



## Net-Zero America - National data

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

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Table 1: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		2,559	3.33	3.2	2.73	1.88	0.14
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		1,506	1,040	725	645	388	155
Premature deaths from air pollution - Mobile - On-Road (deaths)		11,515	10,889	8,385	4,910	2,254	876
Premature deaths from air pollution - Gas Stations (deaths)		665	617	470	280	135	61.8
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		2,159	1,816	1,245	700	333	129
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		554	452	311	182	82.3	26.9
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		195	180	142	98.2	57.5	31.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		105	101	96	90.9	85.7	80.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		1,436	1,305	1,006	665	403	222
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		352	292	221	153	106	73.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		170	144	119	94.1	69.7	46.2
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		80.8	41.8	41	40	40.1	39.3
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		3,820	3,578	3,230	2,534	1,867	1,154
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		22,684	29.5	28.4	24.2	16.7	1.24
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		13,340	9,212	6,424	5,716	3,438	1,376
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		102,386	96,814	74,557	43,657	20,044	7,790
Monetary damages from air pollution - Gas Stations (million \$2019)		5,886	5,467	4,160	2,477	1,197	547
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		19,136	16,089	11,036	6,207	2,952	1,145
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4,909	4,009	2,756	1,617	729	238
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1,731	1,592	1,261	870	509	277
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		932	892	850	805	758	709
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		12,710	11,555	8,907	5,887	3,569	1,962

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		3,117	2,585	1,954	1,351	939	647
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		1,502	1,275	1,054	833	617	409
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		713	369	362	353	353	347
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		33,918	31,775	28,681	22,506	16,582	10,246

Table 2: *E+ scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		31,616	38,522	43,996	38,634	36,139	47,266
By economic sector - Construction (jobs)		573,592	725,512	924,334	1,031,838	1,126,536	1,367,955
By economic sector - Manufacturing (jobs)		400,628	468,731	525,936	482,966	441,379	480,285
By economic sector - Mining (jobs)		458,886	352,163	267,470	175,190	114,496	65,837
By economic sector - Other (jobs)		55,515	80,434	117,990	146,101	175,036	240,097
By economic sector - Pipeline (jobs)		46,153	47,909	40,500	29,005	22,744	20,678
By economic sector - Professional (jobs)		326,519	391,584	504,671	591,429	679,866	854,663
By economic sector - Trade (jobs)		296,685	310,110	357,184	384,484	422,475	521,131
By economic sector - Utilities (jobs)		467,531	556,268	727,994	852,687	943,758	1,156,501
By resource sector - Biomass (jobs)		83,448	93,313	109,174	106,831	133,053	206,231
By resource sector - CO2 (jobs)		4,517	63,856	54,811	25,821	39,491	74,649
By resource sector - Coal (jobs)		69,612	18,956	10,843	9,383	8,412	7,426
By resource sector - Grid (jobs)		521,869	727,428	1,129,188	1,407,122	1,636,273	2,040,460
By resource sector - Natural Gas (jobs)		560,896	449,993	363,389	321,219	224,534	157,167
By resource sector - Nuclear (jobs)		49,013	46,209	41,201	35,097	32,879	52,468
By resource sector - Oil (jobs)		790,088	693,932	596,616	431,490	318,938	201,943
By resource sector - Solar (jobs)		361,297	503,931	674,877	738,614	815,882	1,087,098
By resource sector - Wind (jobs)		216,386	373,616	529,976	656,757	752,968	926,971
By education level - All sectors - High school diploma or less (jobs)		1,104,994	1,247,576	1,479,483	1,564,615	1,652,134	1,978,955
By education level - All sectors - Associates degree or some college (jobs)		795,613	906,357	1,088,792	1,175,510	1,257,895	1,517,555
By education level - All sectors - Bachelors degree (jobs)		592,885	639,550	734,577	770,267	813,551	969,404
By education level - All sectors - Masters or professional degree (jobs)		142,942	155,085	180,573	192,967	207,155	249,827
By education level - All sectors - Doctoral degree (jobs)		20,692	22,666	26,651	28,976	31,695	38,671
By education level - Biomass sector - High school diploma or less (jobs)		47,969	54,390	62,467	57,137	63,198	93,676
By education level - Biomass sector - Associates degree or some college (jobs)		15,986	17,669	21,356	22,114	29,865	47,668
By education level - Biomass sector - Bachelors degree (jobs)		14,722	15,948	18,940	20,437	29,494	47,871
By education level - Biomass sector - Masters or professional degree (jobs)		4,048	4,493	5,404	5,950	8,640	13,975
By education level - Biomass sector - Doctoral degree (jobs)		722	813	1,007	1,194	1,857	3,040
By education level - CO2 sector - High school diploma or less (jobs)		1,928	27,904	23,782	11,037	16,909	32,608
By education level - CO2 sector - Associates degree or some college (jobs)		1,558	22,572	19,168	8,857	13,541	26,104

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - CO2 sector - Bachelors degree (jobs)		825	10,799	9,539	4,738	7,228	12,830
By education level - CO2 sector - Masters or professional degree (jobs)		187	2,381	2,128	1,079	1,645	2,848
By education level - CO2 sector - Doctoral degree (jobs)		18.6	201	194	110	168	259
By education level - Coal sector - High school diploma or less (jobs)		30,308	8,917	5,756	4,901	4,320	3,747
By education level - Coal sector - Associates degree or some college (jobs)		21,423	5,650	2,974	2,582	2,322	2,057
By education level - Coal sector - Bachelors degree (jobs)		13,942	3,430	1,692	1,518	1,411	1,291
By education level - Coal sector - Masters or professional degree (jobs)		3,429	835	370	334	313	288
By education level - Coal sector - Doctoral degree (jobs)		511	123	51.5	48	46.1	43.4
By education level - Grid sector - High school diploma or less (jobs)		221,521	310,236	483,828	605,692	707,528	886,253
By education level - Grid sector - Associates degree or some college (jobs)		173,234	241,394	374,583	466,596	542,342	675,985
By education level - Grid sector - Bachelors degree (jobs)		99,273	137,429	211,885	262,263	302,941	375,277
By education level - Grid sector - Masters or professional degree (jobs)		24,980	34,473	52,987	65,386	75,302	93,006
By education level - Grid sector - Doctoral degree (jobs)		2,862	3,896	5,905	7,186	8,160	9,939
By education level - Natural gas sector - High school diploma or less (jobs)		220,352	177,991	144,372	127,389	89,118	62,586
By education level - Natural gas sector - Associates degree or some college (jobs)		180,210	145,444	118,725	106,910	75,492	53,529
By education level - Natural gas sector - Bachelors degree (jobs)		125,434	99,145	78,646	68,153	47,005	32,235
By education level - Natural gas sector - Masters or professional degree (jobs)		30,731	24,150	19,086	16,571	11,420	7,815
By education level - Natural gas sector - Doctoral degree (jobs)		4,168	3,263	2,560	2,196	1,499	1,002
By education level - Nuclear sector - High school diploma or less (jobs)		16,613	15,708	14,046	11,998	11,271	18,034
By education level - Nuclear sector - Associates degree or some college (jobs)		13,383	12,620	11,256	9,590	8,986	14,344
By education level - Nuclear sector - Bachelors degree (jobs)		14,467	13,610	12,109	10,293	9,623	15,325
By education level - Nuclear sector - Masters or professional degree (jobs)		3,916	3,677	3,266	2,772	2,587	4,114
By education level - Nuclear sector - Doctoral degree (jobs)		634	593	524	443	412	652
By education level - Oil sector - High school diploma or less (jobs)		317,656	281,308	243,630	178,026	132,908	85,196
By education level - Oil sector - Associates degree or some college (jobs)		205,517	181,086	156,220	113,377	84,105	53,454
By education level - Oil sector - Bachelors degree (jobs)		211,988	183,998	156,434	111,473	81,174	50,468
By education level - Oil sector - Masters or professional degree (jobs)		48,078	41,558	35,209	24,945	18,063	11,149
By education level - Oil sector - Doctoral degree (jobs)		6,849	5,981	5,123	3,669	2,686	1,676
By education level - Solar PV sector - High school diploma or less (jobs)		162,237	223,875	296,527	320,689	349,980	460,612
By education level - Solar PV sector - Associates degree or some college (jobs)		115,752	161,585	216,673	237,518	262,792	350,763

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Solar PV sector - Bachelors degree (jobs)		64,993	92,326	125,526	139,341	156,259	211,354
By education level - Solar PV sector - Masters or professional degree (jobs)		15,589	22,274	30,769	34,883	39,757	54,582
By education level - Solar PV sector - Doctoral degree (jobs)		2,726	3,870	5,384	6,184	7,095	9,787
By education level - Wind sector - High school diploma or less (jobs)		86,410	147,246	205,075	247,746	276,902	336,242
By education level - Wind sector - Associates degree or some college (jobs)		68,549	118,337	167,838	207,967	238,449	293,651
By education level - Wind sector - Bachelors degree (jobs)		47,242	82,864	119,806	152,051	178,416	222,754
By education level - Wind sector - Masters or professional degree (jobs)		11,985	21,243	31,355	41,046	49,429	62,052
By education level - Wind sector - Doctoral degree (jobs)		2,200	3,927	5,902	7,946	9,772	12,272
Related work experience - All sectors - None (jobs)		377,180	425,010	505,022	539,026	573,455	690,259
Related work experience - All sectors - Up to 1 year (jobs)		522,250	591,067	703,319	745,593	790,669	954,556
Related work experience - All sectors - 1 to 4 years (jobs)		970,443	1,077,663	1,267,971	1,347,222	1,430,028	1,711,541
Related work experience - All sectors - 4 to 10 years (jobs)		618,746	691,104	816,160	871,281	926,833	1,110,458
Related work experience - All sectors - Over 10 years (jobs)		168,507	186,389	217,602	229,212	241,446	287,599
Related work experience - Biomass sector - None (jobs)		14,115	15,813	18,262	17,227	20,285	30,827
Related work experience - Biomass sector - Up to 1 year (jobs)		27,797	30,938	35,014	31,422	34,666	52,391
Related work experience - Biomass sector - 1 to 4 years (jobs)		24,915	28,344	34,009	35,192	46,257	71,775
Related work experience - Biomass sector - 4 to 10 years (jobs)		13,033	14,336	17,291	18,283	25,407	40,776
Related work experience - Biomass sector - Over 10 years (jobs)		3,589	3,882	4,597	4,707	6,438	10,462
Related work experience - CO2 sector - None (jobs)		691	9,938	8,464	3,932	6,012	11,526
Related work experience - CO2 sector - Up to 1 year (jobs)		808	11,516	9,888	4,649	7,127	13,574
Related work experience - CO2 sector - 1 to 4 years (jobs)		1,623	22,754	19,583	9,276	14,177	26,608
Related work experience - CO2 sector - 4 to 10 years (jobs)		1,115	15,808	13,544	6,363	9,727	18,419
Related work experience - CO2 sector - Over 10 years (jobs)		279	3,841	3,332	1,602	2,448	4,521
Related work experience - Coal sector - None (jobs)		9,454	2,500	1,349	1,167	1,046	923
Related work experience - Coal sector - Up to 1 year (jobs)		14,320	4,221	2,746	2,355	2,091	1,829
Related work experience - Coal sector - 1 to 4 years (jobs)		26,408	7,201	4,147	3,581	3,203	2,820
Related work experience - Coal sector - 4 to 10 years (jobs)		15,512	3,989	2,039	1,786	1,621	1,448
Related work experience - Coal sector - Over 10 years (jobs)		3,917	1,045	562	495	451	405
Related work experience - Grid sector - None (jobs)		77,513	108,126	167,964	209,445	243,703	304,074
Related work experience - Grid sector - Up to 1 year (jobs)		99,923	139,707	217,533	271,912	317,175	396,757



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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - Grid sector - 1 to 4 years (jobs)		188,711	262,837	407,687	507,642	589,859	735,002
Related work experience - Grid sector - 4 to 10 years (jobs)		123,669	172,120	266,779	331,940	385,411	479,884
Related work experience - Grid sector - Over 10 years (jobs)		32,055	44,638	69,226	86,184	100,125	124,742
Related work experience - Natural gas sector - None (jobs)		81,233	65,487	53,255	47,552	33,439	23,590
Related work experience - Natural gas sector - Up to 1 year (jobs)		97,562	78,199	63,010	55,428	38,657	27,056
Related work experience - Natural gas sector - 1 to 4 years (jobs)		206,984	165,949	133,846	118,069	82,427	57,537
Related work experience - Natural gas sector - 4 to 10 years (jobs)		137,737	110,541	89,428	79,407	55,625	39,032
Related work experience - Natural gas sector - Over 10 years (jobs)		37,380	29,816	23,850	20,763	14,387	9,952
Related work experience - Nuclear sector - None (jobs)		6,178	5,831	5,204	4,438	4,161	6,648
Related work experience - Nuclear sector - Up to 1 year (jobs)		9,019	8,509	7,591	6,470	6,065	9,685
Related work experience - Nuclear sector - 1 to 4 years (jobs)		18,294	17,241	15,368	13,087	12,256	19,551
Related work experience - Nuclear sector - 4 to 10 years (jobs)		11,868	11,183	9,966	8,485	7,944	12,671
Related work experience - Nuclear sector - Over 10 years (jobs)		3,653	3,445	3,072	2,617	2,452	3,913
Related work experience - Oil sector - None (jobs)		106,469	93,826	80,891	58,779	43,645	27,806
Related work experience - Oil sector - Up to 1 year (jobs)		147,302	129,295	110,972	80,355	59,452	37,782
Related work experience - Oil sector - 1 to 4 years (jobs)		301,085	264,533	227,574	164,533	121,573	76,878
Related work experience - Oil sector - 4 to 10 years (jobs)		182,691	160,250	137,652	99,339	73,274	46,250
Related work experience - Oil sector - Over 10 years (jobs)		52,541	46,027	39,527	28,483	20,992	13,227
Related work experience - Solar PV sector - None (jobs)		52,067	72,685	97,635	107,322	119,000	159,182
Related work experience - Solar PV sector - Up to 1 year (jobs)		80,805	112,063	149,124	162,047	177,730	235,093
Related work experience - Solar PV sector - 1 to 4 years (jobs)		125,539	175,648	236,066	259,383	287,624	384,727
Related work experience - Solar PV sector - 4 to 10 years (jobs)		81,724	113,907	152,581	167,103	184,620	246,004
Related work experience - Solar PV sector - Over 10 years (jobs)		21,162	29,628	39,472	42,759	46,907	62,092
Related work experience - Wind sector - None (jobs)		29,461	50,804	71,999	89,165	102,163	125,684
Related work experience - Wind sector - Up to 1 year (jobs)		44,713	76,619	107,442	130,954	147,706	180,388
Related work experience - Wind sector - 1 to 4 years (jobs)		76,885	133,155	189,692	236,459	272,652	336,643
Related work experience - Wind sector - 4 to 10 years (jobs)		51,396	88,969	126,879	158,575	183,204	225,974
Related work experience - Wind sector - Over 10 years (jobs)		13,930	24,069	33,964	41,603	47,244	58,282
On-the-Job Training - All sectors - None (jobs)		148,543	163,805	191,393	202,212	214,794	259,020
On-the-Job Training - All sectors - Up to 1 year (jobs)		1,779,857	1,977,042	2,321,833	2,452,480	2,594,281	3,107,995

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		540,524	612,390	731,606	787,128	839,842	1,008,443
On-the-Job Training - All sectors - 4 to 10 years (jobs)		162,503	188,978	231,366	255,191	276,664	335,156
On-the-Job Training - All sectors - Over 10 years (jobs)		25,698	29,019	33,877	35,323	36,849	43,798
On-the-Job Training - Biomass sector - None (jobs)		5,212	5,588	6,391	6,163	7,872	12,541
On-the-Job Training - Biomass sector - Up to 1 year (jobs)		66,316	74,326	86,112	82,895	100,811	154,923
On-the-Job Training - Biomass sector - 1 to 4 years (jobs)		9,212	10,374	12,819	13,599	18,521	29,345
On-the-Job Training - Biomass sector - 4 to 10 years (jobs)		2,109	2,385	3,105	3,464	4,955	7,973
On-the-Job Training - Biomass sector - Over 10 years (jobs)		598	640	747	710	894	1,449
On-the-Job Training - CO2 sector - None (jobs)		217	2,962	2,581	1,248	1,911	3,519
On-the-Job Training - CO2 sector - Up to 1 year (jobs)		2,767	38,439	33,219	15,847	24,226	45,154
On-the-Job Training - CO2 sector - 1 to 4 years (jobs)		1,091	15,833	13,446	6,211	9,500	18,344
On-the-Job Training - CO2 sector - 4 to 10 years (jobs)		398	5,980	5,013	2,256	3,455	6,872
On-the-Job Training - CO2 sector - Over 10 years (jobs)		45	643	552	260	398	761
On-the-Job Training - Coal sector - None (jobs)		3,439	897	504	443	403	361
On-the-Job Training - Coal sector - Up to 1 year (jobs)		47,816	13,261	7,946	6,876	6,164	5,442
On-the-Job Training - Coal sector - 1 to 4 years (jobs)		13,806	3,667	1,903	1,643	1,469	1,294
On-the-Job Training - Coal sector - 4 to 10 years (jobs)		4,083	1,004	421	359	318	276
On-the-Job Training - Coal sector - Over 10 years (jobs)		468	127	70.2	62.7	58	53
On-the-Job Training - Grid sector - None (jobs)		25,540	35,551	55,113	68,592	79,668	99,235
On-the-Job Training - Grid sector - Up to 1 year (jobs)		335,075	466,876	724,464	902,463	1,049,078	1,307,801
On-the-Job Training - Grid sector - 1 to 4 years (jobs)		117,230	163,532	254,036	316,779	368,601	459,923
On-the-Job Training - Grid sector - 4 to 10 years (jobs)		39,842	55,628	86,492	107,949	125,717	156,997
On-the-Job Training - Grid sector - Over 10 years (jobs)		4,183	5,841	9,083	11,340	13,211	16,504
On-the-Job Training - Natural gas sector - None (jobs)		29,256	23,161	18,408	15,980	11,043	7,637
On-the-Job Training - Natural gas sector - Up to 1 year (jobs)		361,987	289,787	233,101	204,684	142,536	99,137
On-the-Job Training - Natural gas sector - 1 to 4 years (jobs)		124,350	100,227	81,565	72,994	51,383	36,361
On-the-Job Training - Natural gas sector - 4 to 10 years (jobs)		39,977	32,555	26,896	24,586	17,510	12,595
On-the-Job Training - Natural gas sector - Over 10 years (jobs)		5,326	4,263	3,418	2,974	2,062	1,437
On-the-Job Training - Nuclear sector - None (jobs)		3,292	3,102	2,765	2,354	2,205	3,517
On-the-Job Training - Nuclear sector - Up to 1 year (jobs)		33,433	31,509	28,084	23,914	22,395	35,726

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Nuclear sector - 1 to 4 years (jobs)		9,489	8,956	7,994	6,816	6,392	10,211
On-the-Job Training - Nuclear sector - 4 to 10 years (jobs)		2,289	2,160	1,928	1,645	1,542	2,465
On-the-Job Training - Nuclear sector - Over 10 years (jobs)		510	482	430	367	345	551
On-the-Job Training - Oil sector - None (jobs)		48,070	41,572	35,156	25,044	18,229	11,385
On-the-Job Training - Oil sector - Up to 1 year (jobs)		556,287	488,515	419,945	303,651	224,385	142,002
On-the-Job Training - Oil sector - 1 to 4 years (jobs)		144,006	126,810	109,359	79,265	58,730	37,263
On-the-Job Training - Oil sector - 4 to 10 years (jobs)		34,011	30,239	26,292	19,275	14,437	9,286
On-the-Job Training - Oil sector - Over 10 years (jobs)		7,713	6,796	5,864	4,255	3,156	2,007
On-the-Job Training - Solar PV sector - None (jobs)		21,343	29,879	40,345	44,639	49,763	66,898
On-the-Job Training - Solar PV sector - Up to 1 year (jobs)		232,935	326,586	438,039	479,286	530,091	707,380
On-the-Job Training - Solar PV sector - 1 to 4 years (jobs)		76,572	105,969	141,284	154,165	169,535	224,822
On-the-Job Training - Solar PV sector - 4 to 10 years (jobs)		26,069	35,481	47,323	52,118	57,439	76,245
On-the-Job Training - Solar PV sector - Over 10 years (jobs)		4,378	6,016	7,886	8,406	9,054	11,753
On-the-Job Training - Wind sector - None (jobs)		12,173	21,093	30,129	37,747	43,701	53,927
On-the-Job Training - Wind sector - Up to 1 year (jobs)		143,241	247,744	350,923	432,864	494,595	610,432
On-the-Job Training - Wind sector - 1 to 4 years (jobs)		44,768	77,022	109,201	135,657	155,711	190,881
On-the-Job Training - Wind sector - 4 to 10 years (jobs)		13,725	23,546	33,897	43,539	51,291	62,447
On-the-Job Training - Wind sector - Over 10 years (jobs)		2,478	4,212	5,825	6,949	7,671	9,284
On-Site or In-Plant Training - All sectors - None (jobs)		428,512	480,068	567,032	603,891	642,770	774,173
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		1,613,069	1,792,003	2,105,853	2,225,758	2,354,914	2,821,150
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		422,553	477,660	569,367	610,466	650,080	779,828
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		172,076	197,117	238,022	259,657	279,624	336,892
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		20,916	24,385	29,800	32,563	35,042	42,369
On-Site or In-Plant Training - Biomass sector - None (jobs)		13,478	15,270	18,154	18,473	23,872	36,959
On-Site or In-Plant Training - Biomass sector - Up to 1 year (jobs)		58,337	65,059	75,205	72,008	87,384	134,729
On-Site or In-Plant Training - Biomass sector - 1 to 4 years (jobs)		8,420	9,462	11,465	11,778	15,479	24,303
On-Site or In-Plant Training - Biomass sector - 4 to 10 years (jobs)		2,630	2,899	3,633	3,912	5,516	8,939
On-Site or In-Plant Training - Biomass sector - Over 10 years (jobs)		584	624	716	660	802	1,299
On-Site or In-Plant Training - CO2 sector - None (jobs)		696	9,738	8,397	3,989	6,102	11,439
On-Site or In-Plant Training - CO2 sector - Up to 1 year (jobs)		2,554	35,610	30,731	14,621	22,355	41,790

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - CO2 sector - 1 to 4 years (jobs)		822	11,889	10,111	4,681	7,161	13,796
On-Site or In-Plant Training - CO2 sector - 4 to 10 years (jobs)		398	5,916	4,982	2,263	3,464	6,818
On-Site or In-Plant Training - CO2 sector - Over 10 years (jobs)		47.2	703	590	267	408	805
On-Site or In-Plant Training - Coal sector - None (jobs)		10,259	2,664	1,410	1,245	1,139	1,026
On-Site or In-Plant Training - Coal sector - Up to 1 year (jobs)		43,813	12,226	7,370	6,360	5,685	5,004
On-Site or In-Plant Training - Coal sector - 1 to 4 years (jobs)		10,870	2,930	1,588	1,369	1,222	1,074
On-Site or In-Plant Training - Coal sector - 4 to 10 years (jobs)		4,169	1,017	428	368	328	287
On-Site or In-Plant Training - Coal sector - Over 10 years (jobs)		502	120	47.1	41.7	38.2	34.4
On-Site or In-Plant Training - Grid sector - None (jobs)		79,472	110,527	171,194	212,870	247,010	307,382
On-Site or In-Plant Training - Grid sector - Up to 1 year (jobs)		307,543	428,707	665,531	829,412	964,571	1,202,957
On-Site or In-Plant Training - Grid sector - 1 to 4 years (jobs)		90,137	125,800	195,520	243,932	283,980	354,516
On-Site or In-Plant Training - Grid sector - 4 to 10 years (jobs)		39,587	55,238	85,830	107,056	124,601	155,508
On-Site or In-Plant Training - Grid sector - Over 10 years (jobs)		5,131	7,156	11,113	13,852	16,112	20,096
On-Site or In-Plant Training - Natural gas sector - None (jobs)		89,308	71,273	57,315	50,611	35,322	24,690
On-Site or In-Plant Training - Natural gas sector - Up to 1 year (jobs)		330,074	264,314	212,678	186,805	130,118	90,578
On-Site or In-Plant Training - Natural gas sector - 1 to 4 years (jobs)		94,541	76,217	61,976	55,313	38,887	27,463
On-Site or In-Plant Training - Natural gas sector - 4 to 10 years (jobs)		41,989	34,111	28,034	25,381	17,986	12,842
On-Site or In-Plant Training - Natural gas sector - Over 10 years (jobs)		4,983	4,077	3,385	3,110	2,221	1,594
On-Site or In-Plant Training - Nuclear sector - None (jobs)		8,773	8,263	7,360	6,264	5,863	9,347
On-Site or In-Plant Training - Nuclear sector - Up to 1 year (jobs)		30,144	28,417	25,336	21,580	20,215	32,256
On-Site or In-Plant Training - Nuclear sector - 1 to 4 years (jobs)		7,232	6,827	6,094	5,197	4,874	7,787
On-Site or In-Plant Training - Nuclear sector - 4 to 10 years (jobs)		2,618	2,470	2,205	1,880	1,762	2,815
On-Site or In-Plant Training - Nuclear sector - Over 10 years (jobs)		245	231	206	176	165	262
On-Site or In-Plant Training - Oil sector - None (jobs)		127,218	110,889	94,600	67,873	49,768	31,263
On-Site or In-Plant Training - Oil sector - Up to 1 year (jobs)		500,847	439,812	378,054	273,388	202,047	127,906
On-Site or In-Plant Training - Oil sector - 1 to 4 years (jobs)		116,425	102,660	88,637	64,336	47,729	30,322
On-Site or In-Plant Training - Oil sector - 4 to 10 years (jobs)		41,052	36,459	31,686	23,187	17,338	11,117
On-Site or In-Plant Training - Oil sector - Over 10 years (jobs)		4,547	4,112	3,638	2,706	2,055	1,336
On-Site or In-Plant Training - Solar PV sector - None (jobs)		61,606	86,167	115,699	126,958	140,610	187,838
On-Site or In-Plant Training - Solar PV sector - Up to 1 year (jobs)		211,352	295,949	396,749	434,054	479,861	640,055

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Solar PV sector - 1 to 4 years (jobs)		59,633	82,607	110,136	120,119	132,086	175,165
On-Site or In-Plant Training - Solar PV sector - 4 to 10 years (jobs)		25,642	34,970	46,636	51,296	56,508	74,983
On-Site or In-Plant Training - Solar PV sector - Over 10 years (jobs)		3,063	4,237	5,657	6,188	6,817	9,056
On-Site or In-Plant Training - Wind sector - None (jobs)		37,702	65,276	92,903	115,609	133,085	164,229
On-Site or In-Plant Training - Wind sector - Up to 1 year (jobs)		128,406	221,909	314,198	387,531	442,678	545,875
On-Site or In-Plant Training - Wind sector - 1 to 4 years (jobs)		34,473	59,268	83,840	103,740	118,661	145,401
On-Site or In-Plant Training - Wind sector - 4 to 10 years (jobs)		13,990	24,039	34,588	44,314	52,121	63,582
On-Site or In-Plant Training - Wind sector - Over 10 years (jobs)		1,814	3,125	4,448	5,562	6,423	7,884
Wage income - Biomass (million \$2019)		4,334	4,965	6,016	6,245	8,304	13,232
Wage income - CO2 (million \$2019)		285	4,015	3,521	1,709	2,655	5,004
Wage income - Coal (million \$2019)		4,212	1,122	603	531	484	434
Wage income - Grid (million \$2019)		32,637	46,101	72,548	91,687	108,174	136,918
Wage income - Natural Gas (million \$2019)		37,156	30,199	24,654	21,962	15,520	10,956
Wage income - Nuclear (million \$2019)		3,504	3,382	3,089	2,697	2,591	4,243
Wage income - Oil (million \$2019)		52,015	46,299	40,361	29,538	22,095	14,135
Wage income - Solar (million \$2019)		20,346	28,771	39,161	43,645	49,103	66,690
Wage income - Wind (million \$2019)		12,926	22,704	32,914	41,913	49,367	61,964

Table 3: E+ scenario - IMPACTS - Capital Investments

Item	2020	2025	2030	2035	2040	2045	2050
Total Supply-Side Capital Committed - Cumulative from 2021 - Power Generation (billion \$2018)	196	622	1,263	2,037	2,888	3,815	4,450
Total Supply-Side Capital Committed - Cumulative from 2021 - Transmission (billion \$2018)	107	309	611	1,013	1,537	2,205	2,357
Total Supply-Side Capital Committed - Cumulative from 2021 - Distribution (billion \$2018)	38.1	227	450	800	1,161	1,488	1,758
Total Supply-Side Capital Committed - Cumulative from 2021 - Fuels Conversion (billion \$2018)	5.18	28.2	103	218	400	742	910
Total Supply-Side Capital Committed - Cumulative from 2021 - CO2 Transport & Storage (billion \$2018)	0.853	108	142	163	182	226	241
Total Supply-Side Capital Committed - Cumulative from 2021 - Industry (billion \$2018)	0.741	46.6	94.9	138	163	186	187
Total Supply-Side Capital Committed - Cumulative from 2021 - Total System (billion \$2018)	348	1,332	2,631	4,329	6,309	8,641	9,904

