56.5
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0.1	0.08	0.07	0.56
Cumulative - All (MMT)		0	11.3	35.4	86.1	143	200
Cumulative - BECCS (MMT)		0	11.3	35.3	86	143	199
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0.1	0.18	0.25	0.81

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	837	1,795	3,172	3,780	3,685
Cumulative investment - All (million \$2018)		0	3,530	7,100	10,298	10,924	10,789
Cumulative investment - Spur (million \$2018)		0	434	909	2,297	2,923	2,787
Cumulative investment - Trunk (million \$2018)		0	3,096	6,192	8,002	8,002	8,002
Spur (km)		0	350	822	1,958	2,566	2,471
Trunk (km)		0	487	973	1,214	1,214	1,214

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	7.39	36.4	71.3	98.5	104
Injection wells (wells)		0	8	34	60	100	124
Resource characterization, appraisal, permitting costs (million \$2020)		32.8	810	1,299	1,299	1,299	1,299
Wells and facilities construction costs (million \$2020)		0	257	1,000	1,782	2,980	3,700

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

Table 56: E-B+ scenario - PILLAR 6: Land	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive	2020	2020	2000	2000	2040	2040	-637
deployment - Corn-ethanol to energy							001
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-5,685
deployment - Cropland measures (1000							0,000
tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							-
crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Aggressive							-58.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-6,380
deployment - Total (1000 tC02e/y)							-,
Carbon sink potential - Moderate							-637
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-2,929
deployment - Cropland measures (1000							•
tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Pasture to energy crops							
(1000 tCO2e/y)							
Carbon sink potential - Moderate							-29.1
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-3,594
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							257
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							4,057
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							119
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							265
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							106
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							4,803
Aggressive deployment - Total (1000							
hectares)							

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							257
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							848
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							119
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							265
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							52.9
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							1,542
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-74
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-50,122
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-1,278
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-8,378
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-5,109
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-15,703
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-809
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-6,522
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-6,558
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-5,019
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-374
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-17,37
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-213
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-3,218
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-2,599
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-5,234
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-283
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,26
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-49
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-1,692
productivity (1000 tCO2e/y)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate							-560
regeneration (1000 tC02e/y)							
Carbon sink potential - Mid - All (not							-33,702
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tCO2e/y)							-,
Land impacted for carbon sink potential -							122
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							173
High - Avoid deforestation (over 30 years)							110
(1000 hectares)							
Land impacted for carbon sink potential -							4,272
High - Extend rotation length (1000							4,212
hectares)							
-							1,882
Land impacted for carbon sink potential -							1,002
High - Improve plantations (1000							
hectares)							0
Land impacted for carbon sink potential -							U
High - Increase retention of HWP (1000							
hectares)							7, 0
Land impacted for carbon sink potential -							76.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							,
hectares)							
Land impacted for carbon sink potential -			+				941
Low - Improve plantations (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 -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000							, -
hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							, -
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							•
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000							00.0
hectares)							
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							020
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							20 1
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							2,021
hectares)							
Land impacted for carbon sink potential -							7,273
Mid - Total impacted (over 30 years) (1000							1,210
hectares)							
neotal 60j							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		220	0.234	0.211	0.138	0.085	0.005
Coal (million 2019\$)							
Monetary damages from air pollution -		91.1	54.2	27.4	17.2	8.77	3.88
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		436	438	424	380	301	205
Transportation (million 2019\$)							
Premature deaths from air pollution -		24.9	0.026	0.024	0.016	0.01	0.001
Coal (deaths)							
Premature deaths from air pollution -		10.3	6.12	3.09	1.95	0.99	0.438
Natural Gas (deaths)							
Premature deaths from air pollution -		49	49.2	47.7	42.8	33.9	23.1
Transportation (deaths)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	7,974	8,300	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	43.5	45.6	45.9	45.7	46	45.9	45.7
Resistance (%)							
Sales of cooking units - Gas (%)	56.5	54.4	54.1	54.3	54	54.1	54.3
Sales of space heating units - Electric	9.46	31.9	71.2	79	79.3	79.4	79.4
Heat Pump (%)							
Sales of space heating units - Electric	4.72	6.4	12	15.8	18.7	19.2	19.2
Resistance (%)							
Sales of space heating units - Fossil (%)	0	2.67	0.47	0.024	0	0	0
Sales of space heating units - Gas Furnace	85.8	59	16.4	5.24	1.95	1.48	1.43
(%)							
Sales of water heating units - Electric	0.153	0.153	0.147	0.149	0.149	0.145	0.148
Heat Pump (%)							
Sales of water heating units - Electric	5.64	5.74	5.58	5.66	5.62	5.55	5.6
Resistance (%)							
Sales of water heating units - Gas Furnace	92.7	92.5	92.7	92.6	92.7	92.7	92.7
(%)							
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		2.32	2.41	3.75	3.99	3.1	3.21
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)	70.6	71.9	72.2	72.2	72.8	74.9	78.5
Final energy use - Industry (PJ)	201	210	218	222	228	232	238
Final energy use - Residential (PJ)	99.2	93.5	91	89.7	89.7	90.9	92.4
Final energy use - Transportation (PJ)	350	326	299	283	283	291	302

