

Net-Zero America - nebraska 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.

Data by category and subcategory

1	E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	1
2	E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	1
3	E+ scenario - PILLAR 1: Efficiency/Electrification - Overview	1
4	E+ scenario - PILLAR 1: Efficiency/Electrification - Residential	1
5	E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	2
6	E+ scenario - PILLAR 2: Clean Electricity - Generating capacity	2
7	E+ scenario - PILLAR 2: Clean Electricity - Generation	2
8	E+ scenario - PILLAR 3: Clean fuels - Bioenergy	3
9	E+ scenario - PILLAR 4: CCUS - CO2 capture	3
10	E+ scenario - PILLAR 4: CCUS - CO2 pipelines	3
11	E+ scenario - PILLAR 4: CCUS - CO2 storage	3
12	E+ scenario - PILLAR 6: Land sinks - Agriculture	4
13	E+ scenario - PILLAR 6: Land sinks - Forests	4
14	E+ scenario - IMPACTS - Fossil fuel industries	7
15	E+ scenario - IMPACTS - Health	7
16	E+ scenario - IMPACTS - Jobs	7
17	E- scenario - PILLAR 1: Efficiency/Electrification - Commercial	8
18	E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	9
19	E- scenario - PILLAR 1: Efficiency/Electrification - Overview	9
20	E- scenario - PILLAR 1: Efficiency/Electrification - Residential	9
21	E- scenario - PILLAR 1: Efficiency/Electrification - Transportation	9
22	E- scenario - PILLAR 6: Land sinks - Agriculture	10
23	E- scenario - PILLAR 6: Land sinks - Forests	11
24	E- scenario - IMPACTS - Health	13
25	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	13
26	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand .	14
27	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview	14
28	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential	14
29	E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	14
30	E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity	15
31	E+RE+ scenario - PILLAR 2: Clean Electricity - Generation	15
32	E+RE+ scenario - PILLAR 6: Land sinks - Agriculture	15
33	E+RE+ scenario - PILLAR 6: Land sinks - Forests	16
34	E+RE+ scenario - IMPACTS - Health	18
35	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial	19
36	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	19
37	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview	19
38	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential	19
39	E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation	20
40	E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity	20
41	E+RE- scenario - PILLAR 2: Clean Electricity - Generation	20
42	E+RE- scenario - PILLAR 6: Land sinks - Agriculture	21
43	E+RE- scenario - PILLAR 6: Land sinks - Forests	21

44	E+RE- scenario - IMPACTS - Health	24
45	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial	24
46	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	24
47	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview	24
48	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential	25
49	E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation	25
50	E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity	26
51	E-B+ scenario - PILLAR 2: Clean Electricity - Generation	26
52	E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy	26
53	E-B+ scenario - PILLAR 4: CCUS - CO2 capture	26
54	E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines	26
55	E-B+ scenario - PILLAR 4: CCUS - CO2 storage	27
56	E-B+ scenario - PILLAR 6: Land sinks - Agriculture	27
57	E-B+ scenario - PILLAR 6: Land sinks - Forests	28
58	E-B+ scenario - IMPACTS - Health	30
59	REF scenario - PILLAR 1: Efficiency/Electrification - Commercial	31
60	REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand	31
61	REF scenario - PILLAR 1: Efficiency/Electrification - Overview	31
62	REF scenario - PILLAR 1: Efficiency/Electrification - Residential	31
63	REF scenario - PILLAR 1: Efficiency/Electrification - Transportation	32
64	REF scenario - PILLAR 6: Land sinks - Forests	32
65	REF scenario - PILLAR 6: Land sinks - Forests - REF only	34
66	REF scenario - IMPACTS - Health	35

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	5,541	6,031	0	0	0	0
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric Heat Pump (%)	3.92	7.61	30.1	78	86.6	87.1	87.1
Sales of space heating units - Electric Resistance (%)	6.31	5.8	8.21	11.8	12.4	12.4	12.4
Sales of space heating units - Fossil (%)	0	1.82	0.351	0.015	0	0	0
Sales of space heating units - Gas Furnace (%)	89.8	84.8	61.3	10.2	1.03	0.454	0.456
Sales of water heating units - Electric Heat Pump (%)	0.944	1.84	14.5	42	47	47.3	47.3
Sales of water heating units - Electric Resistance (%)	8.03	8	20.3	47	51.8	52.1	52.1
Sales of water heating units - Gas Furnace (%)	90.2	89.2	64.5	10.3	0.61	0	0
Sales of water heating units - Other (%)	0.788	0.941	0.732	0.684	0.681	0.683	0.683

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.62	1.68	2.88	3.08	2.81	2.96
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)	70.8	69.4	66.6	62.4	57.8	54.2	52.1
Final energy use - Industry (PJ)	281	293	298	298	301	304	307
Final energy use - Residential (PJ)	86.4	81.9	77.8	69.7	60.5	53.3	48.7
Final energy use - Transportation (PJ)	182	170	150	125	103	89.2	83.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	1.79	2.3	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	74.2	79.7	96.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	25.8	20.3	3.47	0.175	0	0	0
Sales of space heating units - Electric	6.37	12.2	35.2	81.9	90.3	90.9	90.6
Heat Pump (%)							
Sales of space heating units - Electric	16.5	22	17.4	7.5	5.7	5.65	5.9
Resistance (%)							
Sales of space heating units - Fossil (%)	5.83	9.86	7.69	3.24	2.34	2.21	2.25
Sales of space heating units - Gas (%)	71.3	55.9	39.7	7.36	1.62	1.25	1.22
Sales of water heating units - Electric	0	0.739	10.1	30.7	34.4	34.6	34.6
Heat Pump (%)							
Sales of water heating units - Electric	35.5	51.5	55.3	63.7	65.3	65.4	65.3
Resistance (%)							
Sales of water heating units - Gas Furnace	64.5	47.7	34.5	5.53	0.326	0	0
(%)							
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	377	964	1,565	2,370	2,580	2,460
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.061	0	0.695	0	3.07	0	4.98
units)							
Public EV charging plugs - L2 (1000 units)	0.164	0	16.7	0	74	0	120
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 (%)	1.66	1.92	1.3	0.418	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.53	14	44.6	81.1	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.5	79.4	50.7	17.3	3.39	0.593	0
Vehicle sales - Light-duty - hybrid (%)	4.05	4.27	3.08	1.16	0.28	0.06	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.346	0.212	0.066	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.107	0.103	0.068	0.024	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant	0	0	0	0	0	0	0
(billion \$2018)							
Capital invested - Biomass w/ccu allam	0	0	0	0.013	0.004	0	0
power plant (billion \$2018)							
Capital invested - Biomass w/ccu power	0	0	0	0	0.005	0	0.597
plant (billion \$2018)							
Capital invested - Solar PV - Base (billion	0	2.03	11	9.43	6.82	5.94	15.3
\$2018)							
Capital invested - Solar PV - Constrained	0	3.44	13.4	6.07	7	7.8	11.1
(billion \$2018)							
Capital invested - Wind - Base (billion	0	0.55	11.5	23.7	25.9	28.6	37
\$2018)							
Capital invested - Wind - Constrained	0	17	13.9	23.4	20.3	25.7	27.6
(billion \$2018)							
Installed (cumulative) - OffshoreWind -	0	0	0	0	0	0	0
Base land use assumptions (MW)							
Installed (cumulative) - Rooftop PV (MW)	15.1	27	34.4	46	61	78.7	99.6
Installed (cumulative) - Solar - Base land	1.28	1,519	10,666	19,219	25,781	31,834	48,387
use assumptions (MW)							
Installed (cumulative) - Wind - Base land	3,194	3,568	12,188	31,309	53,212	78,726	113,660
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	13.1	17.1	17.1	17.1
Biomass w/ccu power plant (GWh)	0	0	0	0	5.71	5.71	676
Solar - Base land use assumptions (GWh)	3.05	2,886	17,500	16,511	12,674	11,749	32,035
Solar - Constrained land use assumptions (GWh)	0	5,512	13,421	11,662	11,432	16,132	28,383