Table 4: E+ scenario - IMPACTS - Fossil fuel industries

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		5,924	5,196	4,119	3,106	2,308	1,650
Oil consumption - Cumulative (million bbls)							126,839
Oil production - Annual (million bbls)		5,198	5,216	5,209	4,127	3,354	2,232
Oil production - Cumulative (million bbls)							136,632
Natural gas consumption - Annual (tcf)		23,206	19,562	15,689	11,811	7,431	5,154

Table 4: E+ scenario - IMPACTS - Fossil fuel industries (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Cumulative (tcf)							472,555
Natural gas production - Annual (tcf)		36,257	34,274	29,850	25,241	20,015	15,548
Natural gas production - Cumulative (tcf)							872,962

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	27,996	26,390	23,464	19,872	16,608	14,565	13,649
Final energy use - Residential (PJ)	11,788	11,090	10,221	8,966	7,776	6,967	6,512
Final energy use - Commercial (PJ)	9,015	8,942	8,619	8,103	7,608	7,344	7,297
Final energy use - Industry (PJ)	25,107	26,056	26,110	25,372	25,108	24,870	24,572

Table 6: E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		182	187	336	359	314	329

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	4.41	16.7	48.7	82.7	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.1	76.3	46.4	15.6	3.17	0.586	0
Vehicle sales - Light-duty - hybrid (%)	4.91	4.89	3.38	1.24	0.304	0.067	0
Vehicle sales - Light-duty - diesel (%)	1.4	1.68	1.2	0.382	0.072	0.013	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.331	0.191	0.059	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.095	0.091	0.058	0.02	0.004	0.001	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 - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0
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
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		51,477	133,974	213,805	325,180	352,492	336,852
Public EV charging plugs - DC Fast (1000 units)	14.4		93.9		391		628
Public EV charging plugs - L2 (1000 units)	66.2		2,256		9,394		15,098

Table 8: E+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	14.6	27.2	64.4	85	88	88.1	88.1
Sales of space heating units - Electric Resistance (%)	20.3	22.6	12.3	8.07	7.57	7.66	7.68
Sales of space heating units - Gas (%)	55.2	36.9	17.1	3.52	1.45	1.32	1.3
Sales of space heating units - Fossil (%)	9.95	13.2	6.18	3.41	3.02	2.91	2.9
Sales of water heating units - Electric Heat Pump (%)	0	7.44	41.8	56.2	58.5	59.2	59

Table 8: E+ scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Resistance (%)	38.4	49.2	38.5	39.8	39.9	39.3	39.5
Sales of water heating units - Gas Furnace (%)	58	40.9	18	2.56	0.155	0.003	0
Sales of water heating units - Other (%)	3.58	2.47	1.63	1.47	1.51	1.54	1.53
Sales of cooking units - Electric Resistance (%)	61.3	69.6	94.8	99.7	100	100	100
Sales of cooking units - Gas (%)	38.7	30.4	5.2	0.262	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		254	307				

Table 9: E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	2.95	17.6	52.9	76.9	80.6	80.8	80.8
Sales of space heating units - Electric Resistance (%)	7.91	9.07	14.4	17.7	18.4	18.4	18.4
Sales of space heating units - Gas Furnace (%)	85.2	70.1	32.1	5.37	1.07	0.82	0.817
Sales of space heating units - Fossil (%)	3.94	3.28	0.655	0.028	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.385	7.96	43.3	59.2	61.2	61.3	61.3
Sales of water heating units - Electric Resistance (%)	3.8	7.16	24	35.7	37.5	37.6	37.6
Sales of water heating units - Gas Furnace (%)	94.1	83.3	31.5	4.03	0.235	0.003	0
Sales of water heating units - Other (%)	1.66	1.59	1.2	1.1	1.1	1.11	1.11
Sales of cooking units - Electric Resistance (%)	32.5	46.4	80	86.6	87	87	87
Sales of cooking units - Gas (%)	67.5	53.6	20	13.4	13	13	13
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,047,657	1,162,511				

Table 10: E+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed - Onshore wind (MW)	97,767	185,353	346,695	547,707	776,470	970,335	1,194,150
Installed - Offshore wind (MW)	29.3	1,034	4,949	16,240	40,241	103,788	223,624
Installed - Rooftop PV (MW)	33,317	52,523	69,448	90,809	117,114	148,351	185,890
Installed - Utility-scale PV (MW)	34,915	120,697	283,825	518,456	760,638	1,018,045	1,319,902
Installed - Hydro (MW)	78,608	78,608	78,608	78,608	78,608	78,608	78,608
Installed - Geothermal (MW)	2,390	2,393	2,409	2,411	2,414	2,422	2,440
Installed - Nuclear (MW)	98,470	95,134	90,007	76,067	68,456	57,259	61,447
Installed - Ccgt & gas steam (MW)	334,471	336,439	376,538	400,087	346,238	264,930	232,629
Installed - Ccgt w cc (MW)	0	0	243	15,162	25,271	36,796	60,031
Installed - Ct (MW)	146,567	135,736	127,617	148,354	213,247	242,832	242,414
Installed - Biomass (MW)	9,996	9,132	7,837	6,117	4,696	3,379	2,472
Installed - Biomass w cc (MW)	0	0	2,920	2,968	7,511	10,643	11,058
Installed - Coal (MW)	215,907	48,614	171	170	150	122	43.4
Installed - Other (MW)	68,045	57,078	55,303	54,113	52,213	51,122	48,463
Installed - Grid battery storage (MW)		626	2,536	15,363	51,414	131,610	178,317
Installed - Pumped hydro storage (MW)		19,418	19,418	19,418	19,418	19,418	19,418

Table 11: E+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Onshore wind (TWh)	412	764	1,446	2,199	3,029	3,710	4,485
Offshore wind (TWh)	0.093	3.9	20.3	80.7	182	455	934
Rooftop PV (TWh)	50.1	79.4	102	127	168	212	252

Table 11: E+ scenario - PILLAR 2: Clean Electricity - Generation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Utility-scale PV (TWh)	88.9	295	656	1,169	1,694	2,268	2,833
Hydro (TWh)	300	312	295	295	302	292	292
Geothermal (TWh)	14.5	14.5	14.3	14.2	13.8	13.7	13.1
Nuclear (TWh)	802	775	733	620	558	467	503
Gas (TWh)	1,490	1,742	1,453	1,117	853	443	202
Gas w cc (TWh)	0	0	1.42	114	152	181	231
Biomass (TWh)	18.2	19.7	39.5	26.3	18.7	13.4	0.436
Biomass w cc (TWh)	0	0	21.7	21.9	53.7	76.5	79.7
Coal (TWh)	982	284	0.599	0.598	0.526	0.429	0.152

Table 12: E+ scenario - PILLAR 2: Clean Electricity - Transmission

Item	2020	2025	2030	2035	2040	2045	2050
Total HV transmission (for wind and solar) - Base (percent of 2020)	0	0.326	0.621	1.03	1.49	2.02	2.09
Total HV transmission (for wind and solar) - Constrained (percent of 2020)	0	0.371	0.728	1.16	1.63	2.25	2.33

Table 13: E+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass input - Biopower (1000 tonnes)	10,423	20,617	56,097	42,541	34,517	26,793	639
Biomass input - Biopower w/ cc (1000 tonnes)	0	0	13,108	13,204	32,422	46,168	48,033
Biomass input - BECCS-H2 (1000 tonnes)	0	0	0	73,607	137,071	279,102	426,955
Biomass input - FT diesel (1000 tonnes)	0	0	0	90.5	101	104	79.1
Biomass input - Bio-FT w/ CC (1000 tonnes)	0	0	0	108	124	156	209
Biomass input - Pyrolysis liquids (1000 tonnes)	0	0	0	149	170	197	14,252
Biomass input - Pyrolysis liquids w/ cc (1000 tonnes)	0	0	0	102	118	164	93,276
Biomass input - SNG (1000 tonnes)	0	7.13	10.7	7.2	6.76	6.79	2.63
Biomass input - Bio-SNG w/ CC (1000 tonnes)	0	0	19.2	11.8	9.26	8.74	7.28
Biomass input - Ethanol (1000 tonnes)	129,506	129,506	129,536	125,006	67,634	10,261	905
Number of facilities - Power (quantity)	0	12	16	16	17	17	17
Number of facilities - Power ccu (quantity)	0	0	26	30	57	81	95
Number of facilities - Allam power w ccu (quantity)	0	0	0	14	21	32	44
Number of facilities - Beccs hydrogen (quantity)	0	0	0	95	183	377	563
Number of facilities - Diesel (quantity)	0	0	0	14	14	15	16
Number of facilities - Diesel ccu (quantity)	0	0	0	14	23	34	45
Number of facilities - Pyrolysis (quantity)	0	0	0	14	14	15	31
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	14	23	34	171
Number of facilities - Sng (quantity)	0	14	15	15	15	16	17
Number of facilities - Sng ccu (quantity)	0	0	14	14	14	19	22

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		708	14,170	21,068	21,068	21,068	21,068
Spur (km)		0	4,432	19,716	30,362	48,767	84,789
All (km)		708	18,603	40,784	51,430	69,835	105,857
Cumulative investment - Trunk (million \$2018)		3,706	66,274	100,656	100,656	100,656	100,656



Table 14: E+ scenario - PILLAR 4: CCUS - CO2 pipelines (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative investment - Spur (million \$2018)		0	2,974	14,456	23,370	39,305	66,458
Cumulative investment - All (million \$2018)		3,706	69,248	115,112	124,026	139,961	167,114

Table 15: E+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)	0	2.71	64.8	246	435	687	929
Injection wells (wells)		0	71	356	612	998	1,260
Resource characterization, appraisal, permitting costs (million \$2020)		1,500	8,750	13,000	13,000	13,000	13,000
Wells and facilities construction costs (million \$2020)		0	2,264	10,683	18,483	29,950	37,860

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-24,500
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-14,000
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-116,000
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-29,000
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-100,000
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-21,000
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-121,000
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-20,000
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-60,000
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							505,500
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-36,700
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-49,000
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-209,000
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-42,500
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							200,000
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-40,500
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-181,500
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-142,000
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-119,000
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							1,020,200
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-48,900

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-84,000
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-302,000
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-57,000
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							300,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-60,000
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-242,000
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							264,000
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							1,535,900
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							-178,000
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							4,000
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							10,677
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							59,000
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							10,500
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							3,000
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							8,000
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,300
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							35,700
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							132,177
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							6,000
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							11,025
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							106,500
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							15,800
Land impacted for carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							4,350
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							12,000
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							9,400
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							71,900
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							236,975
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8,000
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							11,373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							154,000
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							21,000
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 (1000 hectares)							5,700
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							16,000
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							7,500
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							59,000
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							282,573

Table 17: *E+ scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							-23,286
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-106,430
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-3,696
Carbon sink potential - Moderate deployment - Total (1000 tCO <sub>2</sub> e/y)							-133,412
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							-23,286

Table 17: E+ scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-203,503
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-7,391
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-234,180
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							11,287
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							71,390
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							6,375
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							89,052
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							11,287
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							136,405
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							12,749
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							160,442

Table 18: E+ scenario - PILLAR 6: Land sinks - Total assumed land sink

Item	2020	2025	2030	2035	2040	2045	2050
Total assumed land sink (Gt CO2e/y)	-0.7	-0.73	-0.75	-0.78	-0.8	-0.83	-0.85

Table 19: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		2,559	3.33	3.2	2.73	1.88	0.14
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		1,460	843	408	181	62.3	43.1
Premature deaths from air pollution - Mobile - On-Road (deaths)		11,726	12,039	11,890	10,859	8,759	6,079
Premature deaths from air pollution - Gas Stations (deaths)		679	694	678	614	493	344
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		2,179	2,044	1,857	1,562	1,178	785
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		564	545	527	466	354	231
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		198	201	201	187	154	115
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		105	101	96	90.9	85.7	80.1

Table 19: E- scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		1,444	1,457	1,430	1,311	1,099	846
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		354	324	295	255	215	176
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		170	154	140	124	109	94.1
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		78.4	41.9	41.4	40.6	40.1	38.1
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		3,809	3,424	2,925	2,527	2,222	1,583
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		22,684	29.5	28.4	24.2	16.7	1.24
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		12,934	7,464	3,616	1,603	552	382
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		104,258	107,043	105,711	96,553	77,882	54,050
Monetary damages from air pollution - Gas Stations (million \$2019)		6,015	6,145	6,003	5,440	4,367	3,042
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		19,305	18,115	16,457	13,841	10,437	6,953
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4,996	4,831	4,667	4,128	3,139	2,048
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1,751	1,777	1,781	1,661	1,366	1,020
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		932	892	850	805	758	709
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		12,787	12,898	12,661	11,609	9,733	7,490
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		3,133	2,865	2,608	2,254	1,902	1,554
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		1,502	1,367	1,236	1,102	966	833
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		692	369	365	358	354	337
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		33,820	30,408	25,973	22,443	19,734	14,061

Table 20: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		32,671	42,263	55,525	55,304	48,631	47,267
By economic sector - Construction (jobs)		576,166	743,803	850,678	965,861	1,230,893	1,522,534
By economic sector - Manufacturing (jobs)		406,181	477,205	485,267	491,716	563,535	598,987
By economic sector - Mining (jobs)		459,533	349,848	267,959	202,834	155,840	95,673

Table 20: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		56,369	82,281	105,496	133,458	185,269	253,438
By economic sector - Pipeline (jobs)		46,559	52,128	44,106	34,087	32,405	32,455
By economic sector - Professional (jobs)		327,474	397,314	484,912	602,384	769,337	955,606
By economic sector - Trade (jobs)		298,028	313,915	345,097	392,309	480,746	588,000
By economic sector - Utilities (jobs)		457,628	559,152	646,846	757,649	1,010,515	1,274,900
By resource sector - Biomass (jobs)		85,042	102,575	156,018	206,408	207,068	199,424
By resource sector - CO2 (jobs)		7,188	108,613	93,920	44,746	67,718	127,383
By resource sector - Coal (jobs)		71,673	20,450	10,922	9,493	8,396	7,200
By resource sector - Grid (jobs)		503,761	699,467	941,074	1,204,876	1,737,321	2,238,716
By resource sector - Natural Gas (jobs)		552,821	411,650	307,795	260,549	208,657	168,724
By resource sector - Nuclear (jobs)		49,017	53,548	50,157	53,409	47,329	43,896
By resource sector - Oil (jobs)		792,878	708,136	634,028	554,637	474,581	308,359
By resource sector - Solar (jobs)		374,087	524,459	588,017	662,753	863,333	1,097,677
By resource sector - Wind (jobs)		224,141	389,011	503,955	638,733	862,767	1,177,481
By education level - All sectors - High school diploma or less (jobs)		1,107,372	1,269,514	1,386,107	1,522,690	1,867,770	2,231,550
By education level - All sectors - Associates degree or some college (jobs)		795,967	919,997	1,008,756	1,125,501	1,407,897	1,711,674
By education level - All sectors - Bachelors degree (jobs)		593,528	648,336	694,448	765,855	929,848	1,100,199
By education level - All sectors - Masters or professional degree (jobs)		142,994	157,057	170,943	191,979	235,428	281,939
By education level - All sectors - Doctoral degree (jobs)		20,747	23,005	25,633	29,579	36,228	43,499
By education level - Biomass sector - High school diploma or less (jobs)		49,010	59,413	84,349	99,696	94,444	90,761
By education level - Biomass sector - Associates degree or some college (jobs)		16,251	19,569	31,894	45,570	47,098	45,477
By education level - Biomass sector - Bachelors degree (jobs)		14,930	17,672	29,620	45,296	48,357	46,565
By education level - Biomass sector - Masters or professional degree (jobs)		4,115	5,002	8,479	13,078	14,098	13,643
By education level - Biomass sector - Doctoral degree (jobs)		736	920	1,676	2,768	3,070	2,979
By education level - CO2 sector - High school diploma or less (jobs)		3,107	47,531	40,756	19,094	28,995	55,693
By education level - CO2 sector - Associates degree or some college (jobs)		2,515	38,458	32,848	15,318	23,219	44,587
By education level - CO2 sector - Bachelors degree (jobs)		1,259	18,272	16,339	8,256	12,395	21,828
By education level - CO2 sector - Masters or professional degree (jobs)		281	4,019	3,644	1,884	2,820	4,839
By education level - CO2 sector - Doctoral degree (jobs)		25.6	334	332	195	289	436
By education level - Coal sector - High school diploma or less (jobs)		31,106	9,425	5,799	4,961	4,315	3,636
By education level - Coal sector - Associates degree or some college (jobs)		22,072	6,164	2,995	2,610	2,316	1,994
By education level - Coal sector - Bachelors degree (jobs)		14,426	3,788	1,704	1,536	1,407	1,249
By education level - Coal sector - Masters or professional degree (jobs)		3,542	934	372	338	312	279
By education level - Coal sector - Doctoral degree (jobs)		527	139	51.8	48.4	45.9	42.2
By education level - Grid sector - High school diploma or less (jobs)		213,834	298,312	403,226	518,635	751,221	972,363
By education level - Grid sector - Associates degree or some college (jobs)		167,223	232,115	312,180	399,531	575,835	741,665
By education level - Grid sector - Bachelors degree (jobs)		95,828	132,147	176,587	224,568	321,649	411,739

Table 20: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Grid sector - Masters or professional degree (jobs)		24,113	33,148	44,160	55,988	79,952	102,043
By education level - Grid sector - Doctoral degree (jobs)		2,763	3,746	4,921	6,153	8,664	10,905
By education level - Natural gas sector - High school diploma or less (jobs)		217,308	162,916	122,486	104,023	83,752	67,883
By education level - Natural gas sector - Associates degree or some college (jobs)		177,428	132,902	100,712	86,735	70,072	57,130
By education level - Natural gas sector - Bachelors degree (jobs)		123,689	90,752	66,362	54,800	43,112	34,393
By education level - Natural gas sector - Masters or professional degree (jobs)		30,288	22,094	16,086	13,254	10,379	8,263
By education level - Natural gas sector - Doctoral degree (jobs)		4,108	2,986	2,148	1,737	1,341	1,055
By education level - Nuclear sector - High school diploma or less (jobs)		16,614	18,203	17,099	18,258	16,224	15,088
By education level - Nuclear sector - Associates degree or some college (jobs)		13,384	14,625	13,702	14,594	12,936	12,000
By education level - Nuclear sector - Bachelors degree (jobs)		14,468	15,771	14,741	15,664	13,852	12,821
By education level - Nuclear sector - Masters or professional degree (jobs)		3,916	4,262	3,976	4,218	3,724	3,442
By education level - Nuclear sector - Doctoral degree (jobs)		634	687	638	674	593	545
By education level - Oil sector - High school diploma or less (jobs)		318,831	287,355	259,739	229,389	198,127	130,297
By education level - Oil sector - Associates degree or some college (jobs)		206,241	184,787	166,010	145,737	125,155	81,627
By education level - Oil sector - Bachelors degree (jobs)		212,702	187,569	165,668	142,894	120,528	76,911
By education level - Oil sector - Masters or professional degree (jobs)		48,234	42,333	37,202	31,924	26,788	16,973
By education level - Oil sector - Doctoral degree (jobs)		6,871	6,092	5,410	4,694	3,983	2,552
By education level - Solar PV sector - High school diploma or less (jobs)		167,978	232,999	258,279	287,677	370,548	465,172
By education level - Solar PV sector - Associates degree or some college (jobs)		119,846	168,164	188,823	213,146	278,021	354,160
By education level - Solar PV sector - Bachelors degree (jobs)		67,321	96,106	109,230	124,967	165,442	213,429
By education level - Solar PV sector - Masters or professional degree (jobs)		16,127	23,169	26,936	31,379	41,889	55,057
By education level - Solar PV sector - Doctoral degree (jobs)		2,816	4,021	4,749	5,583	7,433	9,860
By education level - Wind sector - High school diploma or less (jobs)		89,585	153,359	194,374	240,956	320,143	430,658
By education level - Wind sector - Associates degree or some college (jobs)		71,007	123,214	159,591	202,260	273,245	373,034
By education level - Wind sector - Bachelors degree (jobs)		48,906	86,259	114,196	147,874	203,105	281,263
By education level - Wind sector - Masters or professional degree (jobs)		12,378	22,097	30,089	39,916	55,464	77,400
By education level - Wind sector - Doctoral degree (jobs)		2,266	4,081	5,706	7,727	10,809	15,125
Related work experience - All sectors - None (jobs)		377,547	431,905	472,540	523,333	646,181	777,736
Related work experience - All sectors - Up to 1 year (jobs)		523,819	601,813	660,775	730,476	896,113	1,074,174
Related work experience - All sectors - 1 to 4 years (jobs)		971,448	1,093,869	1,187,751	1,313,855	1,616,620	1,934,615

Table 20: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - 4 to 10 years (jobs)		619,121	701,346	761,793	844,801	1,044,383	1,255,835
Related work experience - All sectors - Over 10 years (jobs)		168,673	188,976	203,027	223,138	273,873	326,501
Related work experience - Biomass sector - None (jobs)		14,396	17,318	25,423	31,889	31,116	29,868
Related work experience - Biomass sector - Up to 1 year (jobs)		28,293	33,498	47,022	55,985	53,058	50,959
Related work experience - Biomass sector - 1 to 4 years (jobs)		25,475	31,590	50,358	69,822	71,904	69,386
Related work experience - Biomass sector - 4 to 10 years (jobs)		13,243	15,909	26,334	38,711	40,580	39,157
Related work experience - Biomass sector - Over 10 years (jobs)		3,634	4,259	6,881	10,001	10,410	10,054
Related work experience - CO2 sector - None (jobs)		1,111	16,924	14,505	6,804	10,308	19,683
Related work experience - CO2 sector - Up to 1 year (jobs)		1,290	19,595	16,943	8,053	12,221	23,169
Related work experience - CO2 sector - 1 to 4 years (jobs)		2,572	38,682	33,555	16,084	24,311	45,391
Related work experience - CO2 sector - 4 to 10 years (jobs)		1,778	26,893	23,208	11,024	16,680	31,434
Related work experience - CO2 sector - Over 10 years (jobs)		438	6,520	5,709	2,781	4,197	7,707
Related work experience - Coal sector - None (jobs)		9,744	2,719	1,358	1,180	1,044	895
Related work experience - Coal sector - Up to 1 year (jobs)		14,699	4,460	2,767	2,384	2,089	1,775
Related work experience - Coal sector - 1 to 4 years (jobs)		27,190	7,760	4,177	3,623	3,197	2,734
Related work experience - Coal sector - 4 to 10 years (jobs)		16,006	4,373	2,054	1,806	1,616	1,403
Related work experience - Coal sector - Over 10 years (jobs)		4,035	1,138	566	500	450	393
Related work experience - Grid sector - None (jobs)		74,823	103,970	139,983	179,341	258,753	333,618
Related work experience - Grid sector - Up to 1 year (jobs)		96,456	134,337	181,293	232,830	336,762	435,307
Related work experience - Grid sector - 1 to 4 years (jobs)		182,162	252,734	339,769	434,678	626,285	806,417
Related work experience - Grid sector - 4 to 10 years (jobs)		119,377	165,504	222,336	284,230	409,212	526,511
Related work experience - Grid sector - Over 10 years (jobs)		30,942	42,922	57,693	73,796	106,309	136,863
Related work experience - Natural gas sector - None (jobs)		80,026	59,877	45,157	38,619	31,112	25,287
Related work experience - Natural gas sector - Up to 1 year (jobs)		96,199	71,564	53,404	45,103	36,121	29,186
Related work experience - Natural gas sector - 1 to 4 years (jobs)		204,017	151,824	113,306	95,655	76,470	61,747
Related work experience - Natural gas sector - 4 to 10 years (jobs)		135,709	101,088	75,757	64,353	51,598	41,784
Related work experience - Natural gas sector - Over 10 years (jobs)		36,871	27,298	20,171	16,819	13,357	10,719
Related work experience - Nuclear sector - None (jobs)		6,178	6,757	6,336	6,753	5,990	5,561
Related work experience - Nuclear sector - Up to 1 year (jobs)		9,020	9,860	9,241	9,847	8,731	8,102
Related work experience - Nuclear sector - 1 to 4 years (jobs)		18,296	19,980	18,709	19,915	17,642	16,357



Table 20: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - Nuclear sector - 4 to 10 years (jobs)		11,869	12,959	12,132	12,912	11,436	10,601
Related work experience - Nuclear sector - Over 10 years (jobs)		3,654	3,992	3,740	3,983	3,530	3,274
Related work experience - Oil sector - None (jobs)		106,857	95,809	86,141	75,674	65,021	42,502
Related work experience - Oil sector - Up to 1 year (jobs)		147,845	132,071	118,309	103,547	88,636	57,791
Related work experience - Oil sector - 1 to 4 years (jobs)		302,135	269,872	241,614	211,329	180,792	117,324
Related work experience - Oil sector - 4 to 10 years (jobs)		183,324	163,462	146,091	127,563	108,950	70,576
Related work experience - Oil sector - Over 10 years (jobs)		52,718	46,922	41,873	36,525	31,181	20,166
Related work experience - Solar PV sector - None (jobs)		53,898	75,636	85,165	96,355	125,798	160,694
Related work experience - Solar PV sector - Up to 1 year (jobs)		83,669	116,633	129,876	145,365	188,165	237,414
Related work experience - Solar PV sector - 1 to 4 years (jobs)		129,979	182,798	205,741	232,782	304,256	388,439
Related work experience - Solar PV sector - 4 to 10 years (jobs)		84,607	118,539	133,017	149,982	195,272	248,373
Related work experience - Solar PV sector - Over 10 years (jobs)		21,934	30,854	34,218	38,269	49,843	62,757
Related work experience - Wind sector - None (jobs)		30,515	52,896	68,472	86,717	117,038	159,627
Related work experience - Wind sector - Up to 1 year (jobs)		46,348	79,795	101,920	127,364	170,330	230,470
Related work experience - Wind sector - 1 to 4 years (jobs)		79,623	138,631	180,523	229,968	311,763	426,820
Related work experience - Wind sector - 4 to 10 years (jobs)		53,208	92,618	120,865	154,221	209,039	285,996
Related work experience - Wind sector - Over 10 years (jobs)		14,448	25,070	32,175	40,463	54,597	74,568
On-the-Job Training - All sectors - None (jobs)		148,904	166,552	180,443	199,553	243,896	291,623
On-the-Job Training - All sectors - Up to 1 year (jobs)		1,782,991	2,008,181	2,181,962	2,407,721	2,947,340	3,513,664
On-the-Job Training - All sectors - 1 to 4 years (jobs)		540,597	621,609	678,316	753,236	939,177	1,138,068
On-the-Job Training - All sectors - 4 to 10 years (jobs)		162,310	191,981	213,521	240,707	304,890	375,746
On-the-Job Training - All sectors - Over 10 years (jobs)		25,807	29,587	31,644	34,387	41,867	49,761
On-the-Job Training - Biomass sector - None (jobs)		5,279	6,082	9,258	12,627	12,720	12,160
On-the-Job Training - Biomass sector - Up to 1 year (jobs)		67,622	81,530	121,665	157,468	156,559	150,626
On-the-Job Training - Biomass sector - 1 to 4 years (jobs)		9,389	11,579	19,238	27,648	28,734	27,841
On-the-Job Training - Biomass sector - 4 to 10 years (jobs)		2,148	2,693	4,803	7,245	7,639	7,428
On-the-Job Training - Biomass sector - Over 10 years (jobs)		604	691	1,053	1,421	1,417	1,369
On-the-Job Training - CO2 sector - None (jobs)		338	5,026	4,422	2,168	3,276	5,997
On-the-Job Training - CO2 sector - Up to 1 year (jobs)		4,360	65,304	56,917	27,497	41,543	77,000
On-the-Job Training - CO2 sector - 1 to 4 years (jobs)		1,763	26,977	23,043	10,740	16,291	31,334

