

'Achievability of the Paris targets in the EU – the role of demand-side driven mitigation in different types of scenarios'

- Supplementary Material: Results of the index decomposition with (w/ steps) and without (w/o steps) time steps

Index decomposition - Overall

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
IMAGE 450-NucOff-OPT	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	-5,00	-752,09	-1173,01	-1524,86	-32,9%	-1524,86	-32,9%
Population	86,80	117,82	112,01	92,61	2,0%	58,11	1,3%
Energy use per capita	-263,16	-389,81	-391,34	-521,14	-11,3%	-490,05	-10,6%
Electrification	89,31	109,41	102,77	76,25	1,6%	74,39	1,6%
Renewable fuels + heat	-4,97	-144,67	-374,81	-686,05	-14,8%	-726,61	-15,7%
CO2 intensity power + heat	-536,12	-1096,99	-1356,71	-1408,32	-30,4%	-1402,93	-30,3%
CO2 intensity fossil fuels	-54,34	-165,11	-199,95	-170,42	-3,7%	-129,99	-2,8%
Total	-687,47	-2321,44	-3281,03	-4141,93	-89,5%	-4141,93	-89,5%

Index decomposition - Transport

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
IMAGE 450-NucOff-OPT	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	22,00	30,54	28,86	24,36	2,1%	12,59	1,1%
Activity	75,53	140,79	194,60	231,77	20,3%	187,80	16,5%
Energy intensity	-146,96	-244,82	-285,85	-379,99	-33,3%	-319,09	-28,0%
Electrification	-5,09	-9,78	-12,01	-17,79	-1,6%	-19,56	-1,7%
Biofuels	-33,98	-129,97	-176,37	-117,70	-10,3%	-133,69	-11,7%
Hydrogen	0,00	-7,51	-144,35	-524,76	-46,0%	-531,85	-46,7%
CO2 intensity fossil fuels	-20,63	-30,16	-24,33	9,27	0,8%	28,98	2,5%
Total	-109,12	-250,92	-419,45	-774,83	-68,0%	-774,83	-68,0%

Index decomposition - Buildings

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
IMAGE 450-NucOff-OPT	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	12,78	18,06	16,95	13,36	2,1%	9,17	1,4%
Energy use per capita	-29,42	-39,92	-56,15	-75,16	-11,7%	-69,71	-10,9%
Electrification	-33,81	-48,53	-82,18	-127,90		-124,73	
Renewable fuels + heat	21,65	32,70	35,89	36,03	5,6%	32,33	5,0%
District heat	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
CO2 intensity fossil fuels	-7,28	-6,05	-59,47	-108,27	-16,9%	-112,70	-17,5%
Total	-57,73	-76,43	-180,85	-297,97	-46,4%	-297,97	-46,4%

Index decomposition - Industry

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
IMAGE 450-NucOff-OPT	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	-5,00	-2,42	-63,03	-143,09	-15,5%	-143,09	-15,5%
Population	17,44	23,46	22,34	17,96	2,0%	12,81	1,4%
Energy use per capita	-63,72	-103,64	-92,96	-108,84	-11,8%	-100,08	-10,9%
Electrification	-41,07	-96,08	-123,15	-146,45	-15,9%	-167,20	-18,2%
Renewable fuels + heat	-4,92	-67,88	-136,45	-206,64	-22,4%	-240,35	-26,1%
Combined heat + power	-3,66	-3,61	-0,08	-0,71	-0,1%	-0,05	0,0%
CO2 intensity fossil fuels	-23,49	-108,26	-78,97	29,45	3,2%	79,66	8,7%
Total	-124,42	-358,42	-472,29	-558,31	-60,6%	-558,31	-60,6%

Index decomposition - Energy supply

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
IMAGE 450-NucOff-OPT	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	-749,67	-1109,99	-1381,77	-86,9%	-1381,77	-86,9%
Population	29,06	38,53	36,90	30,88	1,9%	20,16	1,3%
Electricity use per capita	122,80	197,40	254,12	289,87	18,2%	305,18	19,2%
Renewable electricity	-355,33	-1189,55	-1635,08	-1825,64	-114,7%	-1777,42	-111,7%
Nuclear	100,24	368,80	535,40	599,61	37,7%	415,14	26,1%
Import	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Emission factor	-203,30	-138,44	-89,55	21,15	1,3%	152,80	9,6%
Total	-306,53	-1472,94	-2008,20	-2265,91	-142,4%	-2265,91	-142,4%