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

	-	•	-				
Item	2020	2025	2030	2035	2040	2045	2050
Wind - Base land use assumptions (GWh)	13,033	1,310	30,087	66,059	74,417	85,745	117,331
Wind - Constrained land use assumptions	13,033	19,444	38,260	65,181	60,818	77,662	83,575
(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	0	47.4	122	699	3,814
Conversion capital investment -	0	0	0	687	1,056	8,178	62,939
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	1	1	1	1
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	1	2	11	29
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	1	1	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu	0	0	0	0	1	1	2
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu	0	0	0	1	1	1	33
(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 9: E+ scenario - PILLAR 4: CCUS - CO2 capture

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0.86	2.21	12.7	56.8
Annual - BECCS (MMT)		0	0	0.86	2.21	12.7	56.8
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0.86	3.07	15.8	72.6
Cumulative - BECCS (MMT)		0	0	0.86	3.07	15.8	72.6
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	276	678	573	1,227	4,968
Cumulative investment - All (million \$2018)		0	1,459	2,992	2,939	3,694	6,651
Cumulative investment - Spur (million \$2018)		0	0	72.9	19.6	775	3,732
Cumulative investment - Trunk (million \$2018)		0	1,459	2,919	2,919	2,919	2,919
Spur (km)		0	0	126	21.5	675	4,416
Trunk (km)		0	276	552	552	552	552

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million \$2020)		0	0	0	0	0	0
Wells and facilities construction costs (million \$2020)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-2,594
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-7,779
deployment - Cropland measures (1000							
tC02e/y)							
Carbon sink potential - Aggressive							-286
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-10,659
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Moderate							-2,594
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-4,000
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-143
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-6,737
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							1,456
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							7,064
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							489
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							9,008
Aggressive deployment - Total (1000							•
hectares)							
Land impacted for carbon sink - Moderate							1,456
deployment - Corn-ethanol to energy							,
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,654
deployment - Cropland measures (1000							-,
hectares)							
Land impacted for carbon sink - Moderate							244
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate				+			5,354
deployment - Total (1000 hectares)							5,554
acproyritorit - rotar (1000 lieutal es)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-248
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-17,146
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-947
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-427
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-46.9
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-285
retention of HWP (1000 tCO2e/y)							

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

Carbon sink potential - High - Increase trees outside forests (1000 Ct02e/y) Carbon sink potential - High - Reforest crupland (1000 Ct02e/y) Carbon sink potential - High - Reforest spature (1000 Ct02e/y) Carbon sink potential - High - Reforest spature (1000 Ct02e/y) Carbon sink potential - Ligh - Restore productivity (1000 Ct02e/y) Carbon sink potential - Low - Accelerate regeneration (1000 Ct02e/y) Carbon sink potential - Low - Aul (not counting overlap) (1000 Ct02e/y) Carbon sink potential - Low - Aul (not counting overlap) (1000 Ct02e/y) Carbon sink potential - Low - Aul (not counting overlap) (1000 Ct02e/y) Carbon sink potential - Low - Extend rotation length (1000 Ct02e/y) Carbon sink potential - Low - Extend rotation length (1000 Ct02e/y) Carbon sink potential - Low - Improve plantations (1000 Ct02e/y) Carbon sink potential - Low - Increase retention of HWP (1000 Ct02e/y) Carbon sink potential - Low - Increase trees outside forests (1000 Ct02e/y) Carbon sink potential - Low - Reforest propland (1000 Ct02e/y) Carbon sink potential - Low - Reforest pasture (1000 Ct02e/y) Carbon sink potential - Low - Reforest pasture (1000 Ct02e/y) Carbon sink potential - Low - Reforest pasture (1000 Ct02e/y) Carbon sink potential - Low - Reforest pasture (1000 Ct02e/y) Carbon sink potential - Low - Reforest pasture (1000 Ct02e/y) Carbon sink potential - Mid - Accelerate regeneration (1000 Ct02e/y) Carbon sink potential - Mid - Aul (not counting overlap) (1000 Ct02e/y) Carbon sink potential - Mid - Aul (not counting overlap) (1000 Ct02e/y) Carbon sink potential - Mid - Fatenst productivity (1000 Ct02e/y) Carbon sink potential - Mid - Reforest pasture (1000 Ct02e/y) Carbon sink potential - Mid - Reforest pasture (1000 Ct02e/y) Carbon sink potential - Mid - Reforest pasture (1000 Ct02e/y) Carbon sink potential - Mid - Reforest productivity (1000 Ct02e/y) Carbon sink potential - Mid - Reforest productivity (1000 Ct02e/y) Carbon sink potential - Mid - Reforest productivity (1000 Ct02e/y) Carbon sink potential - Mid - Reforest p	Table 13: E+ scenario - PILLAR 6: Land sin	2020	2025	2030	2025	2040	2045	2050
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Carbon sink potential - Mid - Increase trees outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest cropland (1000 tC02e/y) Carbon sink potential - Mid - Reforest pasture (1000 tC02e/y) Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000	retention of HWP (1000 tCO2e/y)							
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Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000	•							0,07.
pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000								-2,253
Carbon sink potential - Mid - Restore productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000	•							2,200
productivity (1000 tC02e/y) Land impacted for carbon sink potential - High - Accelerate regeneration (1000		+						-288
Land impacted for carbon sink potential - High - Accelerate regeneration (1000								-200
High - Accelerate regeneration (1000								40.5
								40.5
hastanasi								
hectares)								100
Land impacted for carbon sink potential -								128
High - Avoid deforestation (over 30 years)								
(1000 hectares)	•							
Land impacted for carbon sink potential -								218
High - Extend rotation length (1000								
hectares)	The state of the s							
Land impacted for carbon sink potential -	Land impacted for carbon sink potential -						_	17.3
High - Improve plantations (1000	High - Improve plantations (1000							
hectares)	hectares)							

Table 13: E+ 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 -							258
High - Increase trees outside forests							
(1000 hectares)							F40
Land impacted for carbon sink potential -							519
High - Reforest cropland (1000 hectares)							110
Land impacted for carbon sink potential -							119
High - Reforest pasture (1000 hectares) Land impacted for carbon sink potential -							143
High - Restore productivity (1000							143
hectares)							
Land impacted for carbon sink potential -							1,443
High - Total impacted (over 30 years)							1,440
(1000 hectares)							
Land impacted for carbon sink potential -							20.2
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							120
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							83.4
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							8.63
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 -							136
Low - Increase trees outside forests							
(1000 hectares) Land impacted for carbon sink potential -							260
Low - Reforest cropland (1000 hectares)							260
Land impacted for carbon sink potential -							20.6
Low - Reforest pasture (1000 hectares)							20.0
Land impacted for carbon sink potential -							86.4
Low - Restore productivity (1000							00.⊣
hectares)							
Land impacted for carbon sink potential -							735
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							30.4
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							124
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							151
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							13
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 -							197
Mid - Increase trees outside forests (1000							197
1,110 - THO EGGE H EEG ONFOINE INLESTS HOOD	1						

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							390
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							149
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							174
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,228
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)		144	121	97.3	73.2	46.1	32
Natural gas consumption - Cumulative		0	0	0	0	0	2,931
(tcf)							
Natural gas production - Annual (tcf)		0.529	0.5	0.435	0.368	0.292	0.227
Oil consumption - Annual (million bbls)		46.1	40.8	32.6	24.4	18	12.3
Oil consumption - Cumulative (million		0	0	0	0	0	991
bbls)							
Oil production - Annual (million bbls)		2.66	2.67	2.67	2.12	1.72	1.14