Table 20: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - CO2 sector - 4 to 10 years (jobs)		656	10,212	8,592	3,891	5,924	11,754
On-the-Job Training - CO2 sector - Over 10 years (jobs)		71.9	1,094	946	450	683	1,298
On-the-Job Training - Coal sector - None (jobs)		3,553	972	508	448	402	350
On-the-Job Training - Coal sector - Up to 1 year (jobs)		49,217	14,212	8,005	6,959	6,155	5,276
On-the-Job Training - Coal sector - 1 to 4 years (jobs)		14,210	4,006	1,915	1,660	1,465	1,255
On-the-Job Training - Coal sector - 4 to 10 years (jobs)		4,211	1,121	423	363	316	268
On-the-Job Training - Coal sector - Over 10 years (jobs)		482	139	70.7	63.4	57.9	51.4
On-the-Job Training - Grid sector - None (jobs)		24,654	34,185	45,932	58,733	84,588	108,877
On-the-Job Training - Grid sector - Up to 1 year (jobs)		323,448	448,930	603,774	772,751	1,113,863	1,434,870
On-the-Job Training - Grid sector - 1 to 4 years (jobs)		113,162	157,246	211,716	271,248	391,364	504,611
On-the-Job Training - Grid sector - 4 to 10 years (jobs)		38,459	53,490	72,083	92,433	133,480	172,251
On-the-Job Training - Grid sector - Over 10 years (jobs)		4,037	5,616	7,570	9,710	14,026	18,108
On-the-Job Training - Natural gas sector - None (jobs)		28,855	21,202	15,568	12,935	10,235	8,197
On-the-Job Training - Natural gas sector - Up to 1 year (jobs)		356,885	265,191	197,228	165,749	132,187	106,510
On-the-Job Training - Natural gas sector - 1 to 4 years (jobs)		122,490	91,627	69,213	59,363	47,896	38,975
On-the-Job Training - Natural gas sector - 4 to 10 years (jobs)		39,335	29,727	22,887	20,072	16,397	13,478
On-the-Job Training - Natural gas sector - Over 10 years (jobs)		5,256	3,904	2,898	2,430	1,942	1,564
On-the-Job Training - Nuclear sector - None (jobs)		3,292	3,595	3,366	3,583	3,174	2,942
On-the-Job Training - Nuclear sector - Up to 1 year (jobs)		33,436	36,513	34,189	36,392	32,237	29,889
On-the-Job Training - Nuclear sector - 1 to 4 years (jobs)		9,490	10,378	9,731	10,373	9,201	8,543
On-the-Job Training - Nuclear sector - 4 to 10 years (jobs)		2,289	2,503	2,348	2,503	2,220	2,062
On-the-Job Training - Nuclear sector - Over 10 years (jobs)		510	558	524	559	496	461
On-the-Job Training - Oil sector - None (jobs)		48,244	42,447	37,430	32,239	27,156	17,403
On-the-Job Training - Oil sector - Up to 1 year (jobs)		558,254	498,517	446,253	390,274	333,848	216,802
On-the-Job Training - Oil sector - 1 to 4 years (jobs)		144,505	129,357	116,099	101,822	87,357	56,884
On-the-Job Training - Oil sector - 4 to 10 years (jobs)		34,135	30,881	28,017	24,834	21,524	14,206
On-the-Job Training - Oil sector - Over 10 years (jobs)		7,740	6,934	6,229	5,469	4,697	3,065
On-the-Job Training - Solar PV sector - None (jobs)		22,087	31,086	35,245	40,109	52,538	67,513
On-the-Job Training - Solar PV sector - Up to 1 year (jobs)		241,291	339,978	380,894	429,638	561,782	714,506
On-the-Job Training - Solar PV sector - 1 to 4 years (jobs)		79,249	110,260	123,324	138,450	179,159	226,945

Table 20: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Solar PV sector - 4 to 10 years (jobs)		26,925	36,872	41,708	47,028	60,239	76,834
On-the-Job Training - Solar PV sector - Over 10 years (jobs)		4,536	6,263	6,846	7,527	9,616	11,878
On-the-Job Training - Wind sector - None (jobs)		12,601	21,957	28,715	36,710	49,807	68,184
On-the-Job Training - Wind sector - Up to 1 year (jobs)		148,478	258,006	333,037	420,993	569,166	778,184
On-the-Job Training - Wind sector - 1 to 4 years (jobs)		46,340	80,179	104,037	131,932	177,710	241,680
On-the-Job Training - Wind sector - 4 to 10 years (jobs)		14,152	24,482	32,660	42,339	57,150	77,466
On-the-Job Training - Wind sector - Over 10 years (jobs)		2,571	4,388	5,506	6,759	8,933	11,967
On-Site or In-Plant Training - All sectors - None (jobs)		429,454	488,244	532,265	590,883	727,293	873,554
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		1,615,613	1,819,868	1,976,790	2,180,812	2,672,300	3,188,552
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		422,732	484,899	528,726	586,034	728,624	880,305
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		171,916	200,164	220,609	246,963	309,962	378,702
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		20,894	24,734	27,497	30,912	38,992	47,749
On-Site or In-Plant Training - Biomass sector - None (jobs)		13,768	16,945	26,595	36,348	37,151	35,807
On-Site or In-Plant Training - Biomass sector - Up to 1 year (jobs)		59,432	71,230	106,033	137,105	136,029	130,827
On-Site or In-Plant Training - Biomass sector - 1 to 4 years (jobs)		8,583	10,499	16,845	23,383	23,942	23,154
On-Site or In-Plant Training - Biomass sector - 4 to 10 years (jobs)		2,669	3,231	5,551	8,269	8,664	8,399
On-Site or In-Plant Training - Biomass sector - Over 10 years (jobs)		589	670	994	1,303	1,282	1,237
On-Site or In-Plant Training - CO2 sector - None (jobs)		1,101	16,551	14,388	6,918	10,464	19,512
On-Site or In-Plant Training - CO2 sector - Up to 1 year (jobs)		4,033	60,513	52,654	25,364	38,334	71,274
On-Site or In-Plant Training - CO2 sector - 1 to 4 years (jobs)		1,325	20,254	17,327	8,097	12,280	23,564
On-Site or In-Plant Training - CO2 sector - 4 to 10 years (jobs)		652	10,094	8,539	3,907	5,940	11,656
On-Site or In-Plant Training - CO2 sector - Over 10 years (jobs)		77.5	1,201	1,012	460	699	1,377
On-Site or In-Plant Training - Coal sector - None (jobs)		10,585	2,911	1,420	1,259	1,136	994
On-Site or In-Plant Training - Coal sector - Up to 1 year (jobs)		45,080	13,086	7,424	6,436	5,677	4,853
On-Site or In-Plant Training - Coal sector - 1 to 4 years (jobs)		11,186	3,182	1,599	1,384	1,219	1,042
On-Site or In-Plant Training - Coal sector - 4 to 10 years (jobs)		4,304	1,136	431	372	326	278
On-Site or In-Plant Training - Coal sector - Over 10 years (jobs)		519	135	47.4	42.1	38	33.4
On-Site or In-Plant Training - Grid sector - None (jobs)		76,714	106,279	142,675	182,274	262,264	337,248
On-Site or In-Plant Training - Grid sector - Up to 1 year (jobs)		296,871	412,229	554,659	710,200	1,024,137	1,319,839
On-Site or In-Plant Training - Grid sector - 1 to 4 years (jobs)		87,009	120,965	162,948	208,872	301,517	388,962

Table 20: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Grid sector - 4 to 10 years (jobs)		38,213	53,114	71,532	91,669	132,295	170,618
On-Site or In-Plant Training - Grid sector - Over 10 years (jobs)		4,953	6,881	9,261	11,861	17,107	22,049
On-Site or In-Plant Training - Natural gas sector - None (jobs)		88,008	65,188	48,520	40,955	32,692	26,390
On-Site or In-Plant Training - Natural gas sector - Up to 1 year (jobs)		325,428	241,881	179,991	151,372	120,795	97,369
On-Site or In-Plant Training - Natural gas sector - 1 to 4 years (jobs)		93,144	69,692	52,578	44,991	36,270	29,485
On-Site or In-Plant Training - Natural gas sector - 4 to 10 years (jobs)		41,339	31,167	23,829	20,702	16,834	13,779
On-Site or In-Plant Training - Natural gas sector - Over 10 years (jobs)		4,901	3,722	2,877	2,528	2,067	1,700
On-Site or In-Plant Training - Nuclear sector - None (jobs)		8,774	9,575	8,960	9,532	8,439	7,820
On-Site or In-Plant Training - Nuclear sector - Up to 1 year (jobs)		30,147	32,931	30,843	32,840	29,099	26,986
On-Site or In-Plant Training - Nuclear sector - 1 to 4 years (jobs)		7,233	7,911	7,419	7,909	7,017	6,515
On-Site or In-Plant Training - Nuclear sector - 4 to 10 years (jobs)		2,618	2,863	2,684	2,860	2,537	2,355
On-Site or In-Plant Training - Nuclear sector - Over 10 years (jobs)		246	268	251	267	237	220
On-Site or In-Plant Training - Oil sector - None (jobs)		127,666	113,154	100,522	87,241	74,055	47,738
On-Site or In-Plant Training - Oil sector - Up to 1 year (jobs)		502,621	448,835	401,798	351,423	300,645	195,301
On-Site or In-Plant Training - Oil sector - 1 to 4 years (jobs)		116,831	104,736	94,131	82,661	71,002	46,291
On-Site or In-Plant Training - Oil sector - 4 to 10 years (jobs)		41,198	37,215	33,709	29,833	25,820	16,989
On-Site or In-Plant Training - Oil sector - Over 10 years (jobs)		4,563	4,197	3,868	3,480	3,059	2,041
On-Site or In-Plant Training - Solar PV sector - None (jobs)		63,789	89,678	100,805	113,919	148,780	189,662
On-Site or In-Plant Training - Solar PV sector - Up to 1 year (jobs)		218,913	308,068	345,134	389,169	508,392	646,459
On-Site or In-Plant Training - Solar PV sector - 1 to 4 years (jobs)		61,725	85,958	96,083	107,845	139,645	176,837
On-Site or In-Plant Training - Solar PV sector - 4 to 10 years (jobs)		26,490	36,347	41,053	46,259	59,318	75,579
On-Site or In-Plant Training - Solar PV sector - Over 10 years (jobs)		3,169	4,408	4,943	5,560	7,198	9,140
On-Site or In-Plant Training - Wind sector - None (jobs)		39,049	67,963	88,379	112,436	152,311	208,382
On-Site or In-Plant Training - Wind sector - Up to 1 year (jobs)		133,088	231,095	298,252	376,902	509,192	695,643
On-Site or In-Plant Training - Wind sector - 1 to 4 years (jobs)		35,695	61,703	79,798	100,893	135,732	184,456
On-Site or In-Plant Training - Wind sector - 4 to 10 years (jobs)		14,432	24,998	33,283	43,093	58,227	79,049
On-Site or In-Plant Training - Wind sector - Over 10 years (jobs)		1,876	3,252	4,244	5,409	7,304	9,951
Wage income - Biomass (million \$2019)		4,420	5,498	8,852	12,487	13,042	12,804
Wage income - CO2 (million \$2019)		449	6,820	6,032	2,966	4,552	8,531
Wage income - Coal (million \$2019)		4,341	1,223	608	536	482	421
Wage income - Grid (million \$2019)		31,505	44,329	60,462	78,508	114,854	150,222
Wage income - Natural Gas (million \$2019)		36,633	27,637	20,860	17,785	14,393	11,770
Wage income - Nuclear (million \$2019)		3,504	3,919	3,760	4,104	3,730	3,550
Wage income - Oil (million \$2019)		52,193	47,217	42,805	37,909	32,838	21,560

Table 20: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Wage income - Solar (million \$2019)		21,062	29,939	34,156	39,184	51,909	67,323
Wage income - Wind (million \$2019)		13,379	23,634	31,377	40,761	56,217	78,278

Table 21: E- scenario - IMPACTS - Fossil fuel industries

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		5,987	5,545	5,112	4,510	3,786	2,730
Oil consumption - Cumulative (million bbls)							151,515
Oil production - Annual (million bbls)		5,198	5,216	5,209	5,074	4,832	3,313
Oil production - Cumulative (million bbls)							151,997
Natural gas consumption - Annual (tcf)		23,207	18,132	13,835	11,458	9,451	7,359
Natural gas consumption - Cumulative (tcf)							471,240
Natural gas production - Annual (tcf)		36,153	32,458	26,253	21,869	19,030	16,824
Natural gas production - Cumulative (tcf)							827,513

Table 22: E- scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	28,030	26,603	24,463	22,703	21,315	19,677	17,739
Final energy use - Residential (PJ)	11,788	11,126	10,656	10,151	9,457	8,609	7,786
Final energy use - Commercial (PJ)	9,015	8,958	8,853	8,731	8,513	8,263	8,058
Final energy use - Industry (PJ)	25,084	26,117	26,456	26,354	26,498	26,178	25,748

Table 23: E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		149	150	201	208	298	315

Table 24: E- scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	4.05	6.4	12.6	27.1	49.7	72.9	87.9
Vehicle sales - Light-duty - gasoline (%)	89.4	85.5	78.4	65.1	44.7	23.9	10.6
Vehicle sales - Light-duty - hybrid (%)	4.99	5.79	6.54	5.88	4.34	2.52	1.21
Vehicle sales - Light-duty - diesel (%)	1.39	1.82	2.03	1.61	1.02	0.519	0.223
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.371	0.317	0.239	0.168	0.092	0.043
Vehicle sales - Light-duty - other (%)	0.095	0.098	0.09	0.078	0.056	0.03	0.014
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 - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102
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
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	8,683	17,455	59,707	185,491	271,068
Public EV charging plugs - DC Fast (1000 units)	14.4		31.9		147		402

Table 24: E- scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Public EV charging plugs - L2 (1000 units)	66.2		766		3,537		9,670

Table 25: E- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	14.6	21	25.3	37.6	58.4	75.1	82.4
Sales of space heating units - Electric Resistance (%)	20.3	24.4	23.2	19.9	14.3	10.3	8.67
Sales of space heating units - Gas (%)	55.2	40	37.7	31.1	19.6	9.59	4.95
Sales of space heating units - Fossil (%)	9.95	14.5	13.8	11.4	7.66	5.01	4.02
Sales of water heating units - Electric Heat Pump (%)	0	1.36	5.25	16.7	35.2	49.3	55.3
Sales of water heating units - Electric Resistance (%)	38.4	51.5	50.3	47	42.1	39.6	38.9
Sales of water heating units - Gas Furnace (%)	58	44.5	41.9	34	20.8	9.45	4.17
Sales of water heating units - Other (%)	3.58	2.63	2.51	2.27	1.91	1.68	1.62
Sales of cooking units - Electric Resistance (%)	61.2	62.2	65.8	75.1	88.1	96.2	99
Sales of cooking units - Gas (%)	38.8	37.8	34.2	24.9	11.9	3.83	1.03
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		252	303				

Table 26: E- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	2.95	11.9	15.9	27.6	48.1	65.9	74.2
Sales of space heating units - Electric Resistance (%)	7.91	8.18	8.72	10.5	13.8	16.4	17.6
Sales of space heating units - Gas Furnace (%)	85.2	76.1	71.7	59	36.6	17.1	7.89
Sales of space heating units - Fossil (%)	3.94	3.79	3.71	2.91	1.53	0.589	0.302
Sales of water heating units - Electric Heat Pump (%)	0.385	1.8	5.78	17.4	36.6	51.2	57.3
Sales of water heating units - Electric Resistance (%)	3.8	4.53	6.39	12	21.9	30.4	34.4
Sales of water heating units - Gas Furnace (%)	94.1	92	86.2	69	40.2	17.2	7.13
Sales of water heating units - Other (%)	1.66	1.67	1.66	1.51	1.31	1.18	1.14
Sales of cooking units - Electric Resistance (%)	32.5	36.5	41.3	53.8	71.2	81.9	85.6
Sales of cooking units - Gas (%)	67.5	63.5	58.7	46.2	28.8	18.1	14.4
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,046,837	1,158,815				

Table 27: E- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed - Onshore wind (MW)	97,778	190,523	360,186	535,006	755,512	1,070,110	1,512,260
Installed - Offshore wind (MW)	29.3	1,001	5,040	13,607	38,613	103,767	217,041
Installed - Rooftop PV (MW)	33,317	52,523	69,448	90,809	117,114	148,351	185,890
Installed - Utility-scale PV (MW)	36,045	127,524	299,852	482,288	684,358	989,365	1,304,016
Installed - Hydro (MW)	78,608	78,608	78,608	78,608	78,608	78,608	78,608
Installed - Geothermal (MW)	2,393	2,397	2,422	2,418	2,427	2,437	2,450
Installed - Nuclear (MW)	98,481	95,135	93,041	82,240	81,173	73,631	70,690
Installed - Ccgt & gas steam (MW)	334,698	308,455	302,510	290,709	215,137	143,639	117,846
Installed - Ccgt w cc (MW)	0	0	67.8	17,456	40,085	51,995	52,067
Installed - Ct (MW)	146,430	140,119	132,908	111,206	98,767	148,426	241,143

Table 27: E- scenario - PILLAR 2: Clean Electricity - Generating capacity (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Installed - Biomass (MW)	10,004	9,140	7,850	6,124	4,692	3,372	2,478
Installed - Biomass w cc (MW)	0	0	9,932	18,649	22,298	22,479	22,533
Installed - Coal (MW)	215,962	59,668	162	122	55.9	42	34.5
Installed - Other (MW)	68,061	57,347	55,269	53,804	51,795	50,874	49,607
Installed - Grid battery storage (MW)		989	3,715	13,014	37,934	87,773	142,016
Installed - Pumped hydro storage (MW)		19,418	19,418	19,418	19,418	19,418	19,418

Table 28: E- scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Onshore wind (TWh)	412	780	1,497	2,111	2,909	4,105	5,840
Offshore wind (TWh)	0.092	3.66	20.4	66.3	168	454	902
Rooftop PV (TWh)	50.1	79.4	101	126	164	208	254
Utility-scale PV (TWh)	91.1	309	690	1,088	1,510	2,194	2,861
Hydro (TWh)	300	312	295	294	300	291	292
Geothermal (TWh)	14.5	14.5	14.2	14.1	13.4	13.4	13.2
Nuclear (TWh)	802	775	759	671	664	603	580
Gas (TWh)	1,491	1,682	1,051	443	166	54.4	41.6
Gas w cc (TWh)	0	0	0.342	110	179	217	178
Biomass (TWh)	19.1	23.2	39.7	22.2	3.11	0.406	0.051
Biomass w cc (TWh)	0	0	73.9	139	163	165	149
Coal (TWh)	979	260	0.568	0.427	0.196	0.147	0.121

Table 29: E- scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass input - Biopower (1000 tonnes)	12,353	27,983	56,287	38,442	4,029	416	43.3
Biomass input - Biopower w/ cc (1000 tonnes)	0	0	44,659	83,709	98,070	99,590	89,779
Biomass input - BECCS-H2 (1000 tonnes)	0	0	0	143,697	365,549	383,408	381,319
Biomass input - FT diesel (1000 tonnes)	0	0	0	103	97.2	78.2	60.2
Biomass input - Bio-FT w/ CC (1000 tonnes)	0	0	0	148	207	242	231
Biomass input - Pyrolysis liquids (1000 tonnes)	0	0	0	197	5,801	5,774	3,174
Biomass input - Pyrolysis liquids w/ cc (1000 tonnes)	0	0	0	160	2,119	81,909	109,355
Biomass input - SNG (1000 tonnes)	0	8.87	15.7	8.5	7.52	5.18	1.6
Biomass input - Bio-SNG w/ CC (1000 tonnes)	0	0	31	15.3	10.2	8.15	4.09
Biomass input - Ethanol (1000 tonnes)	129,506	129,506	129,536	125,006	67,634	10,261	905

Table 30: E- scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)	0	2.09	106	453	830	1,179	1,484

Table 31: E- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-24,500
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-14,000
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-116,000
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-29,000
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-100,000

Table 31: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-21,000
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-121,000
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-20,000
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-60,000
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							- 505,500
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-36,700
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-49,000
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-209,000
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-42,500
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							- 200,000
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-40,500
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-181,500
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-142,000
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-119,000
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							- 1,020,200
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-48,900
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-84,000
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-302,000
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-57,000
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							- 300,000
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-60,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-242,000
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							- 264,000
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							- 1,535,900
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-178,000
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4,000
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							10,677
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							59,000



Table 31: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							10,500
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							3,000
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							8,000
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1,300
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							35,700
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							132,177
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6,000
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							11,025
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							106,500
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							15,800
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							4,350
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							12,000
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							9,400
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							71,900
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							236,975
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8,000
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							11,373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							154,000
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							21,000
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

Table 31: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							5,700
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							16,000
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							7,500
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							59,000
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							282,573

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-23,286
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-106,430
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3,696
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-133,412
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-23,286
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-203,503
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-7,391
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-234,180
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							11,287
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							71,390
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							6,375
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							89,052
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							11,287
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							136,405
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							12,749

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							160,442

Table 33: E- scenario - PILLAR 6: Land sinks - Total assumed land sink

Item	2020	2025	2030	2035	2040	2045	2050
Total assumed land sink (Gt CO2e/y)	-0.7	-0.73	-0.75	-0.78	-0.8	-0.83	-0.85

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		2,559	3.33	3.2	2.73	1.88	0.14
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		1,340	944	524	365	132	38.4
Premature deaths from air pollution - Mobile - On-Road (deaths)		11,515	10,889	8,385	4,910	2,254	876
Premature deaths from air pollution - Gas Stations (deaths)		665	617	470	280	135	61.8
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		2,159	1,816	1,245	700	333	129
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		554	452	311	182	82.3	26.9
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		195	180	142	98.2	57.5	31.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		105	101	96	90.9	85.7	80.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		1,436	1,305	1,006	665	403	222
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		352	292	221	153	106	73.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		170	144	119	94.1	69.7	46.2
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		87.1	41.8	41	39.9	40	36.7
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		3,745	3,518	2,997	2,164	1,302	175
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		22,684	29.5	28.4	24.2	16.7	1.24
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		11,869	8,363	4,638	3,236	1,166	340
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		102,386	96,814	74,557	43,657	20,044	7,790
Monetary damages from air pollution - Gas Stations (million \$2019)		5,886	5,467	4,160	2,477	1,197	547
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		19,136	16,089	11,036	6,207	2,952	1,145

Table 34: E+RE+ scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4,909	4,009	2,756	1,617	729	238
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1,731	1,592	1,261	870	509	277
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		932	892	850	805	758	709
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		12,710	11,555	8,907	5,887	3,569	1,962
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		3,117	2,585	1,954	1,351	939	647
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		1,502	1,275	1,054	833	617	409
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		768	369	362	352	353	324
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		33,258	31,238	26,617	19,218	11,561	1,556

Table 35: E+RE+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		31,644	36,897	42,750	36,387	31,197	47,266
By economic sector - Construction (jobs)		605,278	763,313	1,102,749	1,323,214	1,659,068	2,254,415
By economic sector - Manufacturing (jobs)		426,798	505,648	650,059	631,426	682,593	846,742
By economic sector - Mining (jobs)		455,199	345,035	249,121	151,098	81,299	14,201
By economic sector - Other (jobs)		61,875	92,566	154,501	200,631	276,167	415,053
By economic sector - Pipeline (jobs)		44,749	39,489	31,071	21,589	13,204	3,548
By economic sector - Professional (jobs)		339,310	418,550	603,343	762,128	992,585	1,402,224
By economic sector - Trade (jobs)		304,934	325,742	412,281	478,783	603,141	842,546
By economic sector - Utilities (jobs)		471,014	543,762	809,531	1,030,060	1,328,637	1,856,189
By resource sector - Biomass (jobs)		81,618	89,469	102,980	105,776	117,006	212,370
By resource sector - CO2 (jobs)		0.001	0.013	0.011	0.016	0.02	0.012
By resource sector - Coal (jobs)		74,788	20,480	10,819	9,345	8,380	6,937
By resource sector - Grid (jobs)		540,768	768,703	1,367,900	1,825,658	2,477,933	3,562,139
By resource sector - Natural Gas (jobs)		540,072	429,685	313,458	255,339	172,228	130,289
By resource sector - Nuclear (jobs)		48,804	44,631	35,535	24,296	14,478	4,079
By resource sector - Oil (jobs)		790,152	691,583	580,471	394,105	245,253	39,559
By resource sector - Solar (jobs)		425,351	608,125	930,938	1,048,923	1,341,788	1,913,500
By resource sector - Wind (jobs)		239,247	418,326	713,306	971,874	1,290,825	1,813,312
By education level - All sectors - High school diploma or less (jobs)		1,142,806	1,290,084	1,711,593	1,942,427	2,361,636	3,192,382
By education level - All sectors - Associates degree or some college (jobs)		822,333	937,027	1,265,479	1,470,489	1,818,050	2,480,559
By education level - All sectors - Bachelors degree (jobs)		607,991	659,915	840,547	947,932	1,149,783	1,547,827
By education level - All sectors - Masters or professional degree (jobs)		146,417	160,276	206,951	238,320	293,437	399,764
By education level - All sectors - Doctoral degree (jobs)		21,252	23,700	30,835	36,148	44,983	61,653
By education level - Biomass sector - High school diploma or less (jobs)		47,358	52,271	59,779	55,811	55,334	96,306

Table 35: E+RE+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Biomass sector - Associates degree or some college (jobs)		15,552	16,889	19,994	22,250	26,445	49,645
By education level - Biomass sector - Bachelors degree (jobs)		14,138	15,252	17,355	20,555	25,986	49,050
By education level - Biomass sector - Masters or professional degree (jobs)		3,886	4,287	4,946	5,961	7,609	14,274
By education level - Biomass sector - Doctoral degree (jobs)		685	770	905	1,198	1,633	3,096
By education level - CO2 sector - High school diploma or less (jobs)		0.001	0.005	0.004	0.006	0.007	0.004
By education level - CO2 sector - Associates degree or some college (jobs)		0	0.004	0.003	0.004	0.006	0.003
By education level - CO2 sector - Bachelors degree (jobs)		0	0.004	0.003	0.004	0.006	0.003
By education level - CO2 sector - Masters or professional degree (jobs)		0	0.001	0.001	0.001	0.001	0.001
By education level - CO2 sector - Doctoral degree (jobs)		0	0	0	0	0	0
By education level - Coal sector - High school diploma or less (jobs)		32,770	9,431	5,745	4,884	4,306	3,504
By education level - Coal sector - Associates degree or some college (jobs)		22,915	6,176	2,967	2,570	2,312	1,923
By education level - Coal sector - Bachelors degree (jobs)		14,923	3,797	1,687	1,511	1,405	1,200
By education level - Coal sector - Masters or professional degree (jobs)		3,640	937	369	332	311	269
By education level - Coal sector - Doctoral degree (jobs)		540	139	51.4	47.7	45.9	40.7
By education level - Grid sector - High school diploma or less (jobs)		229,543	327,840	586,110	785,849	1,071,464	1,547,179
By education level - Grid sector - Associates degree or some college (jobs)		179,507	255,090	453,770	605,380	821,310	1,180,102
By education level - Grid sector - Bachelors degree (jobs)		102,868	145,227	256,678	340,271	458,766	655,140
By education level - Grid sector - Masters or professional degree (jobs)		25,884	36,429	64,188	84,835	114,035	162,366
By education level - Grid sector - Doctoral degree (jobs)		2,966	4,117	7,153	9,323	12,358	17,351
By education level - Natural gas sector - High school diploma or less (jobs)		212,153	169,881	124,164	100,764	67,931	51,285
By education level - Natural gas sector - Associates degree or some college (jobs)		173,454	138,732	102,315	85,093	58,524	45,741
By education level - Natural gas sector - Bachelors degree (jobs)		120,841	94,837	68,163	54,426	35,865	26,072
By education level - Natural gas sector - Masters or professional degree (jobs)		29,607	23,107	16,579	13,286	8,767	6,406
By education level - Natural gas sector - Doctoral degree (jobs)		4,018	3,128	2,237	1,770	1,141	785
By education level - Nuclear sector - High school diploma or less (jobs)		16,542	15,172	12,114	8,306	4,963	1,402
By education level - Nuclear sector - Associates degree or some college (jobs)		13,326	12,190	9,707	6,639	3,957	1,115
By education level - Nuclear sector - Bachelors degree (jobs)		14,405	13,145	10,444	7,126	4,237	1,191
By education level - Nuclear sector - Masters or professional degree (jobs)		3,899	3,552	2,817	1,919	1,139	320
By education level - Nuclear sector - Doctoral degree (jobs)		631	573	452	307	181	50.7
By education level - Oil sector - High school diploma or less (jobs)		317,683	280,308	237,011	162,536	102,033	16,377