Based on the following sources:

IMAGE 450-NucOff-OPT: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

PRIMES HiEffHiRES: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

France-negaWatt: "Scenario négaWatt 2050" (négaWatt Association 2014),

Germany-KS95: "Climate protection scenario 2050", KS95 run (Repenning et al. 2015),

Italy-DDPP-DRS: "Pathways to deep decarbonisation in Italy", demand reduction scenario (Viridis et al. 2015)

UK-ZCB2030: "Zero Carbon Britain 2030" (Allen et al. 2013).

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Index decomposition - Overall							
	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
PRIMES HiEffHiRES	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	-12,18	-14,34	-94,58	-248,67	-0,06	-248,67	-0,06
Population	105,13	140,79	141,47	129,22	0,03	65,31	0,02
Energy use per capita	-113,74	-380,12	-629,86	-841,09	-0,21	-815,91	-0,21
Electrification	49,94	39,06	-43,12	-117,59	-0,03	-124,41	-0,03
Renewable fuels + heat	-76,87	-98,89	-300,84	-544,93	-0,14	-548,60	-0,14
CO2 intensity power + heat	-514,75	-953,00	-1232,20	-1401,84	-0,35	-1300,44	-0,33
CO2 intensity fossil fuels	5,12	-53,51	-86,25	-264,93	-0,07	-317,11	-0,08
Total	-557,36	-1320,02	-2245,37	-3289,83	-0,83	-3289,83	-0,83

Index decomposition - Transport							
	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
PRIMES HiEffHiRES	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	29,21	40,14	40,35	36,50	3,5%	19,10	1,8%
Activity	118,44	178,32	221,89	235,31	22,4%	168,31	16,1%
Energy intensity	-138,86	-300,09	-478,34	-563,84	-53,8%	-472,83	-45,1%
Electrification	-13,61	-66,32	-161,54	-209,97	-20,0%	-207,79	-19,8%
Biofuels	-43,71	-46,05	-136,80	-234,23	-22,3%	-242,15	-23,1%
Hydrogen	-0,03	-0,04	-0,06	-0,08	0,0%	-0,07	0,0%
CO2 intensity fossil fuels	0,62	1,22	2,50	1,90	0,2%	1,02	0,1%
Total	-47,95	-192,82	-511,99	-734,41	-70,1%	-734,41	-70,1%

Index decomposition - Buildings							
	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
PRIMES HiEffHiRES	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	16,38	21,69	21,79	20,35	3,2%	8,95	1,4%
Energy use per capita	-40,67	-112,49	-158,60	-195,25	-30,3%	-175,62	-27,3%
Electrification	-95,91	-131,76	-231,04	-337,86		-358,25	
Renewable fuels + heat	-32,38	-51,74	-110,58	-184,25	-28,6%	-204,88	-31,8%
District heat	3,44	4,37	11,16	15,49	2,4%	19,41	3,0%
CO2 intensity fossil fuels	-13,54	-27,05	-37,07	-37,54	-5,8%	-25,38	-3,9%
Total	-133,73	-249,61	-404,92	-550,30	-85,5%	-550,30	-85,5%

Index decomposition - Industry							
	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
PRIMES HiEffHiRES	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	-1,11	-1,74	-9,59	-63,50	-8,2%	-63,50	-8,2%
Population	21,64	30,01	30,21	26,47	3,4%	15,01	1,9%
Energy use per capita	-4,58	-10,37	-27,50	-60,36	-7,8%	-58,91	-7,6%
Electrification	0,38	2,08	-19,05	-62,71	-8,1%	-58,86	-7,6%
Renewable fuels + heat	-8,80	-25,38	-51,39	-86,79	-11,2%	-74,13	-9,5%
Combined heat + power	-105,69	-129,54	-146,51	-150,54	-19,3%	-112,78	-14,5%
CO2 intensity fossil fuels	58,53	34,42	12,98	-176,29	-22,7%	-220,56	-28,3%
Total	-39,65	-100,52	-210,85	-573,73	-73,7%	-573,73	-73,7%