Table 15: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		125	0.122	0.115	0.092	0.061	0.001
Coal (million 2019\$)							
Monetary damages from air pollution -		73.6	43.8	18.5	11.7	7.14	3.49
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		195	183	140	81.3	37.2	14.7
Transportation (million 2019\$)							
Premature deaths from air pollution -		14.1	0.014	0.013	0.01	0.007	0
Coal (deaths)							
Premature deaths from air pollution -		8.31	4.94	2.09	1.32	0.806	0.395
Natural Gas (deaths)							
Premature deaths from air pollution -		22	20.6	15.7	9.14	4.19	1.65
Transportation (deaths)							

Table 16: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		3,679	3,685	3,623	2,083	1,054	3,462
By economic sector - Construction (jobs)		5,602	16,136	23,789	28,510	34,963	55,610
By economic sector - Manufacturing		6,180	7,502	9,750	9,262	8,469	13,621
(jobs)							
By economic sector - Mining (jobs)		1,054	702	481	303	184	105
By economic sector - Other (jobs)		586	2,339	3,234	3,948	4,846	8,590
By economic sector - Pipeline (jobs)		199	349	315	105	99.8	425
By economic sector - Professional (jobs)		3,529	8,228	13,833	18,367	24,472	40,728
By economic sector - Trade (jobs)		3,206	5,632	8,311	10,371	13,345	21,991
By economic sector - Utilities (jobs)		5,243	10,308	17,535	21,910	28,841	47,111
By education level - All sectors -		8,127	16,530	25,051	30,079	37,368	61,009
Associates degree or some college (jobs)							
By education level - All sectors -		5,488	10,348	15,757	19,124	24,036	39,535
Bachelors degree (jobs)							
By education level - All sectors - Doctoral		188	397	627	797	1,035	1,715
degree (jobs)							
By education level - All sectors - High		14,142	25,005	35,392	39,857	47,457	78,860
school diploma or less (jobs)							

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

Table 10. L+ Scellal 10 - IMPACTS - 3003 (col	•						
Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Masters		1,334	2,602	4,044	5,000	6,378	10,524
or professional degree (jobs)							
By resource sector - Biomass (jobs)		8,621	8,390	8,104	4,972	4,014	15,388
By resource sector - CO2 (jobs)		0	1,453	1,457	14.1	247	3,162
By resource sector - Coal (jobs)		1,025	257	0	0	0	0
By resource sector - Grid (jobs)		7,621	16,428	30,894	41,013	53,982	87,725
By resource sector - Natural Gas (jobs)		1,577	1,420	1,280	1,070	1,313	1,251
By resource sector - Nuclear (jobs)		404	398	231	0.007	0.015	0.026
By resource sector - Oil (jobs)		2,295	1,889	1,433	1,005	703	450
By resource sector - Solar (jobs)		3,760	14,627	15,670	15,382	15,001	29,215
By resource sector - Wind (jobs)		3,975	10,020	21,801	31,402	41,013	54,454
Median wages - Annual - All (\$2019 per		53,898	55,469	57,289	58,995	60,632	61,479
job)							
On-Site or In-Plant Training - Total jobs - 1		4,224	8,567	12,917	15,446	19,150	31,237
to 4 years (jobs)							
On-Site or In-Plant Training - Total jobs - 4		1,641	3,637	5,562	6,755	8,490	13,771
to 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		4,653	8,875	13,119	15,487	19,057	31,441
None (jobs)							
On-Site or In-Plant Training - Total jobs -		244	483	726	860	1,060	1,729
Over 10 years (jobs)							
On-Site or In-Plant Training - Total jobs -		18,516	33,320	48,546	56,310	68,515	113,466
Up to 1 year (jobs)							
On-the-Job Training - All sectors - 1 to 4		5,243	10,903	16,590	19,991	24,911	40,519
years (jobs)							
On-the-Job Training - All sectors - 4 to 10		1,556	3,585	5,517	6,735	8,490	13,752
years (jobs)							
On-the-Job Training - All sectors - None		1,652	3,065	4,436	5,168	6,301	10,438
(jobs)							
On-the-Job Training - All sectors - Over 10		269	531	766	885	1,057	1,706
years (jobs)							
On-the-Job Training - All sectors - Up to 1		20,559	36,798	53,562	62,080	75,515	125,229
year (jobs)							
Related work experience - All sectors - 1		9,814	18,898	28,302	33,735	41,852	68,915
to 4 years (jobs)							
Related work experience - All sectors - 4		6,040	12,063	18,303	22,044	27,492	44,903
to 10 years (jobs)							
Related work experience - All sectors -		4,504	8,224	11,928	13,773	16,748	27,786
None (jobs)							
Related work experience - All sectors -		1,645	3,158	4,764	5,689	7,031	11,460
Over 10 years (jobs)							
Related work experience - All sectors - Up		7,275	12,540	17,573	19,616	23,150	38,579
to 1 year (jobs)							
Wage income - All (million \$2019)		1,578	3,045	4,634	5,597	7,051	11,784

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	5,540	6,039	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	44.8	49.3	53.1	63	76.9	85.5	88.5
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	50.7	46.9	37	23.1	14.5	11.5
Sales of space heating units - Electric	3.92	6.69	9.32	17.9	38.6	64.5	79.7
Heat Pump (%)							
Sales of space heating units - Electric	6.31	5.58	5.85	6.72	8.6	10.7	11.9
Resistance (%)							
Sales of space heating units - Fossil (%)	0	2.1	1.98	1.48	0.719	0.234	0.062
Sales of space heating units - Gas Furnace	89.8	85.6	82.9	73.9	52.1	24.5	8.31
(%)							

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	0.944	1.35	2.81	7.68	19.4	34.3	43
Heat Pump (%)							
Sales of water heating units - Electric	8.03	7.53	8.96	13.7	25.1	39.5	48
Resistance (%)							
Sales of water heating units - Gas Furnace	90.2	90.1	87.3	77.8	54.7	25.5	8.33
(%)							
Sales of water heating units - Other (%)	0.788	0.981	0.957	0.887	0.782	0.716	0.691

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.33	1.36	1.77	1.84	2.53	2.68
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)	70.8	69.4	67.5	65.7	63.5	60.8	58.1
Final energy use - Industry (PJ)	281	293	300	302	307	311	314
Final energy use - Residential (PJ)	86.4	82	78.8	75.5	71.4	65.8	59.3
Final energy use - Transportation (PJ)	182	171	156	144	135	124	111

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	1.78	2.27	0	0	0	0
Sales of cooking units - Electric Resistance (%)	74.1	74.8	77.2	83.4	92.1	97.4	99.3
Sales of cooking units - Gas (%)	25.9	25.2	22.8	16.6	7.91	2.55	0.687
Sales of space heating units - Electric Heat Pump (%)	6.37	11	13.7	22.5	43.2	68.9	83.6
Sales of space heating units - Electric Resistance (%)	16.5	22.2	21.5	19.8	15.5	10.2	7.2
Sales of space heating units - Fossil (%)	5.83	9.99	9.81	8.95	6.83	4.3	2.95
Sales of space heating units - Gas (%)	71.3	56.8	54.9	48.8	34.5	16.7	6.23
Sales of water heating units - Electric Heat Pump (%)	0	0.395	1.48	5.1	13.9	24.9	31.5
Sales of water heating units - Electric Resistance (%)	35.5	51.4	51.8	53.2	56.8	61.3	64
Sales of water heating units - Gas Furnace (%)	64.5	48.2	46.7	41.7	29.3	13.7	4.47
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	0	60.7	128	432	1,362	1,983
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.061	0	0.212	0	1.14	0	3.19
units)							
Public EV charging plugs - L2 (1000 units)	0.164	0	5.1	0	27.4	0	76.8
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 (%)	1.68	2.07	2.08	1.66	1.07	0.552	0.236