Table 35: E+RE+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Oil sector - Associates degree or some college (jobs)		205,534	180,474	151,993	103,553	64,672	10,464
By education level - Oil sector - Bachelors degree (jobs)		212,005	183,408	152,219	101,861	62,544	10,118
By education level - Oil sector - Masters or professional degree (jobs)		48,082	41,430	34,263	22,801	13,932	2,261
By education level - Oil sector - Doctoral degree (jobs)		6,849	5,963	4,985	3,354	2,073	341
By education level - Solar PV sector - High school diploma or less (jobs)		190,988	270,186	409,174	455,652	576,243	812,194
By education level - Solar PV sector - Associates degree or some college (jobs)		136,251	194,974	298,819	337,231	432,013	617,094
By education level - Solar PV sector - Bachelors degree (jobs)		76,667	111,522	173,390	198,078	257,283	372,353
By education level - Solar PV sector - Masters or professional degree (jobs)		18,275	26,808	42,227	49,289	64,817	95,043
By education level - Solar PV sector - Doctoral degree (jobs)		3,169	4,635	7,327	8,673	11,432	16,817
By education level - Wind sector - High school diploma or less (jobs)		95,769	164,996	277,496	368,625	479,364	664,135
By education level - Wind sector - Associates degree or some college (jobs)		75,794	132,500	225,914	307,772	408,817	574,476
By education level - Wind sector - Bachelors degree (jobs)		52,145	92,727	160,611	224,104	303,697	432,703
By education level - Wind sector - Masters or professional degree (jobs)		13,144	23,727	41,562	59,898	82,826	118,826
By education level - Wind sector - Doctoral degree (jobs)		2,395	4,376	7,724	11,475	16,120	23,172
Related work experience - All sectors - None (jobs)		388,940	438,326	582,627	668,545	819,435	1,114,460
Related work experience - All sectors - Up to 1 year (jobs)		541,331	614,781	819,478	932,600	1,138,238	1,548,059
Related work experience - All sectors - 1 to 4 years (jobs)		999,573	1,112,318	1,460,581	1,667,981	2,038,293	2,757,493
Related work experience - All sectors - 4 to 10 years (jobs)		637,386	712,997	941,571	1,081,837	1,326,415	1,796,834
Related work experience - All sectors - Over 10 years (jobs)		173,569	192,581	251,148	284,353	345,508	465,338
Related work experience - Biomass sector - None (jobs)		13,859	15,184	17,335	16,944	17,786	31,692
Related work experience - Biomass sector - Up to 1 year (jobs)		27,386	29,866	33,448	30,859	30,376	53,683
Related work experience - Biomass sector - 1 to 4 years (jobs)		24,277	26,997	31,853	34,825	40,687	73,929
Related work experience - Biomass sector - 4 to 10 years (jobs)		12,619	13,694	16,064	18,393	22,461	42,237
Related work experience - Biomass sector - Over 10 years (jobs)		3,478	3,729	4,280	4,755	5,696	10,830
Related work experience - CO2 sector - None (jobs)		0	0.002	0.002	0.002	0.003	0.002
Related work experience - CO2 sector - Up to 1 year (jobs)		0	0.002	0.002	0.003	0.003	0.002
Related work experience - CO2 sector - 1 to 4 years (jobs)		0.001	0.005	0.004	0.006	0.008	0.004
Related work experience - CO2 sector - 4 to 10 years (jobs)		0	0.003	0.003	0.004	0.005	0.003
Related work experience - CO2 sector - Over 10 years (jobs)		0	0.001	0.001	0.001	0.001	0.001
Related work experience - Coal sector - None (jobs)		10,136	2,723	1,346	1,162	1,042	862

Table 35: E+RE+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - Coal sector - Up to 1 year (jobs)		15,483	4,463	2,741	2,347	2,085	1,710
Related work experience - Coal sector - 1 to 4 years (jobs)		28,389	7,771	4,137	3,566	3,191	2,634
Related work experience - Coal sector - 4 to 10 years (jobs)		16,591	4,383	2,034	1,778	1,613	1,351
Related work experience - Coal sector - Over 10 years (jobs)		4,189	1,141	561	493	449	379
Related work experience - Grid sector - None (jobs)		80,320	114,262	203,472	271,742	369,058	530,838
Related work experience - Grid sector - Up to 1 year (jobs)		103,541	147,634	263,519	352,790	480,323	692,640
Related work experience - Grid sector - 1 to 4 years (jobs)		195,544	277,751	493,872	658,635	893,268	1,283,132
Related work experience - Grid sector - 4 to 10 years (jobs)		128,147	181,887	323,176	430,672	583,658	837,760
Related work experience - Grid sector - Over 10 years (jobs)		33,216	47,171	83,860	111,818	151,627	217,769
Related work experience - Natural gas sector - None (jobs)		78,199	62,490	45,890	37,795	25,770	19,842
Related work experience - Natural gas sector - Up to 1 year (jobs)		93,942	74,664	54,280	43,954	29,562	22,336
Related work experience - Natural gas sector - 1 to 4 years (jobs)		199,314	158,500	115,534	93,908	63,139	47,424
Related work experience - Natural gas sector - 4 to 10 years (jobs)		132,613	105,533	77,155	63,183	42,812	32,649
Related work experience - Natural gas sector - Over 10 years (jobs)		36,004	28,497	20,599	16,500	10,944	8,038
Related work experience - Nuclear sector - None (jobs)		6,152	5,632	4,489	3,072	1,832	517
Related work experience - Nuclear sector - Up to 1 year (jobs)		8,981	8,218	6,547	4,479	2,671	753
Related work experience - Nuclear sector - 1 to 4 years (jobs)		18,216	16,653	13,254	9,059	5,397	1,520
Related work experience - Nuclear sector - 4 to 10 years (jobs)		11,818	10,801	8,595	5,873	3,498	985
Related work experience - Nuclear sector - Over 10 years (jobs)		3,638	3,327	2,649	1,812	1,080	304
Related work experience - Oil sector - None (jobs)		106,478	93,499	78,696	53,672	33,526	5,380
Related work experience - Oil sector - Up to 1 year (jobs)		147,314	128,836	107,956	73,363	45,636	7,249
Related work experience - Oil sector - 1 to 4 years (jobs)		301,109	263,650	221,423	150,297	93,538	15,160
Related work experience - Oil sector - 4 to 10 years (jobs)		182,706	159,719	133,934	90,747	56,384	9,131
Related work experience - Oil sector - Over 10 years (jobs)		52,545	45,879	38,462	26,026	16,169	2,639
Related work experience - Solar PV sector - None (jobs)		61,229	87,655	134,515	152,231	195,318	279,510
Related work experience - Solar PV sector - Up to 1 year (jobs)		95,152	135,260	205,798	230,250	292,602	414,419
Related work experience - Solar PV sector - 1 to 4 years (jobs)		147,770	211,937	325,535	368,232	472,718	676,604
Related work experience - Solar PV sector - 4 to 10 years (jobs)		96,156	137,413	210,348	237,177	303,353	432,563
Related work experience - Solar PV sector - Over 10 years (jobs)		25,043	35,861	54,742	61,033	77,797	110,405
Related work experience - Wind sector - None (jobs)		32,568	56,881	96,886	131,926	175,104	245,819

Table 35: E+RE+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - Wind sector - Up to 1 year (jobs)		49,532	85,840	145,188	194,559	254,984	355,268
Related work experience - Wind sector - 1 to 4 years (jobs)		84,954	149,059	254,972	349,459	466,356	657,092
Related work experience - Wind sector - 4 to 10 years (jobs)		56,737	99,569	170,265	234,013	312,635	440,159
Related work experience - Wind sector - Over 10 years (jobs)		15,456	26,976	45,995	61,917	81,746	114,974
On-the-Job Training - All sectors - None (jobs)		153,262	170,093	221,633	251,693	307,327	417,213
On-the-Job Training - All sectors - Up to 1 year (jobs)		1,835,406	2,045,226	2,680,382	3,040,524	3,700,938	5,007,322
On-the-Job Training - All sectors - 1 to 4 years (jobs)		557,718	631,274	846,215	980,167	1,207,641	1,640,320
On-the-Job Training - All sectors - 4 to 10 years (jobs)		167,721	194,172	267,537	318,571	398,596	545,983
On-the-Job Training - All sectors - Over 10 years (jobs)		26,692	30,236	39,638	44,359	53,387	71,346
On-the-Job Training - Biomass sector - None (jobs)		5,066	5,387	5,981	6,164	6,923	12,884
On-the-Job Training - Biomass sector - Up to 1 year (jobs)		64,933	71,327	81,346	81,677	88,415	158,798
On-the-Job Training - Biomass sector - 1 to 4 years (jobs)		8,979	9,877	12,031	13,677	16,440	30,702
On-the-Job Training - Biomass sector - 4 to 10 years (jobs)		2,054	2,258	2,913	3,534	4,432	8,465
On-the-Job Training - Biomass sector - Over 10 years (jobs)		586	619	708	722	796	1,521
On-the-Job Training - CO2 sector - None (jobs)		0	0.001	0.001	0.001	0.001	0.001
On-the-Job Training - CO2 sector - Up to 1 year (jobs)		0.001	0.009	0.008	0.011	0.014	0.008
On-the-Job Training - CO2 sector - 1 to 4 years (jobs)		0	0.002	0.002	0.003	0.004	0.002
On-the-Job Training - CO2 sector - 4 to 10 years (jobs)		0	0.001	0.001	0.001	0.001	0.001
On-the-Job Training - CO2 sector - Over 10 years (jobs)		0	0	0	0	0	0
On-the-Job Training - Coal sector - None (jobs)		3,704	973	503	441	401	336
On-the-Job Training - Coal sector - Up to 1 year (jobs)		51,515	14,229	7,928	6,850	6,142	5,081
On-the-Job Training - Coal sector - 1 to 4 years (jobs)		14,738	4,014	1,898	1,635	1,463	1,211
On-the-Job Training - Coal sector - 4 to 10 years (jobs)		4,330	1,125	419	357	316	258
On-the-Job Training - Coal sector - Over 10 years (jobs)		500	139	70	62.4	57.8	49.6
On-the-Job Training - Grid sector - None (jobs)		26,465	37,568	66,764	88,994	120,647	173,240
On-the-Job Training - Grid sector - Up to 1 year (jobs)		347,209	493,367	877,616	1,170,892	1,588,698	2,283,097
On-the-Job Training - Grid sector - 1 to 4 years (jobs)		121,475	172,811	307,739	411,002	558,200	802,913
On-the-Job Training - Grid sector - 4 to 10 years (jobs)		41,285	58,785	104,776	140,057	190,382	274,077
On-the-Job Training - Grid sector - Over 10 years (jobs)		4,334	6,172	11,003	14,713	20,006	28,812
On-the-Job Training - Natural gas sector - None (jobs)		28,179	22,136	15,903	12,710	8,434	6,257



Table 35: E+RE+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Natural gas sector - Up to 1 year (jobs)		348,610	276,866	201,297	162,788	108,882	81,003
On-the-Job Training - Natural gas sector - 1 to 4 years (jobs)		119,696	95,608	70,226	57,982	39,688	30,848
On-the-Job Training - Natural gas sector - 4 to 10 years (jobs)		38,459	31,003	23,091	19,510	13,659	11,015
On-the-Job Training - Natural gas sector - Over 10 years (jobs)		5,129	4,071	2,940	2,350	1,565	1,166
On-the-Job Training - Nuclear sector - None (jobs)		3,278	2,996	2,385	1,630	971	273
On-the-Job Training - Nuclear sector - Up to 1 year (jobs)		33,291	30,433	24,221	16,555	9,861	2,777
On-the-Job Training - Nuclear sector - 1 to 4 years (jobs)		9,449	8,650	6,894	4,719	2,815	794
On-the-Job Training - Nuclear sector - 4 to 10 years (jobs)		2,279	2,086	1,663	1,138	679	192
On-the-Job Training - Nuclear sector - Over 10 years (jobs)		508	465	371	254	152	42.8
On-the-Job Training - Oil sector - None (jobs)		48,074	41,427	34,202	22,869	14,003	2,203
On-the-Job Training - Oil sector - Up to 1 year (jobs)		556,332	486,861	408,582	277,346	172,564	27,863
On-the-Job Training - Oil sector - 1 to 4 years (jobs)		144,018	126,388	106,403	72,405	45,178	7,322
On-the-Job Training - Oil sector - 4 to 10 years (jobs)		34,014	30,133	25,578	17,598	11,082	1,779
On-the-Job Training - Oil sector - Over 10 years (jobs)		7,714	6,774	5,705	3,886	2,427	392
On-the-Job Training - Solar PV sector - None (jobs)		25,063	36,002	55,496	63,222	81,466	117,099
On-the-Job Training - Solar PV sector - Up to 1 year (jobs)		274,840	394,603	605,538	681,977	874,494	1,249,579
On-the-Job Training - Solar PV sector - 1 to 4 years (jobs)		89,960	127,732	194,510	218,555	278,071	394,550
On-the-Job Training - Solar PV sector - 4 to 10 years (jobs)		30,318	42,515	64,473	73,183	92,757	131,383
On-the-Job Training - Solar PV sector - Over 10 years (jobs)		5,169	7,274	10,921	11,986	15,000	20,888
On-the-Job Training - Wind sector - None (jobs)		13,433	23,602	40,399	55,663	74,483	104,921
On-the-Job Training - Wind sector - Up to 1 year (jobs)		158,676	277,541	473,853	642,440	851,882	1,199,124
On-the-Job Training - Wind sector - 1 to 4 years (jobs)		49,403	86,192	146,514	200,192	265,787	371,980
On-the-Job Training - Wind sector - 4 to 10 years (jobs)		14,982	26,267	44,622	63,193	85,289	118,813
On-the-Job Training - Wind sector - Over 10 years (jobs)		2,752	4,723	7,918	10,386	13,384	18,475
On-Site or In-Plant Training - All sectors - None (jobs)		442,649	497,923	658,253	753,566	923,287	1,254,464
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		1,663,249	1,852,974	2,430,243	2,759,011	3,359,976	4,546,380
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		436,081	492,734	658,484	759,621	933,680	1,266,660
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		177,221	202,264	273,876	322,416	400,328	545,375
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		21,600	25,107	34,549	40,702	50,618	69,305
On-Site or In-Plant Training - Biomass sector - None (jobs)		13,142	14,575	17,029	18,260	20,980	37,999

Table 35: E+RE+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Biomass sector - Up to 1 year (jobs)		57,121	62,494	71,072	71,076	76,689	138,249
On-Site or In-Plant Training - Biomass sector - 1 to 4 years (jobs)		8,227	9,032	10,798	11,784	13,705	25,340
On-Site or In-Plant Training - Biomass sector - 4 to 10 years (jobs)		2,556	2,763	3,401	3,988	4,919	9,426
On-Site or In-Plant Training - Biomass sector - Over 10 years (jobs)		572	605	679	668	712	1,355
On-Site or In-Plant Training - CO2 sector - None (jobs)		0	0.002	0.002	0.003	0.003	0.002
On-Site or In-Plant Training - CO2 sector - Up to 1 year (jobs)		0.001	0.008	0.007	0.01	0.012	0.007
On-Site or In-Plant Training - CO2 sector - 1 to 4 years (jobs)		0	0.002	0.002	0.002	0.003	0.002
On-Site or In-Plant Training - CO2 sector - 4 to 10 years (jobs)		0	0.001	0.001	0.001	0.001	0.001
On-Site or In-Plant Training - CO2 sector - Over 10 years (jobs)		0	0	0	0	0	0
On-Site or In-Plant Training - Coal sector - None (jobs)		10,986	2,917	1,406	1,239	1,134	957
On-Site or In-Plant Training - Coal sector - Up to 1 year (jobs)		47,210	13,101	7,354	6,336	5,665	4,674
On-Site or In-Plant Training - Coal sector - 1 to 4 years (jobs)		11,633	3,188	1,585	1,363	1,217	1,005
On-Site or In-Plant Training - Coal sector - 4 to 10 years (jobs)		4,427	1,140	427	366	326	268
On-Site or In-Plant Training - Coal sector - Over 10 years (jobs)		532	135	47	41.4	38	32.2
On-Site or In-Plant Training - Grid sector - None (jobs)		82,350	116,798	207,385	276,186	374,066	536,612
On-Site or In-Plant Training - Grid sector - Up to 1 year (jobs)		318,680	453,033	806,225	1,076,112	1,460,722	2,100,066
On-Site or In-Plant Training - Grid sector - 1 to 4 years (jobs)		93,401	132,938	236,853	316,488	430,052	618,898
On-Site or In-Plant Training - Grid sector - 4 to 10 years (jobs)		41,021	58,372	103,975	138,899	188,692	271,479
On-Site or In-Plant Training - Grid sector - Over 10 years (jobs)		5,317	7,562	13,462	17,973	24,400	35,083
On-Site or In-Plant Training - Natural gas sector - None (jobs)		85,997	68,068	49,491	40,303	27,179	20,634
On-Site or In-Plant Training - Natural gas sector - Up to 1 year (jobs)		317,869	252,506	183,598	148,507	99,407	74,103
On-Site or In-Plant Training - Natural gas sector - 1 to 4 years (jobs)		91,008	72,717	53,365	43,919	29,964	23,136
On-Site or In-Plant Training - Natural gas sector - 4 to 10 years (jobs)		40,405	32,509	24,091	20,136	13,945	11,033
On-Site or In-Plant Training - Natural gas sector - Over 10 years (jobs)		4,794	3,885	2,913	2,474	1,732	1,384
On-Site or In-Plant Training - Nuclear sector - None (jobs)		8,736	7,981	6,348	4,336	2,581	727
On-Site or In-Plant Training - Nuclear sector - Up to 1 year (jobs)		30,016	27,447	21,851	14,939	8,901	2,508
On-Site or In-Plant Training - Nuclear sector - 1 to 4 years (jobs)		7,202	6,594	5,256	3,598	2,146	605
On-Site or In-Plant Training - Nuclear sector - 4 to 10 years (jobs)		2,607	2,386	1,901	1,301	776	219
On-Site or In-Plant Training - Nuclear sector - Over 10 years (jobs)		244	223	178	122	72.4	20.4
On-Site or In-Plant Training - Oil sector - None (jobs)		127,228	110,514	92,040	61,993	38,270	6,123

Table 35: *E+RE+ scenario - IMPACTS - Jobs (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Oil sector - Up to 1 year (jobs)		500,887	438,320	367,823	249,700	155,369	25,065
On-Site or In-Plant Training - Oil sector - 1 to 4 years (jobs)		116,435	102,317	86,241	58,766	36,712	5,954
On-Site or In-Plant Training - Oil sector - 4 to 10 years (jobs)		41,055	36,334	30,828	21,174	13,322	2,156
On-Site or In-Plant Training - Oil sector - Over 10 years (jobs)		4,547	4,098	3,539	2,472	1,580	261
On-Site or In-Plant Training - Solar PV sector - None (jobs)		72,537	103,988	159,601	180,293	231,221	330,565
On-Site or In-Plant Training - Solar PV sector - Up to 1 year (jobs)		249,259	357,492	548,218	617,371	791,134	1,129,844
On-Site or In-Plant Training - Solar PV sector - 1 to 4 years (jobs)		70,100	99,606	151,718	170,383	216,840	307,724
On-Site or In-Plant Training - Solar PV sector - 4 to 10 years (jobs)		29,859	41,935	63,621	72,114	91,431	129,506
On-Site or In-Plant Training - Solar PV sector - Over 10 years (jobs)		3,595	5,104	7,780	8,763	11,162	15,861
On-Site or In-Plant Training - Wind sector - None (jobs)		41,673	73,080	124,952	170,956	227,855	320,848
On-Site or In-Plant Training - Wind sector - Up to 1 year (jobs)		142,207	248,582	424,101	574,971	762,089	1,071,871
On-Site or In-Plant Training - Wind sector - 1 to 4 years (jobs)		38,076	66,342	112,670	153,321	203,044	283,998
On-Site or In-Plant Training - Wind sector - 4 to 10 years (jobs)		15,291	26,826	45,632	64,437	86,916	121,287
On-Site or In-Plant Training - Wind sector - Over 10 years (jobs)		1,999	3,495	5,952	8,189	10,921	15,308
Wage income - Biomass (million \$2019)		4,220	4,744	5,634	6,202	7,310	13,618
Wage income - CO2 (million \$2019)		0	0.001	0.001	0.001	0.002	0.001
Wage income - Coal (million \$2019)		4,510	1,225	602	528	482	406
Wage income - Grid (million \$2019)		33,819	48,716	87,884	118,958	163,816	239,026
Wage income - Natural Gas (million \$2019)		35,783	28,853	21,290	17,465	11,852	8,946
Wage income - Nuclear (million \$2019)		3,489	3,266	2,664	1,867	1,141	330
Wage income - Oil (million \$2019)		52,019	46,147	39,272	26,986	17,009	2,804
Wage income - Solar (million \$2019)		23,931	34,700	53,960	61,913	80,598	117,098
Wage income - Wind (million \$2019)		14,261	25,404	44,115	61,776	84,062	120,435

Table 36: *E+RE+ scenario - IMPACTS - Fossil fuel industries*

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		5,925	5,139	3,984	2,776	1,608	0.837
Oil consumption - Cumulative (million bbls)							115,785
Oil production - Annual (million bbls)		5,198	5,216	5,078	3,797	2,654	583
Oil production - Cumulative (million bbls)							125,883
Natural gas consumption - Annual (tcf)		22,299	18,474	12,539	8,059	4,669	3,040
Natural gas consumption - Cumulative (tcf)							408,044
Natural gas production - Annual (tcf)		35,349	33,543	27,543	22,024	15,809	9,807
Natural gas production - Cumulative (tcf)							798,868

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	27,996	26,390	23,464	19,872	16,608	14,565	13,649
Final energy use - Residential (PJ)	11,788	11,090	10,221	8,966	7,776	6,967	6,512
Final energy use - Commercial (PJ)	9,015	8,942	8,619	8,103	7,608	7,344	7,297
Final energy use - Industry (PJ)	25,107	26,056	26,110	25,372	25,108	24,870	24,572

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		182	187	336	359	314	329

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	4.41	16.7	48.7	82.7	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.1	76.3	46.4	15.6	3.17	0.586	0
Vehicle sales - Light-duty - hybrid (%)	4.91	4.89	3.38	1.24	0.304	0.067	0
Vehicle sales - Light-duty - diesel (%)	1.4	1.68	1.2	0.382	0.072	0.013	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.331	0.191	0.059	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.095	0.091	0.058	0.02	0.004	0.001	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 - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0
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
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		51,477	133,974	213,805	325,180	352,492	336,852
Public EV charging plugs - DC Fast (1000 units)	14.4		93.9		391		628
Public EV charging plugs - L2 (1000 units)	66.2		2,256		9,394		15,098

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	14.6	27.2	64.4	85	88	88.1	88.1
Sales of space heating units - Electric Resistance (%)	20.3	22.6	12.3	8.07	7.57	7.66	7.68
Sales of space heating units - Gas (%)	55.2	36.9	17.1	3.52	1.45	1.32	1.3
Sales of space heating units - Fossil (%)	9.95	13.2	6.18	3.41	3.02	2.91	2.9
Sales of water heating units - Electric Heat Pump (%)	0	7.44	41.8	56.2	58.5	59.2	59
Sales of water heating units - Electric Resistance (%)	38.4	49.2	38.5	39.8	39.9	39.3	39.5
Sales of water heating units - Gas Furnace (%)	58	40.9	18	2.56	0.155	0.003	0
Sales of water heating units - Other (%)	3.58	2.47	1.63	1.47	1.51	1.54	1.53
Sales of cooking units - Electric Resistance (%)	61.3	69.6	94.8	99.7	100	100	100
Sales of cooking units - Gas (%)	38.7	30.4	5.2	0.262	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		254	307				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	2.95	17.6	52.9	76.9	80.6	80.8	80.8

Table 41: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Resistance (%)	7.91	9.07	14.4	17.7	18.4	18.4	18.4
Sales of space heating units - Gas Furnace (%)	85.2	70.1	32.1	5.37	1.07	0.82	0.817
Sales of space heating units - Fossil (%)	3.94	3.28	0.655	0.028	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.385	7.96	43.3	59.2	61.2	61.3	61.3
Sales of water heating units - Electric Resistance (%)	3.8	7.16	24	35.7	37.5	37.6	37.6
Sales of water heating units - Gas Furnace (%)	94.1	83.3	31.5	4.03	0.235	0.003	0
Sales of water heating units - Other (%)	1.66	1.59	1.2	1.1	1.1	1.11	1.11
Sales of cooking units - Electric Resistance (%)	32.5	46.4	80	86.6	87	87	87
Sales of cooking units - Gas (%)	67.5	53.6	20	13.4	13	13	13
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,047,657	1,162,511				

Table 42: E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed - Onshore wind (MW)	97,803	200,500	386,229	693,913	1,069,220	1,521,230	2,186,500
Installed - Offshore wind (MW)	29.3	1,026	4,957	36,176	99,902	227,465	457,951
Installed - Rooftop PV (MW)	33,317	52,523	69,448	90,809	117,114	148,351	185,890
Installed - Utility-scale PV (MW)	35,099	150,447	361,210	725,568	1,120,211	1,665,399	2,454,547
Installed - Hydro (MW)	78,608	78,608	78,608	78,608	78,608	78,608	78,608
Installed - Geothermal (MW)	2,390	2,394	2,414	2,426	2,428	2,457	4,871
Installed - Nuclear (MW)	98,501	94,063	83,809	56,742	41,522	14,825	0
Installed - Ccgt & gas steam (MW)	334,781	312,898	343,874	346,127	273,137	203,281	171,091
Installed - Ccgt w cc (MW)	0	0	77.3	164	233	304	331
Installed - Ct (MW)	146,242	137,398	142,744	165,901	204,190	319,096	515,962
Installed - Biomass (MW)	10,003	9,140	7,854	6,156	4,735	3,409	2,488
Installed - Biomass w cc (MW)	0	0	29.9	54.6	85.8	108	150
Installed - Coal (MW)	216,076	60,056	185	104	84.5	61	26.1
Installed - Other (MW)	68,093	57,211	55,709	54,353	52,339	51,350	40,191
Installed - Grid battery storage (MW)		987	11,630	42,944	105,233	143,960	186,175
Installed - Pumped hydro storage (MW)		19,418	19,418	19,418	19,418	19,418	19,418

Table 43: E+RE+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Onshore wind (TWh)	413	816	1,593	2,720	4,109	5,852	8,245
Offshore wind (TWh)	0.092	3.82	20.2	183	437	978	1,833
Rooftop PV (TWh)	50.1	79.4	101	126	165	208	249
Utility-scale PV (TWh)	89.6	362	825	1,615	2,438	3,648	5,253
Hydro (TWh)	300	312	295	294	300	291	291
Geothermal (TWh)	14.5	14.5	14.1	14.2	13.7	13.5	25.7
Nuclear (TWh)	802	766	683	462	338	121	0
Gas (TWh)	1,489	1,589	1,262	737	422	151	51.9
Gas w cc (TWh)	0	0	0.154	0.216	0.297	0.344	0.23
Biomass (TWh)	18.8	17.7	39	29.3	21.4	15.2	0.108
Biomass w cc (TWh)	0	0	0.079	0.098	0.188	0.358	0.556
Coal (TWh)	981	328	0.647	0.364	0.296	0.214	0.092

Table 44: E+RE+ scenario - PILLAR 2: Clean Electricity - Transmission

Item	2020	2025	2030	2035	2040	2045	2050
Total HV transmission (for wind and solar) - Base (percent of 2020)	0	0.293	0.731	1.41	2.36	3.84	4.07

Table 45: E+RE+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass input - Biopower (1000 tonnes)	11,647	16,788	55,652	45,494	37,066	28,898	161
Biomass input - Biopower w/ cc (1000 tonnes)	0	0	47.7	51.6	99.5	192	292
Biomass input - BECCS-H2 (1000 tonnes)	0	0	0	2.28	19,065	118,177	120,886
Biomass input - FT diesel (1000 tonnes)	0	0	0	158	201	193	104
Biomass input - Bio-FT w/ CC (1000 tonnes)	0	0	0	67.5	112	276	352
Biomass input - Pyrolysis liquids (1000 tonnes)	0	0	0	64,735	133,702	142,225	140,053
Biomass input - Pyrolysis liquids w/ cc (1000 tonnes)	0	0	0	65.4	117	7,078	142,580
Biomass input - SNG (1000 tonnes)	0	9.34	18.9	26	25.6	52.2	8.78
Biomass input - Bio-SNG w/ CC (1000 tonnes)	0	0	9.39	4.81	7.06	45.5	179,016
Biomass input - Ethanol (1000 tonnes)	129,506	129,506	129,536	125,006	67,634	10,261	905

Table 46: E+RE+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-24,500
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-14,000
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-116,000
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-29,000
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-100,000
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-21,000
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-121,000
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-20,000
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-60,000
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							505,500
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-36,700
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-49,000
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-209,000
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-42,500
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							200,000
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-40,500

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-181,500
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-142,000
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-119,000
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							1,020,200
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-48,900
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-84,000
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-302,000
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-57,000
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							300,000
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-60,000
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-242,000
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							264,000
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							-
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,535,900
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							-178,000
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							4,000
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							10,677
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							59,000
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							10,500
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							0
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,000
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8,000
							1,300
							35,700
							132,177
							6,000

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							11,025
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							106,500
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							15,800
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							4,350
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							12,000
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							9,400
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							71,900
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							236,975
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8,000
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							11,373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							154,000
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							21,000
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 (1000 hectares)							5,700
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							16,000
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							7,500
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							59,000
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							282,573