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	2.2	2.3	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	75.5	75.5	75.5	75.5	75.5	75.5	75.5
Resistance (%)							
Sales of cooking units - Gas (%)	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Sales of space heating units - Electric	26.6	55.5	56.3	57.6	58.8	60.4	62.7
Heat Pump (%)							
Sales of space heating units - Electric	29.8	23.9	23.5	22.8	21.8	20.4	18
Resistance (%)							
Sales of space heating units - Fossil (%)	12.2	6.81	6.91	6.74	6.58	6.52	6.54
Sales of space heating units - Gas (%)	31.4	13.8	13.3	12.9	12.8	12.7	12.7
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	67.2	78.4	78.5	78.3	78.1	78.1	78
Resistance (%)							
Sales of water heating units - Gas Furnace	29.2	19.2	19	19.2	19.4	19.4	19.5
(%)							
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.52	2.51	2.52

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 (%)	1.55	1.96	2.18	2.03	1.83	1.7	1.62
Vehicle sales - Light-duty - EV (%)	3.58	5.62	6.4	7.87	9.58	11.1	12.3
Vehicle sales - Light-duty - gasoline (%)	90.2	86.6	84.5	82.6	80.6	78.6	77.1
Vehicle sales - Light-duty - hybrid (%)	4.45	5.3	6.48	7.05	7.62	8.2	8.64
Vehicle sales - Light-duty - hydrogen FC	0.111	0.377	0.346	0.307	0.304	0.304	0.315
(%)							
Vehicle sales - Light-duty - other (%)	0.102	0.106	0.102	0.103	0.102	0.101	0.103
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 regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - All (not counting overlap) (1000 tC02e/y)							-50,122
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tC02e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tC02e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-374
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-17,371
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tC02e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest							-497
pasture (1000 tC02e/y)							
Carbon sink potential - Low - Restore							-1,692
productivity (1000 tC02e/y)							
Carbon sink potential - Mid - Accelerate							-560
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-33,702
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-746
deforestation (1000 tC02e/y)							
Carbon sink potential - Mid - Extend							-5,798
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-3,809
plantations (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-10,469
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Mid - Increase							-546
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Mid - Reforest							-4,891
cropland (1000 tCO2e/y)							,
Carbon sink potential - Mid - Reforest							-3,528
pasture (1000 tCO2e/y)							-,
Carbon sink potential - Mid - Restore							-3,356
productivity (1000 tCO2e/y)							0,000
Land impacted for carbon sink potential -							122
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							173
High - Avoid deforestation (over 30 years)							110
(1000 hectares)							
Land impacted for carbon sink potential -							4,272
High - Extend rotation length (1000							4,212
hectares)							
Land impacted for carbon sink potential -							1.000
							1,882
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 -							76.8
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							431
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							186
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,664
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							8,807
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							61.1
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							162
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							1,637
Low - Extend rotation length (1000							.,551
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							941
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							40.4
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							216
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							32.3
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							1,007
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							4,096
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							91.6
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							168
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							2,954
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							1,416
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							58.6
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							323
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							234
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							2,027
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							7,273
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 uptake (Mt CO2e/y)	-32.9		-14.9				-12.1
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-4.27		-7.13				-7.5
Business-as-usual carbon sink - Total (Mt CO2e/y)	-37.1		-22				-19.6

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		949	632	431	348	317	316
Monetary damages from air pollution - Natural Gas (million 2019\$)		94.8	100	105	101	103	106
Monetary damages from air pollution - Transportation (million 2019\$)		436	444	452	463	473	483
Premature deaths from air pollution - Coal (deaths)		107	71.4	48.7	39.3	35.9	35.6
Premature deaths from air pollution - Natural Gas (deaths)		10.7	11.3	11.9	11.4	11.6	12
Premature deaths from air pollution - Transportation (deaths)		49	49.9	50.9	52	53.2	54.3