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	1.75	4.38	11.2	24.9	47.3	71.3	87.3
Vehicle sales - Light-duty - gasoline (%)	92.2	88	80.6	67.9	47.4	25.6	11.3
Vehicle sales - Light-duty - hybrid (%)	4.19	5.02	5.67	5.21	3.97	2.38	1.16
Vehicle sales - Light-duty - hydrogen FC	0.113	0.384	0.333	0.257	0.184	0.103	0.048
(%)							
Vehicle sales - Light-duty - other (%)	0.108	0.111	0.102	0.089	0.065	0.036	0.016
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							-2,594
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-7,779
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-286
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-10,659
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Moderate							-2,594
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Moderate							-4,000
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							-143
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-6,737
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							1,456
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							7,064
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							489
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							9,008
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							1,456
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,654
deployment - Cropland measures (1000							•
hectares)							
Land impacted for carbon sink - Moderate							244
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							5,354
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							-248
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-17,146
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-947
deforestation (1000 tC02e/y)							
Carbon sink potential - High - Extend							-427
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-46.9
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-285
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-2,717
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-7,855
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-4,189
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-431
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-124
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,906
counting overlap) (1000 tCO2e/y)							0,700
Carbon sink potential - Low - Avoid							-158
deforestation (1000 tC02e/y)							-100
Carbon sink potential - Low - Extend							-164
rotation length (1000 tC02e/y)							-104
Carbon sink potential - Low - Improve							-23.8
·							-23.0
plantations (1000 tCO2e/y)							-95
Carbon sink potential - Low - Increase							-95
retention of HWP (1000 tC02e/y)							054
Carbon sink potential - Low - Increase							-951
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,928
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-317
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-145
productivity (1000 tCO2e/y)							
Carbon sink potential - Mid - Accelerate							-186
regeneration (1000 tCO2e/y)							
Carbon sink potential - Mid - All (not							-11,526
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Mid - Avoid							-553
deforestation (1000 tCO2e/y)							
Carbon sink potential - Mid - Extend							-296
rotation length (1000 tCO2e/y)							
Carbon sink potential - Mid - Improve							-34.9
plantations (1000 tC02e/y)							54.7
Carbon sink potential - Mid - Increase							-190
retention of HWP (1000 tCO2e/y)							-170
Carbon sink potential - Mid - Increase							-1,834
trees outside forests (1000 tCO2e/y)							-1,034
ti 669 outside 101,6919 (1000 f0076/A)							

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

Item Peferson	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest							-5,891
cropland (1000 tC02e/y)							0.050
Carbon sink potential - Mid - Reforest							-2,253
pasture (1000 tC02e/y)							
Carbon sink potential - Mid - Restore							-288
productivity (1000 tCO2e/y)							
Land impacted for carbon sink potential -							40.5
High - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							128
High - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							218
High - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							17.3
High - Improve plantations (1000							11.0
hectares)							
•							
Land impacted for carbon sink potential -							0
High - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							258
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							519
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							119
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							143
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,443
							1,443
High - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							20.2
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							120
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							83.4
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							8.63
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							0
Low - Increase retention of HWP (1000							U
hectares)							
							107
Land impacted for carbon sink potential -							136
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							260
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							20.6
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							86.4
Low - Restore productivity (1000	l l		1				

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							735
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							30.4
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							124
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							151
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							13
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 -							197
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							390
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							149
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							174
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,228
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\$)		125	0.122	0.115	0.092	0.061	0.001
Monetary damages from air pollution - Natural Gas (million 2019\$)		81.7	39.4	14.4	6.67	2.65	2.09
Monetary damages from air pollution - Transportation (million 2019\$)		198	202	197	179	143	98.4
Premature deaths from air pollution - Coal (deaths)		14.1	0.014	0.013	0.01	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		9.23	4.45	1.63	0.753	0.3	0.236
Premature deaths from air pollution - Transportation (deaths)		22.3	22.7	22.2	20.1	16.1	11.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	5,541	6,031	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	44.8	57.1	84	89.3	89.6	89.6	89.6
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric	3.92	7.61	30.1	78	86.6	87.1	87.1
Heat Pump (%)							
Sales of space heating units - Electric	6.31	5.8	8.21	11.8	12.4	12.4	12.4
Resistance (%)							
Sales of space heating units - Fossil (%)	0	1.82	0.351	0.015	0	0	0

Table 25: F+RF+	scenario - DII I AR 1	Efficiency/Electrification -	Commercial (continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	89.8	84.8	61.3	10.2	1.03	0.454	0.456
Sales of water heating units - Electric Heat Pump (%)	0.944	1.84	14.5	42	47	47.3	47.3
Sales of water heating units - Electric Resistance (%)	8.03	8	20.3	47	51.8	52.1	52.1
Sales of water heating units - Gas Furnace (%)	90.2	89.2	64.5	10.3	0.61	0	0
Sales of water heating units - Other (%)	0.788	0.941	0.732	0.684	0.681	0.683	0.683

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.62	1.68	2.88	3.08	2.81	2.96
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)	70.8	69.4	66.6	62.4	57.8	54.2	52.1
Final energy use - Industry (PJ)	281	293	298	298	301	304	307
Final energy use - Residential (PJ)	86.4	81.9	77.8	69.7	60.5	53.3	48.7
Final energy use - Transportation (PJ)	182	170	150	125	103	89.2	83.4

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	1.79	2.3	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	74.2	79.7	96.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	25.8	20.3	3.47	0.175	0	0	0
Sales of space heating units - Electric	6.37	12.2	35.2	81.9	90.3	90.9	90.6
Heat Pump (%)							
Sales of space heating units - Electric	16.5	22	17.4	7.5	5.7	5.65	5.9
Resistance (%)							
Sales of space heating units - Fossil (%)	5.83	9.86	7.69	3.24	2.34	2.21	2.25
Sales of space heating units - Gas (%)	71.3	55.9	39.7	7.36	1.62	1.25	1.22
Sales of water heating units - Electric	0	0.739	10.1	30.7	34.4	34.6	34.6
Heat Pump (%)							
Sales of water heating units - Electric	35.5	51.5	55.3	63.7	65.3	65.4	65.3
Resistance (%)							
Sales of water heating units - Gas Furnace	64.5	47.7	34.5	5.53	0.326	0	0
(%)							
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	377	964	1,565	2,370	2,580	2,460
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000 units)	0.061	0	0.695	0	3.07	0	4.98
Public EV charging plugs - L2 (1000 units)	0.164	0	16.7	0	74	0	120
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. F+RF+	scenario - l	DTI I ΔR 1· Efficien	cv/Electrification -	- Transportation	(continued)
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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 (%)	1.66	1.92	1.3	0.418	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.53	14	44.6	81.1	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.5	79.4	50.7	17.3	3.39	0.593	0
Vehicle sales - Light-duty - hybrid (%)	4.05	4.27	3.08	1.16	0.28	0.06	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.346	0.212	0.066	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.107	0.103	0.068	0.024	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion \$2018)	0	0	15.6	12	14.6	12.2	52.8
Capital invested - Wind - Base (billion \$2018)	0	2.4	13.8	28.7	46.8	55.8	72.8
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Solar - Base land use assumptions (MW)	1.28	1.28	13,024	23,937	38,022	50,459	107,446
Installed (cumulative) - Wind - Base land use assumptions (MW)	3,194	4,828	15,204	38,344	77,960	127,723	196,462

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	3.05	0	24,913	21,186	27,829	24,604	116,034
Solar - Constrained land use assumptions (GWh)	3.05	0	28,987	19,022	22,015	28,639	79,291
Wind - Base land use assumptions (GWh)	13,033	5,731	36,051	79,728	133,394	167,139	226,317
Wind - Constrained land use assumptions (GWh)	13,033	25,603	44,290	78,529	113,434	133,374	221,760