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-23,286



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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-106,430
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3,696
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-133,412
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-23,286
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-203,503
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-7,391
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-234,180
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							11,287
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							71,390
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							6,375
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							89,052
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							11,287
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							136,405
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							12,749
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							160,442

Table 49: E+RE+ scenario - PILLAR 6: Land sinks - Total assumed land sink

Item	2020	2025	2030	2035	2040	2045	2050
Total assumed land sink (Gt CO2e/y)	-0.7	-0.73	-0.75	-0.78	-0.8	-0.83	-0.85

Table 50: E+RE- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		2,559	3.33	3.2	2.73	1.88	0.14
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		1,477	944	1,055	933	440	111
Premature deaths from air pollution - Mobile - On-Road (deaths)		11,515	10,889	8,385	4,910	2,254	876
Premature deaths from air pollution - Gas Stations (deaths)		665	617	470	280	135	61.8

Table 50: E+RE- scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		2,159	1,816	1,245	700	333	129
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		554	452	311	182	82.3	26.9
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		195	180	142	98.2	57.5	31.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		105	101	96	90.9	85.7	80.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		1,436	1,305	1,006	665	403	222
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		352	292	221	153	106	73.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		170	144	119	94.1	69.7	46.2
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		74.6	41.7	41	39.9	40.1	36.7
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		3,872	3,753	3,693	3,183	2,682	2,016
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		22,684	29.5	28.4	24.2	16.7	1.24
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		13,081	8,360	9,347	8,269	3,897	985
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		102,386	96,814	74,557	43,657	20,044	7,790
Monetary damages from air pollution - Gas Stations (million \$2019)		5,886	5,467	4,160	2,477	1,197	547
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		19,136	16,089	11,036	6,207	2,952	1,145
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4,909	4,009	2,756	1,617	729	238
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1,731	1,592	1,261	870	509	277
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		932	892	850	805	758	709
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		12,710	11,555	8,907	5,887	3,569	1,962
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		3,117	2,585	1,954	1,351	939	647
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		1,502	1,275	1,054	833	617	409
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		658	368	362	352	353	324

Table 50: *E+RE- scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		34,386	33,323	32,793	28,267	23,819	17,906

Table 51: *E+RE- scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		32,312	43,254	55,699	47,806	40,069	47,266
By economic sector - Construction (jobs)		554,870	609,561	678,377	709,984	731,053	840,030
By economic sector - Manufacturing (jobs)		386,301	367,722	373,338	349,158	305,869	287,281
By economic sector - Mining (jobs)		462,328	364,057	291,916	202,222	144,611	95,196
By economic sector - Other (jobs)		52,365	57,496	70,560	84,193	94,803	129,339
By economic sector - Pipeline (jobs)		47,529	56,650	51,074	38,386	34,708	36,901
By economic sector - Professional (jobs)		315,421	328,609	383,613	428,340	460,769	535,549
By economic sector - Trade (jobs)		290,288	274,110	284,445	284,438	286,595	320,839
By economic sector - Utilities (jobs)		459,157	526,078	637,006	735,494	826,322	1,006,835
By resource sector - Biomass (jobs)		82,054	103,170	159,818	159,067	157,610	200,816
By resource sector - CO2 (jobs)		8,025	122,978	106,414	50,282	76,142	143,768
By resource sector - Coal (jobs)		66,513	18,419	10,825	9,372	8,418	6,947
By resource sector - Grid (jobs)		493,267	565,515	806,588	957,195	1,015,527	1,113,871
By resource sector - Natural Gas (jobs)		579,492	505,649	449,332	435,553	364,642	300,788
By resource sector - Nuclear (jobs)		49,021	58,304	86,624	137,752	227,680	377,149
By resource sector - Oil (jobs)		790,028	693,931	596,610	431,475	326,913	229,514
By resource sector - Solar (jobs)		337,083	326,894	357,780	387,255	409,756	583,913
By resource sector - Wind (jobs)		195,088	232,677	252,039	312,070	338,111	342,470
By education level - All sectors - High school diploma or less (jobs)		1,080,553	1,100,427	1,188,823	1,202,053	1,208,758	1,358,342
By education level - All sectors - Associates degree or some college (jobs)		777,598	795,657	861,642	889,831	909,477	1,029,254
By education level - All sectors - Bachelors degree (jobs)		581,908	572,577	605,119	612,392	624,402	703,407
By education level - All sectors - Masters or professional degree (jobs)		140,259	138,827	148,726	153,018	158,274	180,608
By education level - All sectors - Doctoral degree (jobs)		20,254	20,048	21,719	22,728	23,889	27,627
By education level - Biomass sector - High school diploma or less (jobs)		47,821	60,096	85,822	79,460	73,172	91,357
By education level - Biomass sector - Associates degree or some college (jobs)		15,585	19,605	32,904	34,187	35,394	45,925
By education level - Biomass sector - Bachelors degree (jobs)		14,089	17,574	30,605	33,633	36,161	46,832
By education level - Biomass sector - Masters or professional degree (jobs)		3,878	4,982	8,752	9,750	10,586	13,711
By education level - Biomass sector - Doctoral degree (jobs)		682	913	1,736	2,038	2,297	2,992
By education level - CO2 sector - High school diploma or less (jobs)		3,476	53,796	46,155	21,475	32,628	62,868
By education level - CO2 sector - Associates degree or some college (jobs)		2,815	43,524	37,197	17,230	26,131	50,333
By education level - CO2 sector - Bachelors degree (jobs)		1,395	20,717	18,544	9,251	13,901	24,619
By education level - CO2 sector - Masters or professional degree (jobs)		311	4,559	4,139	2,109	3,160	5,456
By education level - CO2 sector - Doctoral degree (jobs)		27.8	380	378	217	322	491
By education level - Coal sector - High school diploma or less (jobs)		28,741	8,731	5,749	4,896	4,322	3,507
By education level - Coal sector - Associates degree or some college (jobs)		20,558	5,466	2,968	2,579	2,324	1,926

Table 51: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Coal sector - Bachelors degree (jobs)		13,402	3,303	1,688	1,517	1,413	1,203
By education level - Coal sector - Masters or professional degree (jobs)		3,317	801	369	334	313	270
By education level - Coal sector - Doctoral degree (jobs)		496	118	51.4	47.9	46.1	40.8
By education level - Grid sector - High school diploma or less (jobs)		209,380	241,183	345,603	412,022	439,116	483,799
By education level - Grid sector - Associates degree or some college (jobs)		163,739	187,663	267,568	317,401	336,596	369,015
By education level - Grid sector - Bachelors degree (jobs)		93,832	106,840	151,351	178,405	188,015	204,861
By education level - Grid sector - Masters or professional degree (jobs)		23,611	26,800	37,849	44,479	46,735	50,771
By education level - Grid sector - Doctoral degree (jobs)		2,705	3,029	4,218	4,888	5,065	5,426
By education level - Natural gas sector - High school diploma or less (jobs)		227,718	199,738	178,905	173,713	145,948	120,878
By education level - Natural gas sector - Associates degree or some college (jobs)		186,211	163,836	146,374	143,998	121,468	101,198
By education level - Natural gas sector - Bachelors degree (jobs)		129,532	111,273	97,318	92,498	76,385	61,909
By education level - Natural gas sector - Masters or professional degree (jobs)		31,729	27,137	23,572	22,376	18,417	14,876
By education level - Natural gas sector - Doctoral degree (jobs)		4,301	3,664	3,163	2,968	2,424	1,927
By education level - Nuclear sector - High school diploma or less (jobs)		16,616	19,820	29,531	47,092	78,048	129,633
By education level - Nuclear sector - Associates degree or some college (jobs)		13,385	15,924	23,664	37,641	62,228	103,105
By education level - Nuclear sector - Bachelors degree (jobs)		14,469	17,172	25,459	40,401	66,637	110,157
By education level - Nuclear sector - Masters or professional degree (jobs)		3,916	4,640	6,868	10,880	17,916	29,569
By education level - Nuclear sector - Doctoral degree (jobs)		634	748	1,102	1,739	2,851	4,685
By education level - Oil sector - High school diploma or less (jobs)		317,630	281,307	243,628	178,020	136,250	96,881
By education level - Oil sector - Associates degree or some college (jobs)		205,502	181,086	156,218	113,373	86,209	60,753
By education level - Oil sector - Bachelors degree (jobs)		211,973	183,998	156,433	111,469	83,191	57,319
By education level - Oil sector - Masters or professional degree (jobs)		48,075	41,558	35,208	24,944	18,510	12,658
By education level - Oil sector - Doctoral degree (jobs)		6,848	5,981	5,123	3,669	2,753	1,903
By education level - Solar PV sector - High school diploma or less (jobs)		151,368	145,175	157,032	167,902	175,462	246,887
By education level - Solar PV sector - Associates degree or some college (jobs)		108,003	104,868	114,943	124,604	132,058	188,521
By education level - Solar PV sector - Bachelors degree (jobs)		60,585	59,637	66,259	72,859	78,338	113,405
By education level - Solar PV sector - Masters or professional degree (jobs)		14,570	14,620	16,572	18,539	20,227	29,694
By education level - Solar PV sector - Doctoral degree (jobs)		2,558	2,594	2,974	3,351	3,671	5,406
By education level - Wind sector - High school diploma or less (jobs)		77,804	90,581	96,399	117,473	123,812	122,531
By education level - Wind sector - Associates degree or some college (jobs)		61,801	73,684	79,806	98,817	107,068	108,478

Table 51: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Wind sector - Bachelors degree (jobs)		42,631	52,063	57,462	72,361	80,360	83,103
By education level - Wind sector - Masters or professional degree (jobs)		10,852	13,730	15,398	19,608	22,411	23,603
By education level - Wind sector - Doctoral degree (jobs)		2,001	2,620	2,974	3,811	4,460	4,755
Related work experience - All sectors - None (jobs)		369,258	376,894	407,525	415,548	421,231	475,645
Related work experience - All sectors - Up to 1 year (jobs)		509,809	516,411	559,743	568,875	574,705	652,329
Related work experience - All sectors - 1 to 4 years (jobs)		950,554	956,858	1,026,212	1,044,900	1,061,932	1,194,758
Related work experience - All sectors - 4 to 10 years (jobs)		605,893	612,494	656,916	672,114	685,447	772,593
Related work experience - All sectors - Over 10 years (jobs)		165,058	164,879	175,633	178,584	181,485	203,912
Related work experience - Biomass sector - None (jobs)		13,956	17,458	25,959	24,936	23,845	30,064
Related work experience - Biomass sector - Up to 1 year (jobs)		27,570	33,760	47,881	44,406	40,793	51,252
Related work experience - Biomass sector - 1 to 4 years (jobs)		24,432	31,802	51,686	53,347	54,747	69,875
Related work experience - Biomass sector - 4 to 10 years (jobs)		12,623	15,902	27,189	28,912	30,450	39,488
Related work experience - Biomass sector - Over 10 years (jobs)		3,473	4,247	7,104	7,467	7,776	10,138
Related work experience - CO2 sector - None (jobs)		1,242	19,156	16,427	7,651	11,598	22,218
Related work experience - CO2 sector - Up to 1 year (jobs)		1,441	22,184	19,195	9,051	13,744	26,151
Related work experience - CO2 sector - 1 to 4 years (jobs)		2,869	43,804	38,025	18,068	27,328	51,225
Related work experience - CO2 sector - 4 to 10 years (jobs)		1,986	30,448	26,294	12,390	18,757	35,478
Related work experience - CO2 sector - Over 10 years (jobs)		488	7,386	6,473	3,122	4,715	8,696
Related work experience - Coal sector - None (jobs)		9,056	2,422	1,346	1,166	1,047	864
Related work experience - Coal sector - Up to 1 year (jobs)		13,581	4,133	2,742	2,352	2,093	1,712
Related work experience - Coal sector - 1 to 4 years (jobs)		25,218	7,000	4,140	3,577	3,205	2,638
Related work experience - Coal sector - 4 to 10 years (jobs)		14,899	3,852	2,035	1,784	1,622	1,354
Related work experience - Coal sector - Over 10 years (jobs)		3,759	1,011	561	494	452	380
Related work experience - Grid sector - None (jobs)		73,264	84,059	119,978	142,475	151,250	165,992
Related work experience - Grid sector - Up to 1 year (jobs)		94,446	108,610	155,385	184,968	196,850	216,587
Related work experience - Grid sector - 1 to 4 years (jobs)		178,368	204,334	291,214	345,323	366,086	401,232
Related work experience - Grid sector - 4 to 10 years (jobs)		116,891	133,809	190,562	225,802	239,199	261,965
Related work experience - Grid sector - Over 10 years (jobs)		30,298	34,702	49,449	58,626	62,141	68,096
Related work experience - Natural gas sector - None (jobs)		83,936	73,667	65,770	64,307	54,109	44,918
Related work experience - Natural gas sector - Up to 1 year (jobs)		100,806	87,791	78,010	75,381	63,035	51,984

Table 51: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - Natural gas sector - 1 to 4 years (jobs)		213,832	186,439	165,531	160,160	133,948	110,276
Related work experience - Natural gas sector - 4 to 10 years (jobs)		142,303	124,309	110,468	107,416	90,030	74,386
Related work experience - Natural gas sector - Over 10 years (jobs)		38,614	33,442	29,553	28,288	23,520	19,223
Related work experience - Nuclear sector - None (jobs)		6,179	7,357	10,942	17,418	28,818	47,783
Related work experience - Nuclear sector - Up to 1 year (jobs)		9,021	10,736	15,960	25,396	42,000	69,615
Related work experience - Nuclear sector - 1 to 4 years (jobs)		18,297	21,755	32,311	51,364	84,868	140,538
Related work experience - Nuclear sector - 4 to 10 years (jobs)		11,870	14,110	20,953	33,302	55,013	91,083
Related work experience - Nuclear sector - Over 10 years (jobs)		3,654	4,347	6,459	10,272	16,980	28,130
Related work experience - Oil sector - None (jobs)		106,461	93,826	80,890	58,777	44,741	31,613
Related work experience - Oil sector - Up to 1 year (jobs)		147,290	129,295	110,970	80,353	60,948	42,966
Related work experience - Oil sector - 1 to 4 years (jobs)		301,062	264,533	227,572	164,527	124,608	87,357
Related work experience - Oil sector - 4 to 10 years (jobs)		182,677	160,250	137,651	99,336	75,102	52,553
Related work experience - Oil sector - Over 10 years (jobs)		52,538	46,027	39,527	28,482	21,514	15,025
Related work experience - Solar PV sector - None (jobs)		48,601	47,289	51,958	56,448	59,943	85,749
Related work experience - Solar PV sector - Up to 1 year (jobs)		75,382	72,632	78,944	84,838	89,118	126,053
Related work experience - Solar PV sector - 1 to 4 years (jobs)		117,134	114,009	125,266	136,119	144,591	206,863
Related work experience - Solar PV sector - 4 to 10 years (jobs)		76,266	74,001	81,041	87,743	92,845	132,301
Related work experience - Solar PV sector - Over 10 years (jobs)		19,699	18,963	20,572	22,107	23,258	32,947
Related work experience - Wind sector - None (jobs)		26,563	31,658	34,255	42,371	45,879	46,444
Related work experience - Wind sector - Up to 1 year (jobs)		40,271	47,269	50,655	62,130	66,125	66,009
Related work experience - Wind sector - 1 to 4 years (jobs)		69,341	83,183	90,469	112,414	122,550	124,754
Related work experience - Wind sector - 4 to 10 years (jobs)		46,377	55,813	60,723	75,430	82,428	83,985
Related work experience - Wind sector - Over 10 years (jobs)		12,535	14,754	15,937	19,725	21,129	21,277
On-the-Job Training - All sectors - None (jobs)		145,365	144,519	154,184	156,663	159,848	182,644
On-the-Job Training - All sectors - Up to 1 year (jobs)		1,742,212	1,749,227	1,878,141	1,904,964	1,927,382	2,168,704
On-the-Job Training - All sectors - 1 to 4 years (jobs)		528,955	541,194	583,816	600,348	613,281	692,691
On-the-Job Training - All sectors - 4 to 10 years (jobs)		158,937	167,392	183,321	191,282	197,277	224,671
On-the-Job Training - All sectors - Over 10 years (jobs)		25,102	25,204	26,568	26,765	27,011	30,526
On-the-Job Training - Biomass sector - None (jobs)		5,063	6,073	9,513	9,580	9,548	12,238
On-the-Job Training - Biomass sector - Up to 1 year (jobs)		65,325	82,070	124,373	122,328	119,606	151,505

Table 51: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Biomass sector - 1 to 4 years (jobs)		9,019	11,632	19,857	20,755	21,679	28,149
On-the-Job Training - Biomass sector - 4 to 10 years (jobs)		2,062	2,704	4,989	5,335	5,720	7,539
On-the-Job Training - Biomass sector - Over 10 years (jobs)		586	690	1,086	1,071	1,057	1,386
On-the-Job Training - CO2 sector - None (jobs)		376	5,694	5,014	2,434	3,680	6,766
On-the-Job Training - CO2 sector - Up to 1 year (jobs)		4,860	73,964	64,514	30,878	46,684	86,891
On-the-Job Training - CO2 sector - 1 to 4 years (jobs)		1,973	30,531	26,093	12,082	18,335	35,372
On-the-Job Training - CO2 sector - 4 to 10 years (jobs)		736	11,550	9,721	4,383	6,676	13,273
On-the-Job Training - CO2 sector - Over 10 years (jobs)		80.3	1,238	1,072	505	768	1,466
On-the-Job Training - Coal sector - None (jobs)		3,285	870	503	442	403	337
On-the-Job Training - Coal sector - Up to 1 year (jobs)		45,563	12,917	7,933	6,868	6,168	5,088
On-the-Job Training - Coal sector - 1 to 4 years (jobs)		13,265	3,547	1,899	1,641	1,470	1,214
On-the-Job Training - Coal sector - 4 to 10 years (jobs)		3,950	962	419	359	318	259
On-the-Job Training - Coal sector - Over 10 years (jobs)		450	123	70.1	62.6	58.1	49.7
On-the-Job Training - Grid sector - None (jobs)		24,141	27,638	39,368	46,660	49,444	54,172
On-the-Job Training - Grid sector - Up to 1 year (jobs)		316,710	362,957	517,491	613,900	651,093	713,918
On-the-Job Training - Grid sector - 1 to 4 years (jobs)		110,805	127,133	181,460	215,489	228,766	251,069
On-the-Job Training - Grid sector - 4 to 10 years (jobs)		37,658	43,246	61,782	73,432	78,024	85,703
On-the-Job Training - Grid sector - Over 10 years (jobs)		3,953	4,541	6,488	7,714	8,199	9,009
On-the-Job Training - Natural gas sector - None (jobs)		30,220	25,985	22,796	21,727	17,984	14,663
On-the-Job Training - Natural gas sector - Up to 1 year (jobs)		373,945	325,379	288,474	278,083	232,133	190,597
On-the-Job Training - Natural gas sector - 1 to 4 years (jobs)		128,500	112,783	100,700	98,631	83,035	69,060
On-the-Job Training - Natural gas sector - 4 to 10 years (jobs)		41,324	36,725	33,119	33,043	28,098	23,679
On-the-Job Training - Natural gas sector - Over 10 years (jobs)		5,503	4,776	4,243	4,069	3,392	2,789
On-the-Job Training - Nuclear sector - None (jobs)		3,292	3,914	5,813	9,240	15,267	25,278
On-the-Job Training - Nuclear sector - Up to 1 year (jobs)		33,439	39,757	59,046	93,862	155,082	256,799
On-the-Job Training - Nuclear sector - 1 to 4 years (jobs)		9,491	11,300	16,806	26,754	44,264	73,396
On-the-Job Training - Nuclear sector - 4 to 10 years (jobs)		2,289	2,726	4,054	6,455	10,682	17,715
On-the-Job Training - Nuclear sector - Over 10 years (jobs)		510	608	905	1,441	2,386	3,960
On-the-Job Training - Oil sector - None (jobs)		48,067	41,572	35,155	25,043	18,687	12,944
On-the-Job Training - Oil sector - Up to 1 year (jobs)		556,244	488,514	419,941	303,640	229,994	161,382

Table 51: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Oil sector - 1 to 4 years (jobs)		143,995	126,810	109,358	79,262	60,197	42,346
On-the-Job Training - Oil sector - 4 to 10 years (jobs)		34,009	30,239	26,292	19,275	14,800	10,561
On-the-Job Training - Oil sector - Over 10 years (jobs)		7,713	6,796	5,864	4,255	3,235	2,281
On-the-Job Training - Solar PV sector - None (jobs)		19,935	19,514	21,577	23,576	25,163	36,171
On-the-Job Training - Solar PV sector - Up to 1 year (jobs)		217,115	210,681	230,654	249,955	264,981	378,330
On-the-Job Training - Solar PV sector - 1 to 4 years (jobs)		71,505	69,093	75,359	81,207	85,485	121,188
On-the-Job Training - Solar PV sector - 4 to 10 years (jobs)		24,449	23,737	26,060	28,159	29,630	41,984
On-the-Job Training - Solar PV sector - Over 10 years (jobs)		4,079	3,868	4,130	4,358	4,496	6,239
On-the-Job Training - Wind sector - None (jobs)		10,987	13,258	14,444	17,960	19,672	20,074
On-the-Job Training - Wind sector - Up to 1 year (jobs)		129,010	152,989	165,716	205,450	221,641	224,195
On-the-Job Training - Wind sector - 1 to 4 years (jobs)		40,403	48,365	52,284	64,529	70,050	70,896
On-the-Job Training - Wind sector - 4 to 10 years (jobs)		12,459	15,503	16,883	20,842	23,330	23,957
On-the-Job Training - Wind sector - Over 10 years (jobs)		2,228	2,562	2,711	3,289	3,418	3,347
On-Site or In-Plant Training - All sectors - None (jobs)		419,120	422,336	453,734	464,129	473,687	538,264
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		1,579,000	1,586,141	1,703,097	1,727,901	1,748,723	1,968,004
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		413,482	421,968	454,858	466,218	474,912	535,412
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		168,532	175,634	190,784	197,316	202,549	229,508
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		20,437	21,457	23,557	24,458	24,928	28,048
On-Site or In-Plant Training - Biomass sector - None (jobs)		13,221	17,052	27,270	27,875	28,306	36,043
On-Site or In-Plant Training - Biomass sector - Up to 1 year (jobs)		57,434	71,657	108,430	106,373	103,753	131,625
On-Site or In-Plant Training - Biomass sector - 1 to 4 years (jobs)		8,269	10,558	17,339	17,726	18,126	23,389
On-Site or In-Plant Training - Biomass sector - 4 to 10 years (jobs)		2,558	3,232	5,758	6,103	6,468	8,510
On-Site or In-Plant Training - Biomass sector - Over 10 years (jobs)		572	670	1,022	990	957	1,250
On-Site or In-Plant Training - CO2 sector - None (jobs)		1,228	18,743	16,306	7,771	11,762	22,020
On-Site or In-Plant Training - CO2 sector - Up to 1 year (jobs)		4,497	68,533	59,677	28,487	43,083	80,432
On-Site or In-Plant Training - CO2 sector - 1 to 4 years (jobs)		1,483	22,923	19,621	9,107	13,819	26,600
On-Site or In-Plant Training - CO2 sector - 4 to 10 years (jobs)		731	11,419	9,664	4,399	6,691	13,161
On-Site or In-Plant Training - CO2 sector - Over 10 years (jobs)		86.9	1,358	1,145	518	788	1,555
On-Site or In-Plant Training - Coal sector - None (jobs)		9,841	2,576	1,407	1,243	1,140	959
On-Site or In-Plant Training - Coal sector - Up to 1 year (jobs)		41,734	11,915	7,358	6,353	5,689	4,680



Table 51: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Coal sector - 1 to 4 years (jobs)		10,419	2,840	1,585	1,367	1,223	1,007
On-Site or In-Plant Training - Coal sector - 4 to 10 years (jobs)		4,032	975	427	368	328	269
On-Site or In-Plant Training - Coal sector - Over 10 years (jobs)		487	114	47	41.6	38.2	32.3
On-Site or In-Plant Training - Grid sector - None (jobs)		75,116	85,926	122,285	144,805	153,303	167,797
On-Site or In-Plant Training - Grid sector - Up to 1 year (jobs)		290,687	333,284	475,395	564,207	598,645	656,685
On-Site or In-Plant Training - Grid sector - 1 to 4 years (jobs)		85,197	97,799	139,661	165,935	176,248	193,528
On-Site or In-Plant Training - Grid sector - 4 to 10 years (jobs)		37,417	42,943	61,309	72,825	77,331	84,891
On-Site or In-Plant Training - Grid sector - Over 10 years (jobs)		4,850	5,563	7,938	9,423	10,000	10,970
On-Site or In-Plant Training - Natural gas sector - None (jobs)		92,260	80,124	70,811	68,462	57,144	47,024
On-Site or In-Plant Training - Natural gas sector - Up to 1 year (jobs)		340,988	296,769	263,218	253,834	211,953	174,136
On-Site or In-Plant Training - Natural gas sector - 1 to 4 years (jobs)		97,694	85,725	76,562	74,851	62,980	52,317
On-Site or In-Plant Training - Natural gas sector - 4 to 10 years (jobs)		43,400	38,428	34,575	34,233	29,007	24,312
On-Site or In-Plant Training - Natural gas sector - Over 10 years (jobs)		5,150	4,603	4,165	4,173	3,558	2,999
On-Site or In-Plant Training - Nuclear sector - None (jobs)		8,775	10,426	15,475	24,586	40,598	67,188
On-Site or In-Plant Training - Nuclear sector - Up to 1 year (jobs)		30,149	35,856	53,268	84,701	139,985	231,863
On-Site or In-Plant Training - Nuclear sector - 1 to 4 years (jobs)		7,234	8,614	12,813	20,399	33,754	55,975
On-Site or In-Plant Training - Nuclear sector - 4 to 10 years (jobs)		2,618	3,117	4,635	7,377	12,205	20,236
On-Site or In-Plant Training - Nuclear sector - Over 10 years (jobs)		246	292	434	689	1,139	1,887
On-Site or In-Plant Training - Oil sector - None (jobs)		127,208	110,889	94,599	67,871	51,013	35,531
On-Site or In-Plant Training - Oil sector - Up to 1 year (jobs)		500,808	439,812	378,051	273,378	207,099	145,367
On-Site or In-Plant Training - Oil sector - 1 to 4 years (jobs)		116,417	102,660	88,636	64,334	48,922	34,459
On-Site or In-Plant Training - Oil sector - 4 to 10 years (jobs)		41,049	36,459	31,686	23,186	17,772	12,638
On-Site or In-Plant Training - Oil sector - Over 10 years (jobs)		4,546	4,112	3,638	2,706	2,107	1,519
On-Site or In-Plant Training - Solar PV sector - None (jobs)		57,475	55,885	61,331	66,567	70,628	100,917
On-Site or In-Plant Training - Solar PV sector - Up to 1 year (jobs)		197,038	191,137	209,204	226,612	240,100	342,617
On-Site or In-Plant Training - Solar PV sector - 1 to 4 years (jobs)		55,673	53,781	58,637	63,180	66,515	94,305
On-Site or In-Plant Training - Solar PV sector - 4 to 10 years (jobs)		24,036	23,321	25,580	27,628	29,067	41,180
On-Site or In-Plant Training - Solar PV sector - Over 10 years (jobs)		2,862	2,770	3,028	3,269	3,446	4,894
On-Site or In-Plant Training - Wind sector - None (jobs)		33,997	40,715	44,248	54,949	59,794	60,784
On-Site or In-Plant Training - Wind sector - Up to 1 year (jobs)		115,665	137,179	148,496	183,957	198,417	200,600

Table 51: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Wind sector - 1 to 4 years (jobs)		31,097	37,067	40,003	49,318	53,326	53,833
On-Site or In-Plant Training - Wind sector - 4 to 10 years (jobs)		12,691	15,741	17,150	21,198	23,680	24,309
On-Site or In-Plant Training - Wind sector - Over 10 years (jobs)		1,638	1,975	2,141	2,648	2,894	2,943
Wage income - Biomass (million \$2019)		4,239	5,523	9,090	9,523	9,894	12,891
Wage income - CO2 (million \$2019)		501	7,724	6,838	3,330	5,115	9,626
Wage income - Coal (million \$2019)		4,038	1,086	602	530	484	406
Wage income - Grid (million \$2019)		30,849	35,839	51,821	62,370	67,136	74,743
Wage income - Natural Gas (million \$2019)		38,383	33,906	30,513	29,843	25,281	21,066
Wage income - Nuclear (million \$2019)		3,504	4,267	6,495	10,586	17,943	30,498
Wage income - Oil (million \$2019)		52,011	46,299	40,361	29,537	22,646	16,058
Wage income - Solar (million \$2019)		18,990	18,712	20,833	22,952	24,733	35,926
Wage income - Wind (million \$2019)		11,667	14,283	15,794	19,946	22,232	23,098

Table 52: E+RE- scenario - IMPACTS - Fossil fuel industries

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		5,922	5,196	4,119	3,106	2,384	1,930
Oil consumption - Cumulative (million bbls)							128,050
Oil production - Annual (million bbls)		5,198	5,216	5,209	4,127	3,429	2,512
Oil production - Cumulative (million bbls)							137,850
Natural gas consumption - Annual (tcf)		24,131	21,291	20,400	18,525	15,159	12,531
Natural gas consumption - Cumulative (tcf)							604,218
Natural gas production - Annual (tcf)		37,107	36,554	35,527	33,060	29,484	24,832
Natural gas production - Cumulative (tcf)							1,031,902

Table 53: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	27,996	26,390	23,464	19,872	16,608	14,565	13,649
Final energy use - Residential (PJ)	11,788	11,090	10,221	8,966	7,776	6,967	6,512
Final energy use - Commercial (PJ)	9,015	8,942	8,619	8,103	7,608	7,344	7,297
Final energy use - Industry (PJ)	25,107	26,056	26,110	25,372	25,108	24,870	24,572

Table 54: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		182	187	336	359	314	329

Table 55: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	4.41	16.7	48.7	82.7	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.1	76.3	46.4	15.6	3.17	0.586	0
Vehicle sales - Light-duty - hybrid (%)	4.91	4.89	3.38	1.24	0.304	0.067	0
Vehicle sales - Light-duty - diesel (%)	1.4	1.68	1.2	0.382	0.072	0.013	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.331	0.191	0.059	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.095	0.091	0.058	0.02	0.004	0.001	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 - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0

Table 55: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0
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
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		51,477	133,974	213,805	325,180	352,492	336,852
Public EV charging plugs - DC Fast (1000 units)	14.4		93.9		391		628
Public EV charging plugs - L2 (1000 units)	66.2		2,256		9,394		15,098

Table 56: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	14.6	27.2	64.4	85	88	88.1	88.1
Sales of space heating units - Electric Resistance (%)	20.3	22.6	12.3	8.07	7.57	7.66	7.68
Sales of space heating units - Gas (%)	55.2	36.9	17.1	3.52	1.45	1.32	1.3
Sales of space heating units - Fossil (%)	9.95	13.2	6.18	3.41	3.02	2.91	2.9
Sales of water heating units - Electric Heat Pump (%)	0	7.44	41.8	56.2	58.5	59.2	59
Sales of water heating units - Electric Resistance (%)	38.4	49.2	38.5	39.8	39.9	39.3	39.5
Sales of water heating units - Gas Furnace (%)	58	40.9	18	2.56	0.155	0.003	0
Sales of water heating units - Other (%)	3.58	2.47	1.63	1.47	1.51	1.54	1.53
Sales of cooking units - Electric Resistance (%)	61.3	69.6	94.8	99.7	100	100	100
Sales of cooking units - Gas (%)	38.7	30.4	5.2	0.262	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		254	307				

Table 57: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	2.95	17.6	52.9	76.9	80.6	80.8	80.8
Sales of space heating units - Electric Resistance (%)	7.91	9.07	14.4	17.7	18.4	18.4	18.4
Sales of space heating units - Gas Furnace (%)	85.2	70.1	32.1	5.37	1.07	0.82	0.817
Sales of space heating units - Fossil (%)	3.94	3.28	0.655	0.028	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.385	7.96	43.3	59.2	61.2	61.3	61.3
Sales of water heating units - Electric Resistance (%)	3.8	7.16	24	35.7	37.5	37.6	37.6
Sales of water heating units - Gas Furnace (%)	94.1	83.3	31.5	4.03	0.235	0.003	0
Sales of water heating units - Other (%)	1.66	1.59	1.2	1.1	1.1	1.11	1.11
Sales of cooking units - Electric Resistance (%)	32.5	46.4	80	86.6	87	87	87
Sales of cooking units - Gas (%)	67.5	53.6	20	13.4	13	13	13
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,047,657	1,162,511				

Table 58: E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed - Onshore wind (MW)	92,786	165,010	230,880	275,200	372,928	467,805	527,977
Installed - Offshore wind (MW)	29.3	5,029	10,029	15,029	20,029	25,000	30,000
Installed - Rooftop PV (MW)	33,317	52,523	69,448	90,809	117,114	148,351	185,890
Installed - Utility-scale PV (MW)	32,757	107,757	182,757	257,752	332,448	397,567	450,000
Installed - Hydro (MW)	78,608	78,608	78,608	78,608	78,608	78,608	78,608
Installed - Geothermal (MW)	2,397	2,403	24,727	24,718	24,710	24,702	24,666
Installed - Nuclear (MW)	98,486	95,135	95,008	99,119	130,574	191,067	310,836
Installed - Ccgt & gas steam (MW)	337,190	357,350	444,963	472,429	417,657	342,550	265,745
Installed - Ccgt w cc (MW)	0	0	8.75	25,157	76,333	162,793	230,887
Installed - Ct (MW)	143,739	129,695	94,911	100,127	170,549	157,934	130,899
Installed - Biomass (MW)	10,015	9,155	8,012	6,276	4,837	3,506	2,590
Installed - Biomass w cc (MW)	0	0	9,991	10,948	11,823	19,170	30,427
Installed - Coal (MW)	215,985	44,884	62.3	136	148	147	33.9
Installed - Other (MW)	68,074	57,101	54,650	53,942	52,322	51,237	44,539
Installed - Grid battery storage (MW)		819	1,328	3,062	13,842	44,320	52,980
Installed - Pumped hydro storage (MW)		19,418	19,418	19,418	19,418	19,418	19,418

Table 59: E+RE- scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Onshore wind (TWh)	390	686	974	1,157	1,585	1,984	2,223
Offshore wind (TWh)	0.092	20.3	42.4	76.3	90.7	109	133
Rooftop PV (TWh)	50.1	79.4	102	130	173	220	270
Utility-scale PV (TWh)	84.9	275	452	632	819	990	1,099
Hydro (TWh)	300	312	295	296	304	294	296
Geothermal (TWh)	14.6	14.6	151	151	151	151	150
Nuclear (TWh)	802	775	775	812	1,075	1,580	2,578
Gas (TWh)	1,518	1,881	1,802	1,967	1,561	643	112
Gas w cc (TWh)	0	0	0.046	198	585	1,189	1,415
Biomass (TWh)	18.2	19.6	43.4	25.4	19.4	14.6	0.174
Biomass w cc (TWh)	0	0	74.4	81.5	87.9	143	226
Coal (TWh)	982	225	0.218	0.476	0.52	0.515	0.119

Table 60: E+RE- scenario - PILLAR 2: Clean Electricity - Transmission

Item	2020	2025	2030	2035	2040	2045	2050
Total HV transmission (for wind and solar) - Base (percent of 2020)	0	0.258	0.388	0.6	0.808	0.936	0.951

Table 61: E+RE- scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass input - Biopower (1000 tonnes)	10,321	20,110	59,104	41,822	35,169	28,144	186
Biomass input - Biopower w/ cc (1000 tonnes)	0	0	44,936	49,136	52,999	86,012	136,463
Biomass input - BECCS-H2 (1000 tonnes)	0	0	0	181,112	265,263	317,346	406,847
Biomass input - FT diesel (1000 tonnes)	0	0	0	94.3	105	111	67.2
Biomass input - Bio-FT w/ CC (1000 tonnes)	0	0	0	139	152	169	172
Biomass input - Pyrolysis liquids (1000 tonnes)	0	0	0	205	227	232	9,595
Biomass input - Pyrolysis liquids w/ cc (1000 tonnes)	0	0	0	178	195	225	30,115
Biomass input - SNG (1000 tonnes)	0	11.2	45.8	16.6	9.09	8.18	2.31
Biomass input - Bio-SNG w/ CC (1000 tonnes)	0	0	92.7	70.2	47	24.8	5.58
Biomass input - Ethanol (1000 tonnes)	129,506	129,506	129,537	125,006	67,634	10,261	905

Table 62: E+RE- scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)	0	2.77	197	576	889	1,266	1,649

Table 63: E+RE- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-24,500
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-14,000
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-116,000
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-29,000
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-100,000
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-21,000
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-121,000
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-20,000
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-60,000
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							505,500
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-36,700
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-49,000
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-209,000
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-42,500
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							200,000
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-40,500
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-181,500
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-142,000
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-119,000
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							1,020,200
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-48,900
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-84,000
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-302,000
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-57,000
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							300,000
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-60,000
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							300,000
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-60,000

Table 63: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-242,000
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							- 264,000
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							- 1,535,900
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-178,000
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4,000
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							10,677
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							59,000
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							10,500
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							3,000
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							8,000
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1,300
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							35,700
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							132,177
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6,000
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							11,025
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							106,500
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							15,800
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							4,350
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							12,000
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							9,400
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							71,900

Table 63: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							236,975
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8,000
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							11,373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							154,000
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							21,000
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 (1000 hectares)							5,700
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							16,000
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							7,500
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							59,000
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							282,573

Table 64: E+RE- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-23,286
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-106,430
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3,696
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-133,412
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-23,286
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-203,503
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-7,391
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-234,180
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							11,287

Table 64: E+RE- scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							71,390
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							6,375
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							89,052
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							11,287
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							136,405
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							12,749
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							160,442

Table 65: E+RE- scenario - PILLAR 6: Land sinks - Total assumed land sink

Item	2020	2025	2030	2035	2040	2045	2050
Total assumed land sink (Gt CO2e/y)	-0.7	-0.73	-0.75	-0.78	-0.8	-0.83	-0.85

Table 66: E-B+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		2,559	3.33	3.2	2.73	1.88	0.14
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		1,453	816	482	354	202	83.2
Premature deaths from air pollution - Mobile - On-Road (deaths)		11,726	12,039	11,890	10,859	8,759	6,079
Premature deaths from air pollution - Gas Stations (deaths)		679	694	678	614	493	344
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		2,179	2,044	1,857	1,562	1,178	785
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		564	545	527	466	354	231
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		198	201	201	187	154	115
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		105	101	96	90.9	85.7	80.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		1,444	1,457	1,430	1,311	1,099	846
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		354	324	295	255	215	176
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		170	154	140	124	109	94.1
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		80.5	41.8	41.4	40.6	40.7	39.6



Table 66: E-B+ scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		3,809	3,424	2,925	2,527	2,222	1,583
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		22,684	29.5	28.4	24.2	16.7	1.24
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		12,872	7,230	4,270	3,134	1,787	737
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		104,258	107,043	105,711	96,553	77,882	54,050
Monetary damages from air pollution - Gas Stations (million \$2019)		6,015	6,145	6,003	5,440	4,367	3,042
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		19,305	18,115	16,457	13,841	10,437	6,953
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4,996	4,831	4,667	4,128	3,139	2,048
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1,751	1,777	1,781	1,661	1,366	1,020
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		932	892	850	805	758	709
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		12,787	12,898	12,661	11,609	9,733	7,490
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		3,133	2,865	2,608	2,254	1,902	1,554
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		1,502	1,367	1,236	1,102	966	833
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		710	369	365	358	359	350
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		33,820	30,408	25,973	22,443	19,734	14,061

Table 67: E-B+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		32,174	42,288	59,071	62,967	64,464	78,944
By economic sector - Construction (jobs)		575,484	746,785	814,234	833,754	996,525	1,306,738
By economic sector - Manufacturing (jobs)		407,277	479,463	456,205	403,814	454,010	529,607
By economic sector - Mining (jobs)		457,822	349,136	269,459	206,374	156,952	92,010
By economic sector - Other (jobs)		56,223	82,163	98,243	111,026	143,555	221,195
By economic sector - Pipeline (jobs)		46,238	52,377	44,732	34,806	32,366	31,958
By economic sector - Professional (jobs)		327,607	398,767	470,454	538,093	663,903	864,761
By economic sector - Trade (jobs)		297,695	314,577	335,419	353,629	408,159	513,937
By economic sector - Utilities (jobs)		457,425	558,317	620,120	651,547	823,853	1,087,176
By resource sector - Biomass (jobs)		84,135	102,666	169,933	238,222	297,448	376,673
By resource sector - CO2 (jobs)		7,356	110,939	96,104	46,428	69,905	129,825
By resource sector - Coal (jobs)		70,411	19,426	10,921	9,514	8,525	7,486
By resource sector - Grid (jobs)		503,668	703,332	902,053	1,022,720	1,388,906	1,874,725
By resource sector - Natural Gas (jobs)		549,721	413,742	308,646	265,702	210,383	156,961
By resource sector - Nuclear (jobs)		49,017	46,211	41,204	35,097	30,602	43,416
By resource sector - Oil (jobs)		792,899	708,136	634,032	560,853	477,059	296,731

Table 67: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Solar (jobs)		370,685	518,991	531,229	533,475	644,974	1,015,373
By resource sector - Wind (jobs)		230,053	400,430	473,816	483,999	615,983	825,137
By education level - All sectors - High school diploma or less (jobs)		1,106,003	1,272,296	1,337,049	1,340,862	1,565,089	1,976,427
By education level - All sectors - Associates degree or some college (jobs)		795,318	922,464	969,608	980,171	1,162,346	1,488,136
By education level - All sectors - Bachelors degree (jobs)		593,023	648,934	671,043	678,107	785,647	972,635
By education level - All sectors - Masters or professional degree (jobs)		142,869	157,166	165,383	170,402	199,545	249,935
By education level - All sectors - Doctoral degree (jobs)		20,731	23,013	24,856	26,468	31,160	39,193
By education level - Biomass sector - High school diploma or less (jobs)		48,466	59,456	90,901	114,020	132,819	166,652
By education level - Biomass sector - Associates degree or some college (jobs)		16,090	19,588	35,004	52,412	68,012	86,972
By education level - Biomass sector - Bachelors degree (jobs)		14,783	17,693	32,769	53,142	71,318	90,755
By education level - Biomass sector - Masters or professional degree (jobs)		4,070	5,008	9,386	15,369	20,750	26,476
By education level - Biomass sector - Doctoral degree (jobs)		726	921	1,873	3,279	4,550	5,818
By education level - CO2 sector - High school diploma or less (jobs)		3,181	48,591	41,726	19,777	29,903	56,834
By education level - CO2 sector - Associates degree or some college (jobs)		2,575	39,321	33,632	15,862	23,943	45,506
By education level - CO2 sector - Bachelors degree (jobs)		1,286	18,604	16,689	8,614	12,834	22,147
By education level - CO2 sector - Masters or professional degree (jobs)		287	4,086	3,719	1,970	2,924	4,900
By education level - CO2 sector - Doctoral degree (jobs)		26	337	337	205	301	437
By education level - Coal sector - High school diploma or less (jobs)		30,641	9,079	5,799	4,970	4,379	3,778
By education level - Coal sector - Associates degree or some college (jobs)		21,668	5,811	2,994	2,616	2,352	2,073
By education level - Coal sector - Bachelors degree (jobs)		14,117	3,542	1,704	1,540	1,431	1,302
By education level - Coal sector - Masters or professional degree (jobs)		3,469	866	372	338	317	290
By education level - Coal sector - Doctoral degree (jobs)		517	128	51.8	48.5	46.6	43.7
By education level - Grid sector - High school diploma or less (jobs)		213,795	299,960	386,507	440,227	600,566	814,268
By education level - Grid sector - Associates degree or some college (jobs)		167,192	233,397	299,236	339,129	460,353	621,078
By education level - Grid sector - Bachelors degree (jobs)		95,810	132,877	169,265	190,617	257,143	344,795
By education level - Grid sector - Masters or professional degree (jobs)		24,109	33,331	42,329	47,524	63,918	85,452
By education level - Grid sector - Doctoral degree (jobs)		2,762	3,767	4,717	5,223	6,927	9,132
By education level - Natural gas sector - High school diploma or less (jobs)		216,010	163,684	122,940	106,082	84,259	63,187
By education level - Natural gas sector - Associates degree or some college (jobs)		176,526	133,696	100,826	88,327	70,666	53,110
By education level - Natural gas sector - Bachelors degree (jobs)		122,977	91,161	66,596	55,978	43,583	31,999
By education level - Natural gas sector - Masters or professional degree (jobs)		30,123	22,202	16,129	13,537	10,512	7,683

Table 67: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Natural gas sector - Doctoral degree (jobs)		4,086	2,999	2,155	1,778	1,363	982
By education level - Nuclear sector - High school diploma or less (jobs)		16,614	15,709	14,047	11,998	10,490	14,923
By education level - Nuclear sector - Associates degree or some college (jobs)		13,384	12,621	11,256	9,590	8,364	11,869
By education level - Nuclear sector - Bachelors degree (jobs)		14,468	13,610	12,110	10,294	8,957	12,681
By education level - Nuclear sector - Masters or professional degree (jobs)		3,916	3,678	3,267	2,772	2,408	3,404
By education level - Nuclear sector - Doctoral degree (jobs)		634	593	524	443	383	539
By education level - Oil sector - High school diploma or less (jobs)		318,839	287,355	259,740	232,096	199,165	125,368
By education level - Oil sector - Associates degree or some college (jobs)		206,247	184,787	166,011	147,370	125,808	78,548
By education level - Oil sector - Bachelors degree (jobs)		212,707	187,569	165,669	144,398	121,155	74,021
By education level - Oil sector - Masters or professional degree (jobs)		48,235	42,333	37,202	32,247	26,927	16,337
By education level - Oil sector - Doctoral degree (jobs)		6,871	6,092	5,410	4,741	4,004	2,456
By education level - Solar PV sector - High school diploma or less (jobs)		166,451	230,569	233,286	231,392	276,546	430,424
By education level - Solar PV sector - Associates degree or some college (jobs)		118,757	166,412	170,610	171,623	207,774	327,576
By education level - Solar PV sector - Bachelors degree (jobs)		66,702	95,099	98,596	100,447	123,471	197,456
By education level - Solar PV sector - Masters or professional degree (jobs)		15,984	22,930	24,411	25,440	31,532	50,834
By education level - Solar PV sector - Doctoral degree (jobs)		2,792	3,981	4,326	4,573	5,651	9,083
By education level - Wind sector - High school diploma or less (jobs)		92,006	157,892	182,103	180,301	226,962	300,995
By education level - Wind sector - Associates degree or some college (jobs)		72,880	126,831	150,039	153,239	195,072	261,403
By education level - Wind sector - Bachelors degree (jobs)		50,173	88,778	107,645	113,077	145,755	197,478
By education level - Wind sector - Masters or professional degree (jobs)		12,677	22,732	28,569	31,205	40,258	54,558
By education level - Wind sector - Doctoral degree (jobs)		2,316	4,196	5,460	6,178	7,935	10,703
Related work experience - All sectors - None (jobs)		377,113	432,888	455,922	460,931	541,244	686,585
Related work experience - All sectors - Up to 1 year (jobs)		523,267	602,970	636,844	642,387	752,133	956,966
Related work experience - All sectors - 1 to 4 years (jobs)		970,443	1,095,909	1,145,801	1,156,722	1,352,906	1,700,110
Related work experience - All sectors - 4 to 10 years (jobs)		618,578	702,831	733,978	740,815	869,710	1,097,360
Related work experience - All sectors - Over 10 years (jobs)		168,544	189,274	195,393	195,155	227,793	285,306
Related work experience - Biomass sector - None (jobs)		14,242	17,332	27,557	36,705	44,377	55,834
Related work experience - Biomass sector - Up to 1 year (jobs)		28,024	33,522	50,606	64,227	75,606	95,317
Related work experience - Biomass sector - 1 to 4 years (jobs)		25,157	31,622	55,215	80,869	103,220	130,658
Related work experience - Biomass sector - 4 to 10 years (jobs)		13,109	15,926	29,001	44,841	59,014	75,329

Table 67: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - Biomass sector - Over 10 years (jobs)		3,603	4,264	7,554	11,581	15,231	19,534
Related work experience - CO2 sector - None (jobs)		1,137	17,299	14,848	7,050	10,633	20,081
Related work experience - CO2 sector - Up to 1 year (jobs)		1,320	20,019	17,339	8,351	12,612	23,622
Related work experience - CO2 sector - 1 to 4 years (jobs)		2,631	39,497	34,328	16,699	25,105	46,239
Related work experience - CO2 sector - 4 to 10 years (jobs)		1,820	27,472	23,749	11,436	17,216	32,042
Related work experience - CO2 sector - Over 10 years (jobs)		448	6,652	5,838	2,892	4,338	7,842
Related work experience - Coal sector - None (jobs)		9,564	2,569	1,358	1,183	1,060	931
Related work experience - Coal sector - Up to 1 year (jobs)		14,478	4,297	2,767	2,388	2,120	1,844
Related work experience - Coal sector - 1 to 4 years (jobs)		26,712	7,377	4,177	3,631	3,246	2,843
Related work experience - Coal sector - 4 to 10 years (jobs)		15,695	4,109	2,053	1,810	1,642	1,460
Related work experience - Coal sector - Over 10 years (jobs)		3,962	1,074	566	501	457	409
Related work experience - Grid sector - None (jobs)		74,809	104,545	134,178	152,228	206,860	279,376
Related work experience - Grid sector - Up to 1 year (jobs)		96,438	135,079	173,776	197,630	269,226	364,531
Related work experience - Grid sector - 1 to 4 years (jobs)		182,129	254,131	325,681	368,962	500,686	675,302
Related work experience - Grid sector - 4 to 10 years (jobs)		119,355	166,419	213,117	241,259	327,146	440,906
Related work experience - Grid sector - Over 10 years (jobs)		30,937	43,159	55,301	62,640	84,989	114,610
Related work experience - Natural gas sector - None (jobs)		79,594	60,206	45,249	39,353	31,361	23,517
Related work experience - Natural gas sector - Up to 1 year (jobs)		95,636	71,908	53,583	45,998	36,381	27,158
Related work experience - Natural gas sector - 1 to 4 years (jobs)		202,869	152,582	113,636	97,575	77,128	57,447
Related work experience - Natural gas sector - 4 to 10 years (jobs)		134,972	101,628	75,927	65,604	52,043	38,861
Related work experience - Natural gas sector - Over 10 years (jobs)		36,650	27,418	20,251	17,172	13,470	9,977
Related work experience - Nuclear sector - None (jobs)		6,178	5,831	5,205	4,438	3,873	5,501
Related work experience - Nuclear sector - Up to 1 year (jobs)		9,020	8,509	7,592	6,471	5,645	8,014
Related work experience - Nuclear sector - 1 to 4 years (jobs)		18,296	17,242	15,369	13,087	11,407	16,178
Related work experience - Nuclear sector - 4 to 10 years (jobs)		11,869	11,183	9,966	8,485	7,394	10,485
Related work experience - Nuclear sector - Over 10 years (jobs)		3,654	3,445	3,072	2,617	2,282	3,238
Related work experience - Oil sector - None (jobs)		106,860	95,809	86,142	76,551	65,362	40,896
Related work experience - Oil sector - Up to 1 year (jobs)		147,849	132,071	118,310	104,771	89,100	55,605
Related work experience - Oil sector - 1 to 4 years (jobs)		302,142	269,872	241,615	213,657	181,735	112,904
Related work experience - Oil sector - 4 to 10 years (jobs)		183,328	163,462	146,092	128,961	109,518	67,918

Table 67: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - Oil sector - Over 10 years (jobs)		52,719	46,922	41,873	36,913	31,344	19,408
Related work experience - Solar PV sector - None (jobs)		53,411	74,850	76,999	77,691	94,143	148,583
Related work experience - Solar PV sector - Up to 1 year (jobs)		82,907	115,416	117,300	116,920	140,443	219,669
Related work experience - Solar PV sector - 1 to 4 years (jobs)		128,798	180,893	185,906	187,466	227,429	359,260
Related work experience - Solar PV sector - 4 to 10 years (jobs)		83,840	117,305	120,215	120,822	145,996	229,709
Related work experience - Solar PV sector - Over 10 years (jobs)		21,729	30,528	30,810	30,577	36,962	58,153
Related work experience - Wind sector - None (jobs)		31,318	54,448	64,386	65,733	83,573	111,866
Related work experience - Wind sector - Up to 1 year (jobs)		47,594	82,150	95,571	95,632	120,999	161,207
Related work experience - Wind sector - 1 to 4 years (jobs)		81,709	142,693	169,874	174,777	222,950	299,279
Related work experience - Wind sector - 4 to 10 years (jobs)		54,589	95,326	113,857	117,597	149,740	200,650
Related work experience - Wind sector - Over 10 years (jobs)		14,842	25,813	30,128	30,261	38,720	52,135
On-the-Job Training - All sectors - None (jobs)		148,750	166,717	173,942	175,848	204,837	258,726
On-the-Job Training - All sectors - Up to 1 year (jobs)		1,781,183	2,011,740	2,105,526	2,122,983	2,477,744	3,112,513
On-the-Job Training - All sectors - 1 to 4 years (jobs)		540,098	623,157	652,576	657,218	775,735	987,327
On-the-Job Training - All sectors - 4 to 10 years (jobs)		162,120	192,620	205,572	210,171	251,014	324,358
On-the-Job Training - All sectors - Over 10 years (jobs)		25,792	29,639	30,323	29,791	34,456	43,403
On-the-Job Training - Biomass sector - None (jobs)		5,236	6,088	10,105	14,671	18,626	23,562
On-the-Job Training - Biomass sector - Up to 1 year (jobs)		66,889	81,601	132,250	182,098	224,785	283,714
On-the-Job Training - Biomass sector - 1 to 4 years (jobs)		9,286	11,590	21,134	31,640	41,117	52,685
On-the-Job Training - Biomass sector - 4 to 10 years (jobs)		2,125	2,696	5,302	8,200	10,872	14,064
On-the-Job Training - Biomass sector - Over 10 years (jobs)		600	692	1,143	1,614	2,049	2,648
On-the-Job Training - CO2 sector - None (jobs)		346	5,127	4,521	2,256	3,387	6,100
On-the-Job Training - CO2 sector - Up to 1 year (jobs)		4,460	66,655	58,216	28,568	42,915	78,399
On-the-Job Training - CO2 sector - 1 to 4 years (jobs)		1,805	27,584	23,594	11,121	16,798	31,982
On-the-Job Training - CO2 sector - 4 to 10 years (jobs)		672	10,456	8,805	4,017	6,099	12,021
On-the-Job Training - CO2 sector - Over 10 years (jobs)		73.6	1,117	968	466	705	1,324
On-the-Job Training - Coal sector - None (jobs)		3,482	920	508	449	409	364
On-the-Job Training - Coal sector - Up to 1 year (jobs)		48,368	13,561	8,004	6,974	6,249	5,487
On-the-Job Training - Coal sector - 1 to 4 years (jobs)		13,959	3,773	1,915	1,664	1,488	1,303
On-the-Job Training - Coal sector - 4 to 10 years (jobs)		4,129	1,040	423	364	321	278

Table 67: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Coal sector - Over 10 years (jobs)		473	131	70.7	63.5	58.8	53.4
On-the-Job Training - Grid sector - None (jobs)		24,650	34,374	44,027	49,854	67,624	91,175
On-the-Job Training - Grid sector - Up to 1 year (jobs)		323,388	451,411	578,739	655,925	890,481	1,201,576
On-the-Job Training - Grid sector - 1 to 4 years (jobs)		113,141	158,115	202,937	230,240	312,877	422,566
On-the-Job Training - Grid sector - 4 to 10 years (jobs)		38,452	53,786	69,094	78,459	106,711	144,245
On-the-Job Training - Grid sector - Over 10 years (jobs)		4,037	5,647	7,256	8,242	11,213	15,164
On-the-Job Training - Natural gas sector - None (jobs)		28,684	21,298	15,625	13,203	10,325	7,627
On-the-Job Training - Natural gas sector - Up to 1 year (jobs)		354,836	266,458	197,880	169,143	133,336	99,109
On-the-Job Training - Natural gas sector - 1 to 4 years (jobs)		121,834	92,143	69,337	60,467	48,262	36,243
On-the-Job Training - Natural gas sector - 4 to 10 years (jobs)		39,144	29,923	22,892	20,410	16,507	12,526
On-the-Job Training - Natural gas sector - Over 10 years (jobs)		5,223	3,920	2,912	2,479	1,953	1,456
On-the-Job Training - Nuclear sector - None (jobs)		3,292	3,102	2,765	2,354	2,052	2,910
On-the-Job Training - Nuclear sector - Up to 1 year (jobs)		33,436	31,510	28,086	23,915	20,844	29,562
On-the-Job Training - Nuclear sector - 1 to 4 years (jobs)		9,490	8,956	7,994	6,816	5,949	8,449
On-the-Job Training - Nuclear sector - 4 to 10 years (jobs)		2,289	2,160	1,928	1,645	1,436	2,039
On-the-Job Training - Nuclear sector - Over 10 years (jobs)		510	482	430	367	321	456
On-the-Job Training - Oil sector - None (jobs)		48,246	42,447	37,430	32,611	27,298	16,745
On-the-Job Training - Oil sector - Up to 1 year (jobs)		558,269	498,517	446,256	394,637	335,590	208,628
On-the-Job Training - Oil sector - 1 to 4 years (jobs)		144,508	129,357	116,100	102,947	87,812	54,740
On-the-Job Training - Oil sector - 4 to 10 years (jobs)		34,136	30,881	28,017	25,127	21,637	13,669
On-the-Job Training - Oil sector - Over 10 years (jobs)		7,740	6,934	6,229	5,530	4,722	2,949
On-the-Job Training - Solar PV sector - None (jobs)		21,889	30,765	31,896	32,410	39,407	62,392
On-the-Job Training - Solar PV sector - Up to 1 year (jobs)		239,068	336,411	343,648	344,860	418,556	661,339
On-the-Job Training - Solar PV sector - 1 to 4 years (jobs)		78,537	109,117	111,549	111,719	134,157	209,821
On-the-Job Training - Solar PV sector - 4 to 10 years (jobs)		26,697	36,501	37,966	38,462	45,718	70,815
On-the-Job Training - Solar PV sector - Over 10 years (jobs)		4,494	6,197	6,170	6,023	7,137	11,006
On-the-Job Training - Wind sector - None (jobs)		12,926	22,598	27,064	28,040	35,710	47,852
On-the-Job Training - Wind sector - Up to 1 year (jobs)		152,469	265,615	312,448	316,864	404,987	544,700
On-the-Job Training - Wind sector - 1 to 4 years (jobs)		47,539	82,521	98,017	100,602	127,275	169,537
On-the-Job Training - Wind sector - 4 to 10 years (jobs)		14,476	25,177	31,144	33,489	41,713	54,701