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-2,594
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-7,779
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-286
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-10,659
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,594
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-4,000
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							-143
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-6,737
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							1,456
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							7,064
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							489
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -							9,008
Aggressive deployment - Total (1000							
hectares)							
Land impacted for carbon sink - Moderate							1,456
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,654
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							244
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							5,354
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)							-248
Carbon sink potential - High - All (not							-17,146
counting overlap) (1000 tC02e/y) Carbon sink potential - High - Avoid							-947
deforestation (1000 tCO2e/y)							-941
Carbon sink potential - High - Extend rotation length (1000 tC02e/y)							-427
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-46.9
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-285
Carbon sink potential - High - Increase trees outside forests (1000 tC02e/y)							-2,717
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-7,855
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,189
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-431
Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y)							-124
Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)							-5,906
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-164

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

				-23.8
				20.0
1 =				-9:
				-9
				0.5
				-95
				0.00
				-3,92
				-31
				-31
				-14
				10
				-18
				-11,52
				-55
				-29
				-34.
				-19
				-1,83
				-5,89
				-2,25
				-28
				40.
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				Ji
				11
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				14
				14
				1,44

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

Table 33. LTNET Section 10 TILLAN 6. Lai	ia onino	1 6363 (601161	Hacaj				
Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							20.2
Low - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							120
Low - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							83.4
Low - Extend rotation length (1000							
hectares)							0.40
Land impacted for carbon sink potential -							8.63
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000							0
•							
hectares) Land impacted for carbon sink potential -							136
Low - Increase trees outside forests							130
(1000 hectares)							
Land impacted for carbon sink potential -							260
Low - Reforest cropland (1000 hectares)							200
Land impacted for carbon sink potential -							20.6
Low - Reforest pasture (1000 hectares)							20.0
Land impacted for carbon sink potential -			+				86.4
Low - Restore productivity (1000							00.4
hectares)							
Land impacted for carbon sink potential -							735
Low - Total impacted (over 30 years)							100
(1000 hectares)							
Land impacted for carbon sink potential -							30.4
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							124
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							151
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							13
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 -							197
Mid - Increase trees outside forests (1000							
hectares)							
Land impacted for carbon sink potential -							390
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							149
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							174
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,228
Mid - Total impacted (over 30 years) (1000							
hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		125	0.122	0.115	0.092	0.061	0.001
Coal (million 2019\$)							

Table 34:	E+RE+ scenario -	· IMPACTS -	Health	l continued l

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Natural Gas (million 2019\$)		68.4	37.8	10.9	6.51	2.87	1.88
Monetary damages from air pollution - Transportation (million 2019\$)		195	183	140	81.3	37.2	14.7
Premature deaths from air pollution - Coal (deaths)		14.1	0.014	0.013	0.01	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		7.72	4.27	1.24	0.735	0.324	0.212
Premature deaths from air pollution - Transportation (deaths)		22	20.6	15.7	9.14	4.19	1.65

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s -	0	5,541	6,031	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	44.8	57.1	84	89.3	89.6	89.6	89.6
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric	3.92	7.61	30.1	78	86.6	87.1	87.1
Heat Pump (%)							
Sales of space heating units - Electric	6.31	5.8	8.21	11.8	12.4	12.4	12.4
Resistance (%)							
Sales of space heating units - Fossil (%)	0	1.82	0.351	0.015	0	0	0
Sales of space heating units - Gas Furnace	89.8	84.8	61.3	10.2	1.03	0.454	0.456
(%)							
Sales of water heating units - Electric	0.944	1.84	14.5	42	47	47.3	47.3
Heat Pump (%)							
Sales of water heating units - Electric	8.03	8	20.3	47	51.8	52.1	52.1
Resistance (%)							
Sales of water heating units - Gas Furnace	90.2	89.2	64.5	10.3	0.61	0	0
(%)							
Sales of water heating units - Other (%)	0.788	0.941	0.732	0.684	0.681	0.683	0.683

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.62	1.68	2.88	3.08	2.81	2.96
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)	70.8	69.4	66.6	62.4	57.8	54.2	52.1
Final energy use - Industry (PJ)	281	293	298	298	301	304	307
Final energy use - Residential (PJ)	86.4	81.9	77.8	69.7	60.5	53.3	48.7
Final energy use - Transportation (PJ)	182	170	150	125	103	89.2	83.4

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	1.79	2.3	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	74.2	79.7	96.5	99.8	100	100	100
Resistance (%)							
Sales of cooking units - Gas (%)	25.8	20.3	3.47	0.175	0	0	0
Sales of space heating units - Electric	6.37	12.2	35.2	81.9	90.3	90.9	90.6
Heat Pump (%)							
Sales of space heating units - Electric	16.5	22	17.4	7.5	5.7	5.65	5.9
Resistance (%)							

Table 38: E+RE-	acanania DII	IAD 1. Eff	icionou/Floota	ification	Dooidontial	(continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Fossil (%)	5.83	9.86	7.69	3.24	2.34	2.21	2.25
Sales of space heating units - Gas (%)	71.3	55.9	39.7	7.36	1.62	1.25	1.22
Sales of water heating units - Electric Heat Pump (%)	0	0.739	10.1	30.7	34.4	34.6	34.6
Sales of water heating units - Electric Resistance (%)	35.5	51.5	55.3	63.7	65.3	65.4	65.3
Sales of water heating units - Gas Furnace (%)	64.5	47.7	34.5	5.53	0.326	0	0
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs -	0	377	964	1,565	2,370	2,580	2,460
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.061	0	0.695	0	3.07	0	4.98
units)							
Public EV charging plugs - L2 (1000 units)	0.164	0	16.7	0	74	0	120
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 (%)	1.66	1.92	1.3	0.418	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.53	14	44.6	81.1	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.5	79.4	50.7	17.3	3.39	0.593	0
Vehicle sales - Light-duty - hybrid (%)	4.05	4.27	3.08	1.16	0.28	0.06	0
Vehicle sales - Light-duty - hydrogen FC	0.111	0.346	0.212	0.066	0.013	0.002	0
(%)							
Vehicle sales - Light-duty - other (%)	0.107	0.103	0.068	0.024	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen	0.196	1.27	6.33	15.2	19.1	19.9	20
FC (%)							
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 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)		5.7	3.92	4.66	3.09	1.34	0
Capital invested - Solar PV - Constrained (billion \$2018)		2.15	3.06	7.09	4.01	1.27	0
Capital invested - Wind - Base (billion \$2018)		0	3.21	9.2	11.5	16.6	0.769
Capital invested - Wind - Constrained (billion \$2018)		2.45	9.77	10.6	13.1	16.1	0.65

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	622	8,129	6,288	8,093	5,727	2,599	0
Solar - Constrained land use assumptions (GWh)	348	3,080	4,933	12,356	7,405	2,497	0
Wind - Base land use assumptions (GWh)	13,033	0	8,466	25,822	33,799	50,787	2,455
Wind - Constrained land use assumptions (GWh)	13,033	5,785	25,419	29,011	37,227	48,462	1,995

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-2,594
deployment - Corn-ethanol to energy							
grasses (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-7,779
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Aggressive							-286
deployment - Permanent conservation							
cover (1000 tC02e/y)							
Carbon sink potential - Aggressive							-10,659
deployment - Total (1000 tC02e/y)							
Carbon sink potential - Moderate							-2,594
deployment - Corn-ethanol to energy							•
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-4,000
deployment - Cropland measures (1000							.,
tCO2e/y)							
Carbon sink potential - Moderate							-143
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-6,737
deployment - Total (1000 tC02e/y)							0,101
Land impacted for carbon sink -							1,456
Aggressive deployment - Corn-ethanol to							1,400
energy grasses (1000 hectares)							
Land impacted for carbon sink -							7,064
Aggressive deployment - Cropland							1,004
measures (1000 hectares) Land impacted for carbon sink -							489
							407
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							0.000
Land impacted for carbon sink -							9,008
Aggressive deployment - Total (1000							
hectares)							4.5
Land impacted for carbon sink - Moderate							1,456
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,654
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							244
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							5,354
deployment - Total (1000 hectares)							

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate							-248
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-17,146
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-947
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-427
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-46.9
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-285
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							-2,71
trees outside forests (1000 tC02e/y)							7.051
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-7,85
Carbon sink potential - High - Reforest pasture (1000 tC02e/y)							-4,189
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-43
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-124
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,90
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-15
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-16
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-23.
Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)							-9
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-95
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,92
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-31
Carbon sink potential - Low - Restore oroductivity (1000 tCO2e/y)							-14
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-18
Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)							-11,52
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-55
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-29 -34
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-34
retention of HWP (1000 tCO2e/y) Carbon sink potential - Mid - Increase							-1,83
trees outside forests (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							-5,89
cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							-2,25
pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore							-28
productivity (1000 tCO2e/y) Land impacted for carbon sink potential -							40
High - Accelerate regeneration (1000 nectares)							.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years)							12
(1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000							21
hectares) Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							17

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

Item Land impacted for carbon sink potential -	2020	2025	2030	2035	2040	2045	2050
High - Increase retention of HWP (1000							Ĺ
hectares)							
Land impacted for carbon sink potential -							258
High - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							519
High - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							119
High - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							143
High - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,443
High - Total impacted (over 30 years)							
(1000 hectares)							20.2
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000							20.2
hectares)							
Land impacted for carbon sink potential -							120
Low - Avoid deforestation (over 30 years)							120
(1000 hectares)							
Land impacted for carbon sink potential -							83.4
Low - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							8.63
Low - Improve plantations (1000							
hectares)							
Land impacted for carbon sink potential -							C
Low - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							136
Low - Increase trees outside forests							
(1000 hectares)							0.40
Land impacted for carbon sink potential -							260
Low - Reforest cropland (1000 hectares)							20.7
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.6
Land impacted for carbon sink potential -							86.4
Low - Restore productivity (1000							00.4
hectares)							
Land impacted for carbon sink potential -							735
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							30.4
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							124
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							15
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							13
Mid - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential -							C
Mid - Increase retention of HWP (1000							
hectares)							
Land impacted for carbon sink potential -							197
Mid - Increase trees outside forests (1000		1					

Table 43: E+RE-	econario -	DTIIADA	· I and einke .	Enrecte	(continued)
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Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							390
Mid - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							149
Mid - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							174
Mid - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							1,228
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 -		125	0.122	0.115	0.092	0.061	0.001
Coal (million 2019\$)							
Monetary damages from air pollution -		75.3	34.1	42.7	25.1	10.1	4.54
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		195	183	140	81.3	37.2	14.7
Transportation (million 2019\$)							
Premature deaths from air pollution -		14.1	0.014	0.013	0.01	0.007	0
Coal (deaths)							
Premature deaths from air pollution -		8.5	3.85	4.82	2.84	1.14	0.512
Natural Gas (deaths)							
Premature deaths from air pollution -		22	20.6	15.7	9.14	4.19	1.65
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 -	0	5,540	6,039	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	44.8	49.3	53.1	63	76.9	85.5	88.5
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	50.7	46.9	37	23.1	14.5	11.5
Sales of space heating units - Electric	3.92	6.69	9.32	17.9	38.6	64.5	79.7
Heat Pump (%)							
Sales of space heating units - Electric	6.31	5.58	5.85	6.72	8.6	10.7	11.9
Resistance (%)							
Sales of space heating units - Fossil (%)	0	2.1	1.98	1.48	0.719	0.234	0.062
Sales of space heating units - Gas Furnace	89.8	85.6	82.9	73.9	52.1	24.5	8.31
(%)							
Sales of water heating units - Electric	0.944	1.35	2.81	7.68	19.4	34.3	43
Heat Pump (%)							
Sales of water heating units - Electric	8.03	7.53	8.96	13.7	25.1	39.5	48
Resistance (%)							
Sales of water heating units - Gas Furnace	90.2	90.1	87.3	77.8	54.7	25.5	8.33
(%)							
Sales of water heating units - Other (%)	0.788	0.981	0.957	0.887	0.782	0.716	0.691

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.33	1.36	1.77	1.84	2.53	2.68
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)	70.8	69.4	67.5	65.7	63.5	60.8	58.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	281	293	300	302	307	311	314
Final energy use - Residential (PJ)	86.4	82	78.8	75.5	71.4	65.8	59.3
Final energy use - Transportation (PJ)	182	171	156	144	135	124	111

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	1.78	2.27	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	74.1	74.8	77.2	83.4	92.1	97.4	99.3
Resistance (%)							
Sales of cooking units - Gas (%)	25.9	25.2	22.8	16.6	7.91	2.55	0.687
Sales of space heating units - Electric	6.37	11	13.7	22.5	43.2	68.9	83.6
Heat Pump (%)							
Sales of space heating units - Electric	16.5	22.2	21.5	19.8	15.5	10.2	7.2
Resistance (%)							
Sales of space heating units - Fossil (%)	5.83	9.99	9.81	8.95	6.83	4.3	2.95
Sales of space heating units - Gas (%)	71.3	56.8	54.9	48.8	34.5	16.7	6.23
Sales of water heating units - Electric	0	0.395	1.48	5.1	13.9	24.9	31.5
Heat Pump (%)							
Sales of water heating units - Electric	35.5	51.4	51.8	53.2	56.8	61.3	64
Resistance (%)							
Sales of water heating units - Gas Furnace	64.5	48.2	46.7	41.7	29.3	13.7	4.47
(%)							
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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	60.7	128	432	1,362	1,983
Cumulative 5-yr (million \$2018)							
Public EV charging plugs - DC Fast (1000	0.061	0	0.212	0	1.14	0	3.19
units)							
Public EV charging plugs - L2 (1000 units)	0.164	0	5.1	0	27.4	0	76.8
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 (%)	1.68	2.07	2.08	1.66	1.07	0.552	0.236
Vehicle sales - Light-duty - EV (%)	1.75	4.38	11.2	24.9	47.3	71.3	87.3
Vehicle sales - Light-duty - gasoline (%)	92.2	88	80.6	67.9	47.4	25.6	11.3
Vehicle sales - Light-duty - hybrid (%)	4.19	5.02	5.67	5.21	3.97	2.38	1.16
Vehicle sales - Light-duty - hydrogen FC	0.113	0.384	0.333	0.257	0.184	0.103	0.048
(%)							
Vehicle sales - Light-duty - other (%)	0.108	0.111	0.102	0.089	0.065	0.036	0.016
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
	1						

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	0.003	0.032	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0.024	0.006	0.01	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0.061	0.002	0.208	0.095

Table 51: E-B+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	5.4	67.8	67.8	67.8	67.8	67.8
Biomass w/ccu allam power plant (GWh)	0	0	0	24.1	30.2	40.1	40.1
Biomass w/ccu power plant (GWh)	0	0	0	68	69.9	303	410

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)	0	0.41	4.64	117	1,093	2,577	6,002
Conversion capital investment -	0	3.12	35.5	1,454	12,265	18,692	53,340
Cumulative 5-yr (million \$2018)							
Number of facilities - Allam power w ccu	0	0	0	1	2	3	3
(quantity)							
Number of facilities - Beccs hydrogen	0	0	0	1	15	35	41
(quantity)							
Number of facilities - Diesel (quantity)	0	0	0	1	1	2	3
Number of facilities - Diesel ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu	0	0	0	1	2	3	3
(quantity)							
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	2	32
Number of facilities - Pyrolysis ccu	0	0	0	1	2	3	17
(quantity)							
Number of facilities - Sng (quantity)	0	1	1	1	1	2	2
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	1	2

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	1.79	17.5	41.5	57.6
Annual - BECCS (MMT)		0	0	1.79	17.5	41.5	57.6
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	1.79	19.3	60.8	118
Cumulative - BECCS (MMT)		0	0	1.79	19.3	60.8	118
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	276	573	1,503	2,642	3,732
Cumulative investment - All (million \$2018)		0	1,627	3,273	5,868	6,875	7,932
Cumulative investment - Spur (million \$2018)		0	0	17.9	986	1,993	3,050
Cumulative investment - Trunk (million \$2018)		0	1,627	3,255	4,882	4,882	4,882
Spur (km)		0	0	21.5	675	1,814	2,905
Trunk (km)		0	276	552	828	828	828