Table 67: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Wind sector - Over 10 years (jobs)		2,642	4,518	5,143	5,005	6,297	8,347
On-Site or In-Plant Training - All sectors - None (jobs)		429,061	489,111	512,721	518,562	607,898	770,522
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		1,613,963	1,823,107	1,907,229	1,921,889	2,243,904	2,820,387
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		422,330	486,069	508,860	512,095	603,152	765,793
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		171,713	200,758	212,661	216,486	256,577	328,119
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		20,877	24,829	26,467	26,979	32,254	41,506
On-Site or In-Plant Training - Biomass sector - None (jobs)		13,603	16,961	29,104	42,115	53,377	67,470
On-Site or In-Plant Training - Biomass sector - Up to 1 year (jobs)		58,813	71,291	115,204	158,414	195,521	247,019
On-Site or In-Plant Training - Biomass sector - 1 to 4 years (jobs)		8,490	10,509	18,437	26,783	34,224	43,693
On-Site or In-Plant Training - Biomass sector - 4 to 10 years (jobs)		2,644	3,234	6,114	9,424	12,463	16,088
On-Site or In-Plant Training - Biomass sector - Over 10 years (jobs)		586	671	1,075	1,486	1,863	2,403
On-Site or In-Plant Training - CO2 sector - None (jobs)		1,126	16,898	14,719	7,184	10,807	19,874
On-Site or In-Plant Training - CO2 sector - Up to 1 year (jobs)		4,125	61,774	53,861	26,345	39,594	72,583
On-Site or In-Plant Training - CO2 sector - 1 to 4 years (jobs)		1,357	20,707	17,740	8,386	12,664	24,047
On-Site or In-Plant Training - CO2 sector - 4 to 10 years (jobs)		668	10,330	8,747	4,038	6,119	11,913
On-Site or In-Plant Training - CO2 sector - Over 10 years (jobs)		79.4	1,229	1,037	475	720	1,408
On-Site or In-Plant Training - Coal sector - None (jobs)		10,380	2,741	1,420	1,262	1,154	1,034
On-Site or In-Plant Training - Coal sector - Up to 1 year (jobs)		44,315	12,498	7,424	6,450	5,763	5,046
On-Site or In-Plant Training - Coal sector - 1 to 4 years (jobs)		10,991	3,009	1,599	1,387	1,238	1,082
On-Site or In-Plant Training - Coal sector - 4 to 10 years (jobs)		4,217	1,054	430	373	332	289
On-Site or In-Plant Training - Coal sector - Over 10 years (jobs)		508	124	47.4	42.2	38.6	34.7
On-Site or In-Plant Training - Grid sector - None (jobs)		76,700	106,866	136,759	154,718	209,668	282,415
On-Site or In-Plant Training - Grid sector - Up to 1 year (jobs)		296,816	414,506	531,661	602,830	818,749	1,105,248
On-Site or In-Plant Training - Grid sector - 1 to 4 years (jobs)		86,993	121,633	156,191	177,294	241,049	325,721
On-Site or In-Plant Training - Grid sector - 4 to 10 years (jobs)		38,206	53,408	68,566	77,810	105,764	142,877
On-Site or In-Plant Training - Grid sector - Over 10 years (jobs)		4,952	6,919	8,877	10,068	13,677	18,464
On-Site or In-Plant Training - Natural gas sector - None (jobs)		87,524	65,527	48,636	41,762	32,988	24,543
On-Site or In-Plant Training - Natural gas sector - Up to 1 year (jobs)		323,555	243,038	180,589	154,459	121,820	90,603
On-Site or In-Plant Training - Natural gas sector - 1 to 4 years (jobs)		92,637	70,073	52,690	45,840	36,543	27,423
On-Site or In-Plant Training - Natural gas sector - 4 to 10 years (jobs)		41,127	31,357	23,855	21,069	16,949	12,811

Table 67: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Natural gas sector - Over 10 years (jobs)		4,878	3,747	2,877	2,572	2,083	1,580
On-Site or In-Plant Training - Nuclear sector - None (jobs)		8,774	8,263	7,361	6,264	5,457	7,735
On-Site or In-Plant Training - Nuclear sector - Up to 1 year (jobs)		30,147	28,419	25,337	21,581	18,815	26,691
On-Site or In-Plant Training - Nuclear sector - 1 to 4 years (jobs)		7,233	6,827	6,095	5,197	4,537	6,444
On-Site or In-Plant Training - Nuclear sector - 4 to 10 years (jobs)		2,618	2,470	2,205	1,880	1,640	2,330
On-Site or In-Plant Training - Nuclear sector - Over 10 years (jobs)		246	231	206	176	153	217
On-Site or In-Plant Training - Oil sector - None (jobs)		127,669	113,154	100,523	88,217	74,442	45,938
On-Site or In-Plant Training - Oil sector - Up to 1 year (jobs)		502,634	448,835	401,801	355,364	302,214	187,936
On-Site or In-Plant Training - Oil sector - 1 to 4 years (jobs)		116,834	104,736	94,131	83,578	71,372	44,546
On-Site or In-Plant Training - Oil sector - 4 to 10 years (jobs)		41,199	37,215	33,709	30,174	25,955	16,347
On-Site or In-Plant Training - Oil sector - Over 10 years (jobs)		4,563	4,197	3,868	3,520	3,075	1,964
On-Site or In-Plant Training - Solar PV sector - None (jobs)		63,208	88,743	91,068	91,701	111,160	175,435
On-Site or In-Plant Training - Solar PV sector - Up to 1 year (jobs)		216,902	304,840	311,470	312,556	378,985	598,282
On-Site or In-Plant Training - Solar PV sector - 1 to 4 years (jobs)		61,169	85,065	86,877	86,956	104,488	163,523
On-Site or In-Plant Training - Solar PV sector - 4 to 10 years (jobs)		26,264	35,980	37,340	37,770	44,944	69,685
On-Site or In-Plant Training - Solar PV sector - Over 10 years (jobs)		3,141	4,363	4,474	4,493	5,398	8,447
On-Site or In-Plant Training - Wind sector - None (jobs)		40,076	69,957	83,132	85,339	108,846	146,078
On-Site or In-Plant Training - Wind sector - Up to 1 year (jobs)		136,658	237,906	279,884	283,891	362,441	486,978
On-Site or In-Plant Training - Wind sector - 1 to 4 years (jobs)		36,627	63,510	75,101	76,673	97,038	129,314
On-Site or In-Plant Training - Wind sector - 4 to 10 years (jobs)		14,768	25,710	31,694	33,949	42,411	55,779
On-Site or In-Plant Training - Wind sector - Over 10 years (jobs)		1,924	3,347	4,005	4,147	5,246	6,988
Wage income - Biomass (million \$2019)		4,370	5,504	9,694	14,467	18,822	24,312
Wage income - CO2 (million \$2019)		460	6,961	6,170	3,083	4,704	8,683
Wage income - Coal (million \$2019)		4,260	1,154	608	538	490	438
Wage income - Grid (million \$2019)		31,499	44,573	57,955	66,639	91,821	125,797
Wage income - Natural Gas (million \$2019)		36,422	27,768	20,930	18,149	14,518	10,952
Wage income - Nuclear (million \$2019)		3,504	3,382	3,089	2,697	2,412	3,511
Wage income - Oil (million \$2019)		52,195	47,217	42,805	38,319	33,009	20,749
Wage income - Solar (million \$2019)		20,872	29,628	30,879	31,591	38,846	62,249
Wage income - Wind (million \$2019)		13,724	24,323	29,582	31,168	40,333	54,951

Table 68: E-B+ scenario - IMPACTS - Fossil fuel industries

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		5,987	5,545	5,112	4,688	3,810	2,612
Oil consumption - Cumulative (million bbls)							152,170
Oil production - Annual (million bbls)		5,198	5,216	5,209	5,074	4,856	3,195
Oil production - Cumulative (million bbls)							151,760



Table 68: E-B+ scenario - IMPACTS - Fossil fuel industries (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		22,870	18,067	14,168	11,671	9,024	6,935
Natural gas consumption - Cumulative (tcf)							468,505
Natural gas production - Annual (tcf)		35,855	32,336	26,667	22,472	19,164	16,450
Natural gas production - Cumulative (tcf)							830,136

Table 69: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	28,030	26,603	24,463	22,703	21,315	19,677	17,739
Final energy use - Residential (PJ)	11,788	11,126	10,656	10,151	9,457	8,609	7,786
Final energy use - Commercial (PJ)	9,015	8,958	8,853	8,731	8,513	8,263	8,058
Final energy use - Industry (PJ)	25,084	26,117	26,456	26,354	26,498	26,178	25,748

Table 70: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		149	150	201	208	298	315

Table 71: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	4.05	6.4	12.6	27.1	49.7	72.9	87.9
Vehicle sales - Light-duty - gasoline (%)	89.4	85.5	78.4	65.1	44.7	23.9	10.6
Vehicle sales - Light-duty - hybrid (%)	4.99	5.79	6.54	5.88	4.34	2.52	1.21
Vehicle sales - Light-duty - diesel (%)	1.39	1.82	2.03	1.61	1.02	0.519	0.223
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.371	0.317	0.239	0.168	0.092	0.043
Vehicle sales - Light-duty - other (%)	0.095	0.098	0.09	0.078	0.056	0.03	0.014
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 - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102
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
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	8,683	17,455	59,707	185,491	271,068
Public EV charging plugs - DC Fast (1000 units)	14.4		31.9		147		402
Public EV charging plugs - L2 (1000 units)	66.2		766		3,537		9,670

Table 72: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	14.6	21	25.3	37.6	58.4	75.1	82.4
Sales of space heating units - Electric Resistance (%)	20.3	24.4	23.2	19.9	14.3	10.3	8.67
Sales of space heating units - Gas (%)	55.2	40	37.7	31.1	19.6	9.59	4.95
Sales of space heating units - Fossil (%)	9.95	14.5	13.8	11.4	7.66	5.01	4.02

Table 72: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Heat Pump (%)	0	1.36	5.25	16.7	35.2	49.3	55.3
Sales of water heating units - Electric Resistance (%)	38.4	51.5	50.3	47	42.1	39.6	38.9
Sales of water heating units - Gas Furnace (%)	58	44.5	41.9	34	20.8	9.45	4.17
Sales of water heating units - Other (%)	3.58	2.63	2.51	2.27	1.91	1.68	1.62
Sales of cooking units - Electric Resistance (%)	61.2	62.2	65.8	75.1	88.1	96.2	99
Sales of cooking units - Gas (%)	38.8	37.8	34.2	24.9	11.9	3.83	1.03
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		252	303				

Table 73: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	2.95	11.9	15.9	27.6	48.1	65.9	74.2
Sales of space heating units - Electric Resistance (%)	7.91	8.18	8.72	10.5	13.8	16.4	17.6
Sales of space heating units - Gas Furnace (%)	85.2	76.1	71.7	59	36.6	17.1	7.89
Sales of space heating units - Fossil (%)	3.94	3.79	3.71	2.91	1.53	0.589	0.302
Sales of water heating units - Electric Heat Pump (%)	0.385	1.8	5.78	17.4	36.6	51.2	57.3
Sales of water heating units - Electric Resistance (%)	3.8	4.53	6.39	12	21.9	30.4	34.4
Sales of water heating units - Gas Furnace (%)	94.1	92	86.2	69	40.2	17.2	7.13
Sales of water heating units - Other (%)	1.66	1.67	1.66	1.51	1.31	1.18	1.14
Sales of cooking units - Electric Resistance (%)	32.5	36.5	41.3	53.8	71.2	81.9	85.6
Sales of cooking units - Gas (%)	67.5	63.5	58.7	46.2	28.8	18.1	14.4
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,046,837	1,158,815				

Table 74: E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed - Onshore wind (MW)	97,778	194,426	370,380	515,269	613,437	779,748	1,020,520
Installed - Offshore wind (MW)	29.3	1,005	4,962	13,173	33,174	90,306	207,350
Installed - Rooftop PV (MW)	33,317	52,523	69,448	90,809	117,114	148,351	185,890
Installed - Utility-scale PV (MW)	35,714	125,684	295,566	446,736	575,331	752,836	1,053,909
Installed - Hydro (MW)	78,608	78,608	78,608	78,608	78,608	78,608	78,608
Installed - Geothermal (MW)	2,392	2,395	2,420	2,417	2,420	2,426	2,446
Installed - Nuclear (MW)	98,481	95,135	90,008	76,069	68,456	56,274	56,682
Installed - Ccgt & gas steam (MW)	334,478	316,742	319,849	311,404	252,180	173,113	145,943
Installed - Ccgt w cc (MW)	0	0	45.2	4,211	7,837	13,514	25,116
Installed - Ct (MW)	146,590	139,058	120,032	114,037	120,046	165,945	194,030
Installed - Biomass (MW)	10,005	9,140	7,852	6,129	4,704	3,387	2,483
Installed - Biomass w cc (MW)	0	0	9,955	23,417	47,848	60,968	66,453
Installed - Coal (MW)	215,959	52,040	132	129	105	90.8	47.3
Installed - Other (MW)	68,061	57,088	55,241	53,843	52,087	51,085	49,630
Installed - Grid battery storage (MW)		890	1,834	10,282	32,471	86,943	123,183
Installed - Pumped hydro storage (MW)		19,418	19,418	19,418	19,418	19,418	19,418

Table 75: E-B+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Onshore wind (TWh)	412	794	1,536	2,051	2,391	3,054	3,994
Offshore wind (TWh)	0.092	3.73	20.2	63.9	146	394	885
Rooftop PV (TWh)	50.1	79.4	101	127	167	212	256
Utility-scale PV (TWh)	90.4	305	681	1,014	1,286	1,690	2,290
Hydro (TWh)	300	312	295	294	301	292	293
Geothermal (TWh)	14.5	14.5	14.3	14.2	13.6	13.6	13.5
Nuclear (TWh)	802	775	733	620	558	458	463
Gas (TWh)	1,492	1,655	1,062	582	369	195	94.1
Gas w cc (TWh)	0	0	0.221	26.2	35.4	50.5	83
Biomass (TWh)	18.1	21.4	39.6	23.5	15.6	6.71	0.45
Biomass w cc (TWh)	0	0	74.1	174	356	454	493
Coal (TWh)	980	280	0.461	0.452	0.368	0.318	0.166

Table 76: E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass input - Biopower (1000 tonnes)	10,249	24,177	56,258	40,450	30,444	12,725	636
Biomass input - Biopower w/ cc (1000 tonnes)	0	0	44,765	105,109	214,980	273,940	297,408
Biomass input - BECCS-H2 (1000 tonnes)	0	0	0	161,322	336,108	552,980	641,173
Biomass input - FT diesel (1000 tonnes)	0	0	0	107	122	124	99.1
Biomass input - Bio-FT w/ CC (1000 tonnes)	0	0	0	151	192	227	279
Biomass input - Pyrolysis liquids (1000 tonnes)	0	0	0	212	316	1,714	123,715
Biomass input - Pyrolysis liquids w/ cc (1000 tonnes)	0	0	0	158	219	299	56,876
Biomass input - SNG (1000 tonnes)	0	9.94	18.5	8.41	8.23	7.31	3.45
Biomass input - Bio-SNG w/ CC (1000 tonnes)	0	0	38.5	22.5	15.4	14.5	11.9
Biomass input - Ethanol (1000 tonnes)	129,506	129,506	129,537	125,006	67,634	10,261	905
Number of facilities - Power (quantity)	0	12	16	16	17	17	17
Number of facilities - Power ccu (quantity)	0	0	67	148	296	379	413
Number of facilities - Allam power w ccu (quantity)	0	0	0	14	24	33	42
Number of facilities - Beccs hydrogen (quantity)	0	0	0	217	453	742	858
Number of facilities - Diesel (quantity)	0	0	0	14	16	18	20
Number of facilities - Diesel ccu (quantity)	0	0	0	14	24	35	39
Number of facilities - Pyrolysis (quantity)	0	0	0	14	16	19	178
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	14	24	35	119
Number of facilities - Sng (quantity)	0	14	15	15	15	16	17
Number of facilities - Sng ccu (quantity)	0	0	14	14	14	16	19

Table 77: E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		708	14,170	21,713	25,426	25,426	25,426
Spur (km)		0	5,992	25,136	45,143	68,934	85,735
All (km)		708	20,162	46,849	70,569	94,360	111,162
Cumulative investment - Trunk (million \$2018)		3,706	68,664	109,640	134,549	135,923	135,923
Cumulative investment - Spur (million \$2018)		0	5,264	24,259	46,256	73,186	88,637
Cumulative investment - All (million \$2018)		3,706	73,928	133,899	180,805	209,109	224,560

Table 78: E-B+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)	0	1.77	98.8	477	941	1,281	1,361
Injection wells (wells)		0	124	553	966	1,582	1,993
Resource characterization, appraisal, permitting costs (million \$2020)		1,500	12,421	19,310	19,310	19,310	19,310
Wells and facilities construction costs (million \$2020)		0	3,766	16,623	29,044	47,564	59,759

Table 79: E-B+ scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-24,500
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-14,000
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-116,000
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-29,000
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-100,000
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-21,000
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-121,000
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-20,000
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-60,000
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							505,500
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-36,700
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-49,000
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-209,000
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-42,500
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							200,000
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-40,500
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-181,500
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-142,000
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-119,000
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							1,020,200
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-48,900
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-84,000
							-302,000
							-57,000
							-
							300,000

Table 79: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-60,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-242,000
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							264,000
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							1,535,900
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-178,000
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4,000
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							10,677
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							59,000
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							10,500
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							3,000
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							8,000
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1,300
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							35,700
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							132,177
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6,000
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							11,025
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							106,500
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							15,800
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							4,350
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							12,000
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							9,400

Table 79: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							71,900
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							236,975
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8,000
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							11,373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							154,000
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							21,000
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 (1000 hectares)							5,700
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							16,000
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							7,500
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							59,000
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							282,573

Table 80: E-B+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-38,876
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-98,674
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3,397
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-140,947
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-38,876
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-188,807

Table 80: E-B+ scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-6,794
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-234,477
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							21,138
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							66,454
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							5,855
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							4,087
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							14,777
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							112,310
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							21,138
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							313,710
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							11,710
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							4,087
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							14,777
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							365,421

Table 81: E-B+ scenario - PILLAR 6: Land sinks - Total assumed land sink

Item	2020	2025	2030	2035	2040	2045	2050
Total assumed land sink (Gt CO2e/y)	-0.7	-0.73	-0.75	-0.78	-0.8	-0.83	-0.85

Table 82: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		8,024	4,920	3,923	3,545	3,381	3,176
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		1,336	1,314	1,574	1,555	1,571	1,517

Table 82: REF scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Mobile - On-Road (deaths)		11,702	12,181	12,657	13,199	13,743	14,295
Premature deaths from air pollution - Gas Stations (deaths)		676	700	721	747	772	795
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		2,152	2,047	1,976	1,955	1,967	1,975
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		546	464	337	226	147	103
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		191	193	197	203	207	210
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		110	110	110	110	109	108
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		1,456	1,478	1,430	1,377	1,394	1,482
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		361	344	318	281	259	247
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		177	183	190	196	202	207
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		153	110	92.2	87.6	85	80.1
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		3,833	4,098	4,245	4,094	4,114	3,917
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		71,114	43,608	34,774	31,416	29,967	28,147
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		11,837	11,639	13,941	13,774	13,915	13,437
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		104,043	108,301	112,532	117,351	122,191	127,101
Monetary damages from air pollution - Gas Stations (million \$2019)		5,990	6,196	6,380	6,616	6,835	7,036
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		19,068	18,140	17,507	17,324	17,427	17,501
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		4,842	4,108	2,983	2,005	1,304	910
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1,695	1,709	1,746	1,799	1,835	1,862
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		973	976	976	972	966	955
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		12,886	13,084	12,660	12,193	12,344	13,118
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		3,197	3,047	2,813	2,490	2,290	2,183
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		1,570	1,622	1,681	1,735	1,787	1,837



Table 82: REF scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		1,347	974	813	773	750	707
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		34,036	36,393	37,698	36,352	36,536	34,785

Table 83: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		31,901	31,368	31,313	30,472	30,467	30,778
By economic sector - Construction (jobs)		449,662	448,696	500,764	539,089	561,514	657,380
By economic sector - Manufacturing (jobs)		298,392	310,515	333,104	336,058	313,850	321,745
By economic sector - Mining (jobs)		481,485	400,603	333,553	269,133	224,097	177,285
By economic sector - Other (jobs)		35,017	35,277	44,788	53,423	60,095	95,270
By economic sector - Pipeline (jobs)		46,537	48,395	49,114	46,834	47,106	45,678
By economic sector - Professional (jobs)		274,750	264,423	279,357	301,235	313,032	359,090
By economic sector - Trade (jobs)		278,534	253,984	250,915	253,455	254,836	283,916
By economic sector - Utilities (jobs)		435,375	425,089	469,308	506,490	522,410	550,918
By resource sector - Biomass (jobs)		82,434	79,427	76,547	73,317	72,403	71,509
By resource sector - CO2 (jobs)			1.03	1.31	1.41	1.55	1.66
By resource sector - Coal (jobs)		117,264	72,102	50,758	42,743	38,286	33,441
By resource sector - Grid (jobs)		457,965	464,310	559,946	622,725	656,659	744,741
By resource sector - Natural Gas (jobs)		570,260	562,626	562,154	548,271	541,238	504,129
By resource sector - Nuclear (jobs)		49,007	46,204	41,200	35,099	30,010	24,657
By resource sector - Oil (jobs)		795,394	714,448	648,289	589,677	544,285	474,550
By resource sector - Solar (jobs)		172,816	163,280	212,479	231,201	246,839	446,301
By resource sector - Wind (jobs)		86,514	115,953	140,841	193,154	197,686	222,730
By education level - All sectors - High school diploma or less (jobs)		967,124	923,201	960,029	980,306	978,356	1,064,576
By education level - All sectors - Associates degree or some college (jobs)		688,935	660,421	692,108	713,776	716,169	785,076
By education level - All sectors - Bachelors degree (jobs)		529,597	497,665	501,785	502,696	494,679	524,269
By education level - All sectors - Masters or professional degree (jobs)		127,756	119,934	121,054	121,929	120,748	129,149
By education level - All sectors - Doctoral degree (jobs)		18,244	17,130	17,241	17,483	17,456	18,992
By education level - Biomass sector - High school diploma or less (jobs)		47,731	46,172	44,960	43,255	42,721	42,422
By education level - Biomass sector - Associates degree or some college (jobs)		15,721	15,116	14,471	13,823	13,632	13,402
By education level - Biomass sector - Bachelors degree (jobs)		14,337	13,667	12,869	12,186	12,012	11,712
By education level - Biomass sector - Masters or professional degree (jobs)		3,946	3,803	3,617	3,454	3,441	3,386
By education level - Biomass sector - Doctoral degree (jobs)		698	670	631	598	598	587
By education level - CO2 sector - High school diploma or less (jobs)			0.368	0.468	0.503	0.555	0.591
By education level - CO2 sector - Associates degree or some college (jobs)			0.287	0.366	0.393	0.435	0.463
By education level - CO2 sector - Bachelors degree (jobs)			0.287	0.365	0.393	0.435	0.464
By education level - CO2 sector - Masters or professional degree (jobs)			0.074	0.094	0.101	0.112	0.119
By education level - CO2 sector - Doctoral degree (jobs)			0.012	0.015	0.016	0.018	0.019

Table 83: REF scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Coal sector - High school diploma or less (jobs)		53,521	32,643	22,951	19,159	16,860	14,468
By education level - Coal sector - Associates degree or some college (jobs)		34,993	21,604	15,196	12,828	11,588	10,214
By education level - Coal sector - Bachelors degree (jobs)		22,698	14,077	9,948	8,484	7,744	6,882
By education level - Coal sector - Masters or professional degree (jobs)		5,292	3,300	2,326	1,983	1,825	1,635
By education level - Coal sector - Doctoral degree (jobs)		760	478	338	289	268	242
By education level - Grid sector - High school diploma or less (jobs)		194,395	198,021	239,922	268,050	283,941	323,471
By education level - Grid sector - Associates degree or some college (jobs)		152,021	154,079	185,749	206,493	217,650	246,726
By education level - Grid sector - Bachelors degree (jobs)		87,116	87,720	105,070	116,065	121,574	136,971
By education level - Grid sector - Masters or professional degree (jobs)		21,921	22,004	26,275	28,937	30,220	33,946
By education level - Grid sector - Doctoral degree (jobs)		2,512	2,487	2,928	3,180	3,275	3,628
By education level - Natural gas sector - High school diploma or less (jobs)		224,113	223,226	224,560	219,540	217,980	204,472
By education level - Natural gas sector - Associates degree or some college (jobs)		183,106	181,431	182,804	180,503	179,358	167,676
By education level - Natural gas sector - Bachelors degree (jobs)		127,562	123,827	121,511	116,438	113,191	103,983
By education level - Natural gas sector - Masters or professional degree (jobs)		31,242	30,086	29,351	28,067	27,139	24,764
By education level - Natural gas sector - Doctoral degree (jobs)		4,238	4,055	3,927	3,724	3,570	3,234
By education level - Nuclear sector - High school diploma or less (jobs)		16,611	15,707	14,046	11,999	10,287	8,475
By education level - Nuclear sector - Associates degree or some college (jobs)		13,382	12,619	11,255	9,591	8,202	6,741
By education level - Nuclear sector - Bachelors degree (jobs)		14,465	13,608	12,109	10,294	8,783	7,202
By education level - Nuclear sector - Masters or professional degree (jobs)		3,915	3,677	3,266	2,772	2,361	1,933
By education level - Nuclear sector - Doctoral degree (jobs)		634	593	524	443	376	306
By education level - Oil sector - High school diploma or less (jobs)		319,890	290,042	265,879	244,649	228,550	202,090
By education level - Oil sector - Associates degree or some college (jobs)		206,894	186,432	169,741	154,947	143,556	125,658
By education level - Oil sector - Bachelors degree (jobs)		213,345	189,156	169,188	151,377	137,271	117,201
By education level - Oil sector - Masters or professional degree (jobs)		48,374	42,677	37,962	33,746	30,392	25,735
By education level - Oil sector - Doctoral degree (jobs)		6,891	6,141	5,520	4,959	4,515	3,865
By education level - Solar PV sector - High school diploma or less (jobs)		77,631	72,470	93,202	100,149	105,581	188,653
By education level - Solar PV sector - Associates degree or some college (jobs)		55,428	52,423	68,288	74,421	79,582	144,103
By education level - Solar PV sector - Bachelors degree (jobs)		30,683	29,574	39,255	43,420	47,138	86,667
By education level - Solar PV sector - Masters or professional degree (jobs)		7,662	7,446	9,928	11,167	12,284	22,732
By education level - Solar PV sector - Doctoral degree (jobs)		1,413	1,367	1,806	2,044	2,253	4,146