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

		•					
Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million \$2020)		0	0	0	0	0	0
Wells and facilities construction costs (million \$2020)		0	0	0	0	0	0

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

Table 56: <i>E-B+ scenario - PILLAR 6: Land s</i> Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive							-2,881
deployment - Corn-ethanol to energy							_,-,
grasses (1000 tC02e/y)							
Carbon sink potential - Aggressive							-7,608
deployment - Cropland measures (1000							,
tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Aggressive							0
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Aggressive							-273
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Aggressive							-10,762
deployment - Total (1000 tCO2e/y)							
Carbon sink potential - Moderate							-2,881
deployment - Corn-ethanol to energy							
grasses (1000 tC02e/y)							
Carbon sink potential - Moderate							-3,910
deployment - Cropland measures (1000							
tCO2e/y)							
Carbon sink potential - Moderate							0
deployment - Cropland to woody energy							
crops (1000 tCO2e/y)							
Carbon sink potential - Moderate							C
deployment - Pasture to energy crops							
(1000 tC02e/y)							
Carbon sink potential - Moderate							-136
deployment - Permanent conservation							
cover (1000 tCO2e/y)							
Carbon sink potential - Moderate							-6,927
deployment - Total (1000 tCO2e/y)							
Land impacted for carbon sink -							1,679
Aggressive deployment - Corn-ethanol to							
energy grasses (1000 hectares)							
Land impacted for carbon sink -							16,939
Aggressive deployment - Cropland							
measures (1000 hectares)							
Land impacted for carbon sink -							15.7
Aggressive deployment - Cropland to							
woody energy crops (1000 hectares)							
Land impacted for carbon sink -							288
Aggressive deployment - Pasture to							
energy crops (1000 hectares)							
Land impacted for carbon sink -							466
Aggressive deployment - Permanent							
conservation cover (1000 hectares)							
Land impacted for carbon sink -	+		+				19,388
Aggressive deployment - Total (1000							,550
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							1,679
deployment - Corn-ethanol to energy							
grasses (1000 hectares)							
Land impacted for carbon sink - Moderate							3,547
deployment - Cropland measures (1000							
hectares)							
Land impacted for carbon sink - Moderate							15.7
deployment - Cropland to woody energy							
crops (1000 hectares)							
Land impacted for carbon sink - Moderate							288
deployment - Pasture to energy crops							
(1000 hectares)							
Land impacted for carbon sink - Moderate							233
deployment - Permanent conservation							
cover (1000 hectares)							
Land impacted for carbon sink - Moderate							5,762
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							-248
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-17,146
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-947
deforestation (1000 tC02e/y)							
Carbon sink potential - High - Extend							-427
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-46.9
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-285
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-2,717
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-7,855
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-4,189
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-43
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-124
regeneration (1000 tC02e/y)							
Carbon sink potential - Low - All (not							-5,906
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-158
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-164
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-23.8
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-95
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-95
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,928
cropland (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-317
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore							-145
productivity (1000 tCO2e/y)							

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

Carbon sink potential - Mid - Accelerate regeneration (1000 tC02e/y)	-18
Carbon sink potential - Mid - All (not	-11,52
counting overlap) (1000 tCO2e/y)	
Carbon sink potential - Mid - Avoid	-55
deforestation (1000 tC02e/y)	
Carbon sink potential - Mid - Extend	-29
rotation length (1000 tC02e/y)	
Carbon sink potential - Mid - Improve	-34.
plantations (1000 tC02e/y)	
Carbon sink potential - Mid - Increase	-19
retention of HWP (1000 tCO2e/y)	
Carbon sink potential - Mid - Increase	-1,83
trees outside forests (1000 tC02e/y)	
Carbon sink potential - Mid - Reforest	-5,89
cropland (1000 tC02e/y)	0,07
Carbon sink potential - Mid - Reforest	-2,25
pasture (1000 tC02e/y)	-2,23
	00
Carbon sink potential - Mid - Restore	-28
productivity (1000 tC02e/y)	
Land impacted for carbon sink potential -	40.
High - Accelerate regeneration (1000	
hectares)	
Land impacted for carbon sink potential -	12
High - Avoid deforestation (over 30 years)	
(1000 hectares)	
Land impacted for carbon sink potential -	21
High - Extend rotation length (1000	
hectares)	
Land impacted for carbon sink potential -	17.
High - Improve plantations (1000	
hectares)	
Land impacted for carbon sink potential -	
High - Increase retention of HWP (1000	
hectares)	
Land impacted for carbon sink potential -	25
High - Increase trees outside forests	
(1000 hectares)	
Land impacted for carbon sink potential -	51
High - Reforest cropland (1000 hectares)	10
Land impacted for carbon sink potential -	11
High - Reforest pasture (1000 hectares)	
Land impacted for carbon sink potential -	14
High - Restore productivity (1000	
hectares)	
Land impacted for carbon sink potential -	1,44
High - Total impacted (over 30 years)	
(1000 hectares)	
Land impacted for carbon sink potential -	20.
Low - Accelerate regeneration (1000	
hectares)	
Land impacted for carbon sink potential -	12
Low - Avoid deforestation (over 30 years)	
(1000 hectares)	
Land impacted for carbon sink potential -	83.
Low - Extend rotation length (1000	83.
hectares)	
Land impacted for carbon sink potential -	8.6
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 -							136
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							260
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							20.6
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							86.4
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							735
Low - Total impacted (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							30.4
Mid - Accelerate regeneration (1000							
hectares)							
Land impacted for carbon sink potential -							124
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							
Land impacted for carbon sink potential -							151
Mid - Extend rotation length (1000							
hectares)							
Land impacted for carbon sink potential -							13
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 -							197
Mid - Increase trees outside forests (1000							.,,
hectares)							
Land impacted for carbon sink potential -							390
Mid - Reforest cropland (1000 hectares)							0,0
Land impacted for carbon sink potential -							149
Mid - Reforest pasture (1000 hectares)							1 17
Land impacted for carbon sink potential -		-					174
Mid - Restore productivity (1000							11-7
hectares)							
Land impacted for carbon sink potential -							1,228
Mid - Total impacted (over 30 years) (1000							1,220
hectares)							
nootal coj							

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution -		125	0.122	0.115	0.092	0.061	0.001
Coal (million 2019\$)							
Monetary damages from air pollution -		82.7	34.5	17.3	10.8	4.35	2.21
Natural Gas (million 2019\$)							
Monetary damages from air pollution -		198	202	197	179	143	98.4
Transportation (million 2019\$)							
Premature deaths from air pollution -		14.1	0.014	0.013	0.01	0.007	0
Coal (deaths)							
Premature deaths from air pollution -		9.33	3.89	1.95	1.22	0.491	0.249
Natural Gas (deaths)							
Premature deaths from air pollution -		22.3	22.7	22.2	20.1	16.1	11.1
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	5,476	5,633	0	0	0	0
Cumulative 5-yr (million \$2018)							
Sales of cooking units - Electric	44.8	47.8	47.9	47.8	47.9	47.9	48
Resistance (%)							
Sales of cooking units - Gas (%)	55.2	52.2	52.1	52.2	52.1	52.1	52
Sales of space heating units - Electric	3.92	13	44.6	70.5	74.8	75.2	75.2
Heat Pump (%)							
Sales of space heating units - Electric	6.31	6.4	10.8	18.4	23.4	24.2	24.3
Resistance (%)							
Sales of space heating units - Fossil (%)	0	2.06	1.59	0.699	0.102	0.009	0
Sales of space heating units - Gas Furnace	89.8	78.5	43	10.4	1.69	0.518	0.457
(%)							
Sales of water heating units - Electric	0.944	0.821	0.817	0.818	0.814	0.81	0.81
Heat Pump (%)							
Sales of water heating units - Electric	8.03	7.01	7.03	7.01	7.01	7.01	7.01
Resistance (%)							
Sales of water heating units - Gas Furnace	90.2	91.2	91.2	91.2	91.2	91.2	91.2
(%)							
Sales of water heating units - Other (%)	0.788	0.989	0.989	0.988	0.987	0.991	0.991

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested -		1.36	1.39	1.46	1.5	1.63	1.69
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)	70.8	71	71	70.2	69.4	70	71.9			
Final energy use - Industry (PJ)	281	297	305	312	321	329	340			
Final energy use - Residential (PJ)	86.4	82.5	80.6	79.4	79.2	79.6	79.9			
Final energy use - Transportation (PJ)	182	171	157	149	149	153	158			

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs.	0	1.71	1.81	0	0	0	0
REF - Cumulative 5-yr (billion \$2018)							
Sales of cooking units - Electric	73.9	73.9	73.9	73.9	73.9	73.9	73.9
Resistance (%)							
Sales of cooking units - Gas (%)	26.1	26.1	26.1	26.1	26.1	26.1	26.1
Sales of space heating units - Electric	5.61	14.1	14.5	15.1	15.7	16.4	17.4
Heat Pump (%)							
Sales of space heating units - Electric	16.7	21.4	21.2	20.9	20.5	19.8	18.9
Resistance (%)							
Sales of space heating units - Fossil (%)	5.95	9.38	9.47	9.46	9.32	9.23	9.3
Sales of space heating units - Gas (%)	71.7	55	54.8	54.5	54.5	54.6	54.4
Sales of water heating units - Electric	0	0	0	0	0	0	0
Heat Pump (%)							
Sales of water heating units - Electric	35.5	51.2	51.2	51.1	51.1	51	51
Resistance (%)							
Sales of water heating units - Gas Furnace	64.5	48.7	48.8	48.9	48.9	48.9	49
(%)							
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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 (%)	1.67	2.06	2.2	2.05	1.85	1.72	1.64
Vehicle sales - Light-duty - EV (%)	3.18	5.11	5.84	7.15	8.75	10.2	11.4
Vehicle sales - Light-duty - gasoline (%)	90.9	87.4	85.4	83.7	81.8	79.8	78.2
Vehicle sales - Light-duty - hybrid (%)	4.06	4.93	6.05	6.62	7.22	7.85	8.38
Vehicle sales - Light-duty - hydrogen FC	0.111	0.381	0.353	0.315	0.313	0.314	0.325
(%)							
Vehicle sales - Light-duty - other (%)	0.107	0.111	0.108	0.108	0.108	0.107	0.11
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							-248
regeneration (1000 tCO2e/y)							
Carbon sink potential - High - All (not							-17,14
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - High - Avoid							-94
deforestation (1000 tCO2e/y)							
Carbon sink potential - High - Extend							-42
rotation length (1000 tCO2e/y)							
Carbon sink potential - High - Improve							-46.
plantations (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-28
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - High - Increase							-2,71
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-7,85
cropland (1000 tCO2e/y)							
Carbon sink potential - High - Reforest							-4,18
pasture (1000 tCO2e/y)							
Carbon sink potential - High - Restore							-43
productivity (1000 tCO2e/y)							
Carbon sink potential - Low - Accelerate							-12
regeneration (1000 tCO2e/y)							
Carbon sink potential - Low - All (not							-5,90
counting overlap) (1000 tCO2e/y)							
Carbon sink potential - Low - Avoid							-15
deforestation (1000 tCO2e/y)							
Carbon sink potential - Low - Extend							-16
rotation length (1000 tCO2e/y)							
Carbon sink potential - Low - Improve							-23.
plantations (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-9
retention of HWP (1000 tCO2e/y)							
Carbon sink potential - Low - Increase							-95
trees outside forests (1000 tCO2e/y)							
Carbon sink potential - Low - Reforest							-3,92
cropland (1000 tCO2e/y)							

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

Item Carbon sink potential - Low - Reforest	2020	2025	2030	2035	2040	2045	2050 -317
pasture (1000 tCO2e/y)							
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-145
Carbon sink potential - Mid - Accelerate regeneration (1000 tC02e/y)							-186
Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)							-11,526
Carbon sink potential - Mid - Avoid deforestation (1000 tC02e/y)							-553
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-296
Carbon sink potential - Mid - Improve							-34.9
plantations (1000 tC02e/y) Carbon sink potential - Mid - Increase							-190
retention of HWP (1000 tC02e/y) Carbon sink potential - Mid - Increase							-1,834
trees outside forests (1000 tC02e/y) Carbon sink potential - Mid - Reforest							-5,891
cropland (1000 tCO2e/y) Carbon sink potential - Mid - Reforest							-2,253
pasture (1000 tCO2e/y) Carbon sink potential - Mid - Restore							-288
productivity (1000 tC02e/y) Land impacted for carbon sink potential -							40.5
High - Accelerate regeneration (1000 hectares)							
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years)							128
(1000 hectares) Land impacted for carbon sink potential - High - Extend rotation length (1000							218
hectares) Land impacted for carbon sink potential -							17.3
High - Improve plantations (1000 hectares)							
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests							258
(1000 hectares) Land impacted for carbon sink potential -							519
High - Reforest cropland (1000 hectares) Land impacted for carbon sink potential -							119
High - Reforest pasture (1000 hectares) Land impacted for carbon sink potential - High - Restore productivity (1000							143
hectares) Land impacted for carbon sink potential -							1,443
High - Total impacted (over 30 years) (1000 hectares)							
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000							20.2
hectares) Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years)							120
(1000 hectares) Land impacted for carbon sink potential -							83.4
Low - Extend rotation length (1000 hectares)							20.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential -							8.63
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 -							136
Low - Increase trees outside forests							
(1000 hectares)							
Land impacted for carbon sink potential -							260
Low - Reforest cropland (1000 hectares)							
Land impacted for carbon sink potential -							20.6
Low - Reforest pasture (1000 hectares)							
Land impacted for carbon sink potential -							86.4
Low - Restore productivity (1000							
hectares)							
Land impacted for carbon sink potential -							735
Low - Total impacted (over 30 years)							
(1000 hectares)							00.1
Land impacted for carbon sink potential -							30.4
Mid - Accelerate regeneration (1000							
hectares)							10/
Land impacted for carbon sink potential -							124
Mid - Avoid deforestation (over 30 years)							
(1000 hectares)							151
Land impacted for carbon sink potential -							151
Mid - Extend rotation length (1000							
hectares)							13
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							13
Land impacted for carbon sink potential -							0
Mid - Increase retention of HWP (1000							U
hectares)							
Land impacted for carbon sink potential -							197
Mid - Increase trees outside forests (1000							171
hectares)							
Land impacted for carbon sink potential -							390
Mid - Reforest cropland (1000 hectares)							070
Land impacted for carbon sink potential -							149
Mid - Reforest pasture (1000 hectares)							177
Land impacted for carbon sink potential -							174
Mid - Restore productivity (1000							11-7
hectares)							
Land impacted for carbon sink potential -							1,228
Mid - Total impacted (over 30 years) (1000							.,3
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)	-0.18		0.307				0.088
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.078		-0.161				-0.17
Business-as-usual carbon sink - Total (Mt CO2e/y)	-0.258		0.146				-0.081

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		368	190	123	96.5	83.6	81.5
Monetary damages from air pollution - Natural Gas (million 2019\$)		95.6	78.3	89.6	56.8	32.9	29.7
Monetary damages from air pollution - Transportation (million 2019\$)		198	204	210	217	224	231
Premature deaths from air pollution - Coal (deaths)		41.6	21.4	13.9	10.9	9.45	9.2
Premature deaths from air pollution - Natural Gas (deaths)		10.8	8.84	10.1	6.41	3.72	3.36
Premature deaths from air pollution - Transportation (deaths)		22.3	23	23.6	24.4	25.2	26