Table 83: REF scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By education level - Wind sector - High school diploma or less (jobs)		33,232	44,919	54,508	73,504	72,435	80,524
By education level - Wind sector - Associates degree or some college (jobs)		27,391	36,717	44,603	61,170	62,601	70,556
By education level - Wind sector - Bachelors degree (jobs)		19,390	26,035	31,834	44,431	46,964	53,650
By education level - Wind sector - Masters or professional degree (jobs)		5,403	6,941	8,328	11,803	13,085	15,017
By education level - Wind sector - Doctoral degree (jobs)		1,098	1,340	1,567	2,246	2,601	2,984
Related work experience - All sectors - None (jobs)		330,521	315,981	328,724	336,717	337,033	367,187
Related work experience - All sectors - Up to 1 year (jobs)		453,065	430,922	446,844	456,216	454,502	498,089
Related work experience - All sectors - 1 to 4 years (jobs)		857,825	814,137	838,127	852,079	847,943	914,892
Related work experience - All sectors - 4 to 10 years (jobs)		542,618	516,803	534,165	545,072	543,420	587,187
Related work experience - All sectors - Over 10 years (jobs)		147,625	140,508	144,356	146,105	144,509	154,704
Related work experience - Biomass sector - None (jobs)		13,981	13,454	12,993	12,440	12,256	12,113
Related work experience - Biomass sector - Up to 1 year (jobs)		27,594	26,850	26,215	25,390	25,189	25,054
Related work experience - Biomass sector - 1 to 4 years (jobs)		24,570	23,497	22,459	21,305	20,969	20,627
Related work experience - Biomass sector - 4 to 10 years (jobs)		12,773	12,232	11,633	11,065	10,904	10,683
Related work experience - Biomass sector - Over 10 years (jobs)		3,517	3,394	3,249	3,117	3,085	3,032
Related work experience - CO2 sector - None (jobs)			0.136	0.173	0.186	0.205	0.218
Related work experience - CO2 sector - Up to 1 year (jobs)			0.177	0.225	0.242	0.268	0.285
Related work experience - CO2 sector - 1 to 4 years (jobs)			0.391	0.497	0.535	0.591	0.629
Related work experience - CO2 sector - 4 to 10 years (jobs)			0.248	0.315	0.339	0.375	0.4
Related work experience - CO2 sector - Over 10 years (jobs)			0.076	0.097	0.105	0.116	0.123
Related work experience - Coal sector - None (jobs)		15,674	9,651	6,784	5,718	5,147	4,519
Related work experience - Coal sector - Up to 1 year (jobs)		25,283	15,455	10,897	9,125	8,050	6,923
Related work experience - Coal sector - 1 to 4 years (jobs)		44,669	27,422	19,283	16,215	14,491	12,628
Related work experience - Coal sector - 4 to 10 years (jobs)		25,249	15,610	10,989	9,304	8,436	7,458
Related work experience - Coal sector - Over 10 years (jobs)		6,389	3,965	2,805	2,382	2,162	1,914
Related work experience - Grid sector - None (jobs)		68,021	69,016	83,291	92,690	97,801	110,983
Related work experience - Grid sector - Up to 1 year (jobs)		87,687	89,173	107,871	120,335	127,287	144,811
Related work experience - Grid sector - 1 to 4 years (jobs)		165,602	167,766	202,165	224,658	236,719	268,266
Related work experience - Grid sector - 4 to 10 years (jobs)		108,525	109,863	132,291	146,901	154,671	175,152
Related work experience - Grid sector - Over 10 years (jobs)		28,130	28,492	34,328	38,141	40,182	45,529

Table 83: REF scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - Natural gas sector - None (jobs)		82,567	81,821	82,254	80,821	80,174	74,939
Related work experience - Natural gas sector - Up to 1 year (jobs)		99,217	97,937	97,761	95,087	93,846	87,481
Related work experience - Natural gas sector - 1 to 4 years (jobs)		210,446	207,459	207,046	201,646	198,838	185,049
Related work experience - Natural gas sector - 4 to 10 years (jobs)		140,009	138,076	138,085	135,005	133,351	124,173
Related work experience - Natural gas sector - Over 10 years (jobs)		38,021	37,332	37,008	35,713	35,028	32,487
Related work experience - Nuclear sector - None (jobs)		6,177	5,830	5,204	4,438	3,798	3,124
Related work experience - Nuclear sector - Up to 1 year (jobs)		9,018	8,508	7,591	6,471	5,536	4,551
Related work experience - Nuclear sector - 1 to 4 years (jobs)		18,292	17,240	15,368	13,088	11,186	9,188
Related work experience - Nuclear sector - 4 to 10 years (jobs)		11,867	11,182	9,965	8,485	7,251	5,955
Related work experience - Nuclear sector - Over 10 years (jobs)		3,653	3,445	3,072	2,617	2,238	1,839
Related work experience - Oil sector - None (jobs)		107,206	96,690	88,143	80,619	74,855	65,744
Related work experience - Oil sector - Up to 1 year (jobs)		148,335	133,305	121,106	110,446	102,284	89,701
Related work experience - Oil sector - 1 to 4 years (jobs)		303,081	272,244	246,965	224,455	206,940	180,054
Related work experience - Oil sector - 4 to 10 years (jobs)		183,894	164,890	149,308	135,444	124,649	108,255
Related work experience - Oil sector - Over 10 years (jobs)		52,877	47,319	42,767	38,712	35,557	30,796
Related work experience - Solar PV sector - None (jobs)		25,088	23,738	30,923	33,772	36,178	65,564
Related work experience - Solar PV sector - Up to 1 year (jobs)		38,594	36,227	46,846	50,601	53,631	96,325
Related work experience - Solar PV sector - 1 to 4 years (jobs)		60,117	57,004	74,432	81,316	87,156	158,132
Related work experience - Solar PV sector - 4 to 10 years (jobs)		39,241	37,056	48,179	52,437	55,977	101,137
Related work experience - Solar PV sector - Over 10 years (jobs)		9,777	9,255	12,100	13,075	13,896	25,143
Related work experience - Wind sector - None (jobs)		11,808	15,780	19,134	26,217	26,824	30,201
Related work experience - Wind sector - Up to 1 year (jobs)		17,337	23,468	28,557	38,761	38,679	43,243
Related work experience - Wind sector - 1 to 4 years (jobs)		31,047	41,505	50,408	69,398	71,642	80,948
Related work experience - Wind sector - 4 to 10 years (jobs)		21,061	27,894	33,715	46,431	48,180	54,375
Related work experience - Wind sector - Over 10 years (jobs)		5,261	7,306	9,028	12,348	12,361	13,964
On-the-Job Training - All sectors - None (jobs)		130,233	122,606	125,019	126,243	125,015	136,087
On-the-Job Training - All sectors - Up to 1 year (jobs)		1,568,598	1,488,704	1,530,762	1,553,547	1,542,308	1,663,970
On-the-Job Training - All sectors - 1 to 4 years (jobs)		470,637	450,564	470,585	483,598	484,654	527,942
On-the-Job Training - All sectors - 4 to 10 years (jobs)		140,505	135,696	144,330	150,949	153,844	170,560
On-the-Job Training - All sectors - Over 10 years (jobs)		21,682	20,781	21,522	21,852	21,587	23,501

Table 83: REF scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Biomass sector - None (jobs)		5,115	4,898	4,671	4,461	4,387	4,302
On-the-Job Training - Biomass sector - Up to 1 year (jobs)		65,569	63,189	60,975	58,425	57,706	57,044
On-the-Job Training - Biomass sector - 1 to 4 years (jobs)		9,082	8,752	8,404	8,030	7,931	7,814
On-the-Job Training - Biomass sector - 4 to 10 years (jobs)		2,078	2,011	1,934	1,853	1,834	1,809
On-the-Job Training - Biomass sector - Over 10 years (jobs)		590	578	562	548	545	540
On-the-Job Training - CO2 sector - None (jobs)			0.062	0.078	0.084	0.093	0.1
On-the-Job Training - CO2 sector - Up to 1 year (jobs)			0.709	0.902	0.97	1.07	1.14
On-the-Job Training - CO2 sector - 1 to 4 years (jobs)			0.199	0.253	0.273	0.301	0.321
On-the-Job Training - CO2 sector - 4 to 10 years (jobs)			0.048	0.061	0.066	0.073	0.078
On-the-Job Training - CO2 sector - Over 10 years (jobs)			0.01	0.012	0.013	0.015	0.016
On-the-Job Training - Coal sector - None (jobs)		5,855	3,604	2,545	2,156	1,940	1,701
On-the-Job Training - Coal sector - Up to 1 year (jobs)		82,094	50,386	35,517	29,893	26,663	23,181
On-the-Job Training - Coal sector - 1 to 4 years (jobs)		22,287	13,762	9,662	8,139	7,352	6,483
On-the-Job Training - Coal sector - 4 to 10 years (jobs)		6,269	3,873	2,694	2,263	2,063	1,837
On-the-Job Training - Coal sector - Over 10 years (jobs)		759	476	340	292	268	239
On-the-Job Training - Grid sector - None (jobs)		22,413	22,692	27,330	30,356	31,972	36,219
On-the-Job Training - Grid sector - Up to 1 year (jobs)		294,044	298,002	359,250	399,387	421,010	477,330
On-the-Job Training - Grid sector - 1 to 4 years (jobs)		102,875	104,381	125,972	140,191	147,925	167,866
On-the-Job Training - Grid sector - 4 to 10 years (jobs)		34,963	35,507	42,890	47,773	50,452	57,302
On-the-Job Training - Grid sector - Over 10 years (jobs)		3,670	3,728	4,504	5,018	5,302	6,024
On-the-Job Training - Natural gas sector - None (jobs)		29,757	28,985	28,529	27,393	26,723	24,643
On-the-Job Training - Natural gas sector - Up to 1 year (jobs)		368,095	362,428	360,924	350,441	344,973	320,729
On-the-Job Training - Natural gas sector - 1 to 4 years (jobs)		126,385	125,235	125,961	123,905	122,978	114,961
On-the-Job Training - Natural gas sector - 4 to 10 years (jobs)		40,605	40,624	41,408	41,379	41,485	39,059
On-the-Job Training - Natural gas sector - Over 10 years (jobs)		5,419	5,354	5,332	5,154	5,079	4,737
On-the-Job Training - Nuclear sector - None (jobs)		3,292	3,102	2,765	2,354	2,012	1,653
On-the-Job Training - Nuclear sector - Up to 1 year (jobs)		33,429	31,506	28,083	23,916	20,441	16,789
On-the-Job Training - Nuclear sector - 1 to 4 years (jobs)		9,488	8,955	7,993	6,817	5,834	4,798
On-the-Job Training - Nuclear sector - 4 to 10 years (jobs)		2,288	2,160	1,928	1,645	1,408	1,158
On-the-Job Training - Nuclear sector - Over 10 years (jobs)		510	482	430	367	315	259

Table 83: REF scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - Oil sector - None (jobs)		48,401	42,836	38,296	34,340	31,258	26,919
On-the-Job Training - Oil sector - Up to 1 year (jobs)		560,028	502,962	456,281	414,875	382,737	333,419
On-the-Job Training - Oil sector - 1 to 4 years (jobs)		144,954	130,489	118,668	108,164	100,062	87,426
On-the-Job Training - Oil sector - 4 to 10 years (jobs)		34,246	31,166	28,675	26,483	24,839	22,064
On-the-Job Training - Oil sector - Over 10 years (jobs)		7,764	6,995	6,369	5,814	5,389	4,722
On-the-Job Training - Solar PV sector - None (jobs)		10,380	9,858	12,877	14,144	15,224	27,670
On-the-Job Training - Solar PV sector - Up to 1 year (jobs)		109,793	104,245	136,462	148,700	159,151	289,014
On-the-Job Training - Solar PV sector - 1 to 4 years (jobs)		37,128	34,808	44,906	48,632	51,627	92,669
On-the-Job Training - Solar PV sector - 4 to 10 years (jobs)		13,463	12,465	15,799	17,142	18,148	32,188
On-the-Job Training - Solar PV sector - Over 10 years (jobs)		2,052	1,903	2,436	2,583	2,689	4,762
On-the-Job Training - Wind sector - None (jobs)		5,021	6,631	8,006	11,039	11,498	12,981
On-the-Job Training - Wind sector - Up to 1 year (jobs)		55,547	75,984	93,268	127,909	129,627	146,463
On-the-Job Training - Wind sector - 1 to 4 years (jobs)		18,438	24,181	29,017	39,720	40,946	45,924
On-the-Job Training - Wind sector - 4 to 10 years (jobs)		6,591	7,891	9,002	12,410	13,615	15,145
On-the-Job Training - Wind sector - Over 10 years (jobs)		916	1,265	1,549	2,076	2,001	2,218
On-Site or In-Plant Training - All sectors - None (jobs)		372,104	353,385	364,232	370,873	368,686	401,469
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		1,422,833	1,350,271	1,389,206	1,410,404	1,400,944	1,511,925
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		368,612	352,606	367,702	377,223	377,598	410,916
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		150,124	144,546	152,333	158,062	160,236	175,795
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		17,981	17,542	18,743	19,629	19,944	21,956
On-Site or In-Plant Training - Biomass sector - None (jobs)		13,295	12,752	12,228	11,645	11,488	11,329
On-Site or In-Plant Training - Biomass sector - Up to 1 year (jobs)		57,665	55,606	53,672	51,476	50,846	50,255
On-Site or In-Plant Training - Biomass sector - 1 to 4 years (jobs)		8,314	8,010	7,705	7,367	7,270	7,168
On-Site or In-Plant Training - Biomass sector - 4 to 10 years (jobs)		2,584	2,495	2,393	2,293	2,266	2,228
On-Site or In-Plant Training - Biomass sector - Over 10 years (jobs)		576	564	550	536	533	529
On-Site or In-Plant Training - CO2 sector - None (jobs)			0.171	0.217	0.234	0.259	0.276
On-Site or In-Plant Training - CO2 sector - Up to 1 year (jobs)			0.639	0.813	0.875	0.966	1.03
On-Site or In-Plant Training - CO2 sector - 1 to 4 years (jobs)			0.154	0.196	0.211	0.233	0.249
On-Site or In-Plant Training - CO2 sector - 4 to 10 years (jobs)			0.057	0.073	0.078	0.086	0.092
On-Site or In-Plant Training - CO2 sector - Over 10 years (jobs)			0.006	0.008	0.009	0.009	0.01

Table 83: REF scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Coal sector - None (jobs)		16,850	10,437	7,376	6,265	5,686	5,029
On-Site or In-Plant Training - Coal sector - Up to 1 year (jobs)		75,351	46,205	32,545	27,355	24,357	21,143
On-Site or In-Plant Training - Coal sector - 1 to 4 years (jobs)		17,859	11,003	7,730	6,504	5,849	5,134
On-Site or In-Plant Training - Coal sector - 4 to 10 years (jobs)		6,442	3,981	2,774	2,336	2,131	1,898
On-Site or In-Plant Training - Coal sector - Over 10 years (jobs)		761	475	333	283	262	236
On-Site or In-Plant Training - Grid sector - None (jobs)		69,740	70,548	84,892	94,206	99,129	112,190
On-Site or In-Plant Training - Grid sector - Up to 1 year (jobs)		269,883	273,639	330,026	367,058	387,096	439,064
On-Site or In-Plant Training - Grid sector - 1 to 4 years (jobs)		79,099	80,297	96,955	107,953	113,965	129,394
On-Site or In-Plant Training - Grid sector - 4 to 10 years (jobs)		34,740	35,258	42,562	47,378	50,004	56,759
On-Site or In-Plant Training - Grid sector - Over 10 years (jobs)		4,503	4,568	5,511	6,130	6,466	7,335
On-Site or In-Plant Training - Natural gas sector - None (jobs)		90,790	89,018	88,485	86,038	84,592	78,439
On-Site or In-Plant Training - Natural gas sector - Up to 1 year (jobs)		335,648	330,639	329,404	319,930	315,066	293,042
On-Site or In-Plant Training - Natural gas sector - 1 to 4 years (jobs)		96,099	95,281	95,809	94,122	93,397	87,337
On-Site or In-Plant Training - Natural gas sector - 4 to 10 years (jobs)		42,664	42,609	43,259	42,963	42,940	40,366
On-Site or In-Plant Training - Natural gas sector - Over 10 years (jobs)		5,060	5,079	5,198	5,218	5,244	4,946
On-Site or In-Plant Training - Nuclear sector - None (jobs)		8,772	8,262	7,360	6,264	5,351	4,393
On-Site or In-Plant Training - Nuclear sector - Up to 1 year (jobs)		30,140	28,415	25,335	21,582	18,451	15,158
On-Site or In-Plant Training - Nuclear sector - 1 to 4 years (jobs)		7,232	6,826	6,094	5,198	4,449	3,659
On-Site or In-Plant Training - Nuclear sector - 4 to 10 years (jobs)		2,617	2,470	2,204	1,880	1,609	1,323
On-Site or In-Plant Training - Nuclear sector - Over 10 years (jobs)		245	231	206	176	150	123
On-Site or In-Plant Training - Oil sector - None (jobs)		128,070	114,160	102,780	92,748	84,932	73,475
On-Site or In-Plant Training - Oil sector - Up to 1 year (jobs)		504,220	452,845	410,849	373,639	344,793	300,510
On-Site or In-Plant Training - Oil sector - 1 to 4 years (jobs)		117,197	105,658	96,224	87,832	81,356	71,167
On-Site or In-Plant Training - Oil sector - 4 to 10 years (jobs)		41,330	37,551	34,480	31,757	29,692	26,252
On-Site or In-Plant Training - Oil sector - Over 10 years (jobs)		4,577	4,235	3,956	3,702	3,512	3,145
On-Site or In-Plant Training - Solar PV sector - None (jobs)		29,444	27,905	36,422	39,744	42,551	77,136
On-Site or In-Plant Training - Solar PV sector - Up to 1 year (jobs)		99,930	94,761	123,869	134,911	144,294	261,760
On-Site or In-Plant Training - Solar PV sector - 1 to 4 years (jobs)		28,805	27,027	34,906	37,800	40,136	72,101
On-Site or In-Plant Training - Solar PV sector - 4 to 10 years (jobs)		13,142	12,185	15,476	16,785	17,773	31,562
On-Site or In-Plant Training - Solar PV sector - Over 10 years (jobs)		1,495	1,402	1,808	1,961	2,085	3,743

Table 83: REF scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Wind sector - None (jobs)		15,143	20,303	24,688	33,961	34,957	39,478
On-Site or In-Plant Training - Wind sector - Up to 1 year (jobs)		49,996	68,161	83,506	114,453	116,041	130,992
On-Site or In-Plant Training - Wind sector - 1 to 4 years (jobs)		14,006	18,503	22,279	30,448	31,175	34,955
On-Site or In-Plant Training - Wind sector - 4 to 10 years (jobs)		6,606	7,996	9,186	12,669	13,822	15,407
On-Site or In-Plant Training - Wind sector - Over 10 years (jobs)		763	990	1,182	1,622	1,691	1,899
Wage income - Biomass (million \$2019)		4,270	4,184	4,096	3,994	4,034	4,069
Wage income - CO2 (million \$2019)			0.075	0.097	0.107	0.121	0.132
Wage income - Coal (million \$2019)		6,924	4,321	3,077	2,630	2,405	2,146
Wage income - Grid (million \$2019)		28,641	29,425	35,975	40,576	43,412	49,973
Wage income - Natural Gas (million \$2019)		37,783	37,773	38,180	37,614	37,575	35,454
Wage income - Nuclear (million \$2019)		3,503	3,382	3,089	2,697	2,365	1,994
Wage income - Oil (million \$2019)		52,354	47,625	43,737	40,221	37,516	33,003
Wage income - Solar (million \$2019)		9,792	9,387	12,396	13,730	14,926	27,469
Wage income - Wind (million \$2019)		5,343	7,146	8,746	12,248	12,993	14,921

Table 84: REF scenario - IMPACTS - Fossil fuel industries

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		6,043	5,699	5,491	5,512	5,642	5,820
Oil consumption - Cumulative (million bbls)							178,024
Oil production - Annual (million bbls)		5,198	5,216	5,209	5,074	4,957	4,365
Oil production - Cumulative (million bbls)							155,778
Natural gas consumption - Annual (tcf)		23,809	26,243	27,450	25,560	25,988	25,610
Natural gas consumption - Cumulative (tcf)							792,006
Natural gas production - Annual (tcf)		36,910	41,028	42,444	40,854	41,386	41,138
Natural gas production - Cumulative (tcf)							1,236,087

Table 85: REF scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	28,007	26,732	24,918	23,878	24,004	24,746	25,679
Final energy use - Residential (PJ)	11,787	11,149	10,849	10,682	10,653	10,714	10,787
Final energy use - Commercial (PJ)	9,013	9,089	9,161	9,159	9,215	9,479	9,955
Final energy use - Industry (PJ)	25,111	26,559	27,315	27,857	28,763	29,709	30,835

Table 86: REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		174	178	262	276	263	274

Table 87: REF scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	4.05	6.24	7.05	8.71	10.6	12.1	13.3
Vehicle sales - Light-duty - gasoline (%)	89.4	85.7	83.4	81.3	79.2	77.3	75.7
Vehicle sales - Light-duty - hybrid (%)	4.93	5.75	7	7.55	8.08	8.59	8.95
Vehicle sales - Light-duty - diesel (%)	1.4	1.84	2.16	2.01	1.81	1.68	1.6
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.371	0.337	0.298	0.293	0.293	0.303
Vehicle sales - Light-duty - other (%)	0.095	0.099	0.095	0.096	0.095	0.094	0.096
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



Table 87: REF scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Medium-duty - hybrid (%)	0.365	0.427	0.496	0.577	0.674	0.793	0.929
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - hydrogen FC (%)	0.175	0.208	0.242	0.285	0.339	0.409	0.487
Vehicle sales - Medium-duty - other (%)	0.255	0.271	0.298	0.345	0.42	0.528	0.671
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

Table 88: REF scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	13	31.3	32.2	33.6	35.1	36.7	38.4
Sales of space heating units - Electric Resistance (%)	20.8	20.7	20.5	20.1	19.6	18.5	16.6
Sales of space heating units - Gas (%)	56.2	36.1	38.6	39.6	39	38.5	38.6
Sales of space heating units - Fossil (%)	10.1	11.9	8.72	6.7	6.35	6.23	6.31
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	38.4	51.9	52	52.3	52.2	52.3	52.3
Sales of water heating units - Gas Furnace (%)	58	45.4	45.4	45.1	45.2	45.1	45.1
Sales of water heating units - Other (%)	3.58	2.66	2.63	2.62	2.62	2.6	2.59
Sales of cooking units - Electric Resistance (%)	60.9	60.9	60.9	60.9	60.9	60.9	60.9
Sales of cooking units - Gas (%)	39.1	39.1	39.1	39.1	39.1	39.1	39.1
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		244	252				

Table 89: REF scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	2.95	20.2	53	69	71.2	71.5	71.4
Sales of space heating units - Electric Resistance (%)	7.91	9.57	15.3	22	26.9	27.7	27.7
Sales of space heating units - Gas Furnace (%)	85.2	66.6	29.1	7.95	1.72	0.875	0.814
Sales of space heating units - Fossil (%)	3.94	3.64	2.67	1.11	0.16	0.012	0
Sales of water heating units - Electric Heat Pump (%)	0.385	0.401	0.397	0.398	0.398	0.397	0.397
Sales of water heating units - Electric Resistance (%)	3.8	3.86	3.84	3.85	3.86	3.85	3.86
Sales of water heating units - Gas Furnace (%)	94.1	94.1	94	94	94	94	94
Sales of water heating units - Other (%)	1.66	1.69	1.73	1.71	1.73	1.74	1.73
Sales of cooking units - Electric Resistance (%)	32.5	34.7	34.8	34.8	34.8	34.9	34.9
Sales of cooking units - Gas (%)	67.5	65.3	65.2	65.2	65.2	65.1	65.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,033,244	1,071,458				

Table 90: REF scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed - Onshore wind (MW)	97,749	99,521	121,386	144,651	220,515	277,590	307,422
Installed - Offshore wind (MW)	29.3	997	2,991	5,028	7,082	9,651	38,635
Installed - Rooftop PV (MW)	33,317	52,523	69,448	90,809	117,114	148,351	185,890
Installed - Utility-scale PV (MW)	18,371	20,175	28,189	51,008	69,172	75,363	101,359
Installed - Hydro (MW)	78,608	78,608	78,608	78,608	78,608	78,608	78,608
Installed - Geothermal (MW)	2,394	2,396	2,400	2,405	2,409	2,415	2,421
Installed - Nuclear (MW)	98,458	95,132	90,001	76,069	68,465	56,021	48,338
Installed - Ccgt & gas steam (MW)	335,091	336,429	372,171	418,875	420,609	411,216	402,211
Installed - Ccgt w cc (MW)	0	0	75.1	123	155	183	198
Installed - Ct (MW)	147,318	141,836	138,659	133,493	148,035	248,004	303,871
Installed - Biomass (MW)	10,004	9,138	7,833	6,120	4,703	3,396	2,509
Installed - Biomass w cc (MW)	0	0	28.2	35.9	41.9	48.4	53.9
Installed - Coal (MW)	215,803	136,252	87,021	67,927	65,539	63,529	58,003
Installed - Other (MW)	67,926	57,451	55,131	53,826	51,918	50,896	49,542
Installed - Grid battery storage (MW)		1,001	1,423	2,713	3,240	4,835	5,590
Installed - Pumped hydro storage (MW)		19,418	19,418	19,418	19,418	19,418	19,418

Table 91: REF scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Onshore wind (TWh)	411	413	510	613	942	1,177	1,300
Offshore wind (TWh)	0.096	3.67	11.1	23.4	28.7	38.7	173
Rooftop PV (TWh)	50.1	79.5	102	130	174	221	268
Utility-scale PV (TWh)	49.1	54.5	72.9	131	182	199	257
Hydro (TWh)	300	312	295	296	304	294	295
Geothermal (TWh)	14.6	14.5	14.6	14.6	14.2	14.2	13.9
Nuclear (TWh)	802	775	733	620	558	456	394
Gas (TWh)	1,547	1,791	2,184	2,446	2,263	2,338	2,245
Gas w cc (TWh)	0	0	0.252	0.351	0.376	0.416	0.441
Biomass (TWh)	16.8	20.1	14	8.93	3.82	4.42	5.62
Biomass w cc (TWh)	0	0	0.088	0.099	0.108	0.12	0.13
Coal (TWh)	965	844	534	394	366	342	310

Table 92: REF scenario - PILLAR 2: Clean Electricity - Transmission

Item	2020	2025	2030	2035	2040	2045	2050
Total HV transmission (for wind and solar) - Base (percent of 2020)	0	0.145	0.183	0.299	0.379	0.463	0.471

Table 93: REF scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass input - Biopower (1000 tonnes)	7,104	16,068	14,149	12,723	6,554	8,191	11,637
Biomass input - Biopower w/ cc (1000 tonnes)	0	0	53.2	59.8	65.2	72.5	78.2
Biomass input - BECCS-H2 (1000 tonnes)	0	0	0	0	0	0	0
Biomass input - FT diesel (1000 tonnes)	0	0	0	0	0	0	0
Biomass input - Bio-FT w/ CC (1000 tonnes)	0	0	0	0	0	0	0
Biomass input - Pyrolysis liquids (1000 tonnes)	0	0	0	0	0	0	0
Biomass input - Pyrolysis liquids w/ cc (1000 tonnes)	0	0	0	0	0	0	0
Biomass input - SNG (1000 tonnes)	0	0	0	0	0	0	0
Biomass input - Bio-SNG w/ CC (1000 tonnes)	0	0	5.9	6.22	5.52	5.33	5.34
Biomass input - Ethanol (1000 tonnes)	129,536	129,536	129,529	129,529	129,536	129,536	129,536

Table 94: REF scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)	0	0	0.18	0.23	0.25	0.28	0.29

Table 95: 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)	-575		-367				-325
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-81.6		-139				-146
Business-as-usual carbon sink - Total (Mt CO2e/y)	-657		-507				-472

Table 96: REF scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-24,500
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-14,000
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-116,000
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-29,000
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-100,000
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-21,000
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-121,000
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-20,000
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-60,000
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							505,500
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-36,700
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-49,000
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-209,000
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-42,500
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							200,000
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-40,500
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-181,500
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-142,000
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-119,000
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							1,020,200
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-48,900
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-84,000

Table 96: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-302,000
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-57,000
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							300,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-60,000
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-242,000
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							264,000
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							-
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							1,535,900
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							-178,000
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							4,000
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							10,677
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							59,000
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							10,500
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							3,000
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							8,000
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							1,300
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							35,700
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							132,177
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							6,000
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							11,025
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							106,500
							15,800
							0
							4,350

Table 96: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							12,000
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							9,400
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							71,900
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							236,975
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8,000
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							11,373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							154,000
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							21,000
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 (1000 hectares)							5,700
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							16,000
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							7,500
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							59,000
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							282,573

Table 97: REF scenario - PILLAR 6: Land sinks - Total assumed land sink

Item	2020	2025	2030	2035	2040	2045	2050
Total assumed land sink (Gt CO2e/y)	-0.7	-0.73	-0.75	-0.78	-0.8	-0.83	-0.85