Index decomposition - Energy supply

PRIMES HiEffHiRES	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
	w/ steps Mt CO2/a	w/ steps Mt CO2/a	w/ steps Mt CO2/a	w/ steps Mt CO2/a	w/ steps %	w/o steps Mt CO2/a	w/o steps %
CO2 capture + sequestration	-11,06	-12,60	-85,00	-185,17	-14,9%	-185,17	-14,9%
Population	31,12	39,77	39,90	37,33	3,0%	18,16	1,5%
Electricity use per capita	103,74	74,78	131,25	158,69	12,8%	162,35	13,1%
Renewable electricity	-392,55	-821,04	-1040,84	-1213,35	-97,8%	-993,46	-80,0%
Nuclear	68,62	204,65	284,73	348,18	28,0%	197,89	15,9%
Import	-19,45	-4,27	6,40	10,71	0,9%	8,92	0,7%
Emission factor	-79,33	-186,90	-302,08	-374,31	-30,2%	-426,62	-34,4%
Total	-298,92	-705,62	-965,63	-1217,92	-98,1%	-1217,92	-98,1%

Based on the following sources:

IMAGE 450-NucOff-OPT: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

PRIMES HiEffHiRES: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

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Index decomposition - Overall

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
Germany-KS95	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0	-3,7	-7,1	-11,7	-1,4%	-11,70	-1,4%
Population	-15,97	-22,50	-27,59	-30,49	-3,6%	-23,29	-2,8%
Energy use per capita	-103,99	-203,70	-257,50	-269,18	-31,9%	-186,96	-22,2%
Electrification	5,03	5,97	-13,90	-36,68	-4,3%	-58,60	-6,9%
Renewable fuels + heat	-26,39	-63,55	-128,66	-147,32	-17,5%	-158,21	-18,8%
CO2 intensity power + heat	-112,68	-212,02	-256,34	-328,59	-39,0%	-357,74	-42,4%
CO2 intensity fossil fuels	-1,60	12,63	25,18	14,05	1,7%	-13,40	-1,6%
Total	-255,61	-486,87	-665,90	-809,91	-96,0%	-809,91	-96,0%

Index decomposition - Transport

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
Germany-KS95	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	-3,73	-5,59	-7,00	-7,64	-4,2%	-4,91	-2,7%
Activity	31,66	42,29	47,16	48,26	26,8%	22,39	12,4%
Energy intensity	-52,36	-92,14	-118,05	-124,11	-69,0%	-72,08	-40,1%
Electrification	-2,55	-8,36	-27,32	-43,32	-24,1%	-57,81	-32,1%
Biofuels	-1,61	-0,77	-33,22	-44,58	-24,8%	-59,14	-32,9%
Hydrogen	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
CO2 intensity fossil fuels	0,33	-0,71	0,70	0,75	0,4%	0,90	0,5%
Total	-28,27	-65,29	-137,73	-170,65	-94,9%	-170,65	-94,9%

Index decomposition - Buildings

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
Germany-KS95	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	-2,87	-3,92	-4,49	-4,77	-3,2%	-3,74	-2,5%
Energy use per capita	-25,63	-44,89	-51,30	-52,10	-34,6%	-33,29	-22,1%
Electrification	-17,02	-51,61	-78,63	-87,57		-106,83	
Renewable fuels + heat	-15,23	-34,38	-47,54	-49,75	-33,1%	-54,15	-36,0%
District heat	-1,63	-5,63	-5,14	-3,75	-2,5%	-4,86	-3,2%
CO2 intensity fossil fuels	1,04	0,11	-0,55	-0,54	-0,4%	-1,12	-0,7%
Total	-44,48	-100,31	-134,97	-144,98	-96,4%	-144,98	-96,4%

Index decomposition - Industry

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
Germany-KS95	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	-3,70	-7,10	-11,70	-10,1%	-11,70	-10,1%
Population	-2,26	-3,29	-4,18	-4,71	-4,1%	-3,47	-3,0%
Energy use per capita	-8,27	-19,00	-24,43	-25,84	-22,3%	-17,31	-14,9%
Electrification	-4,27	-9,29	-15,60	-20,02	-17,3%	-17,25	-14,9%
Renewable fuels + heat	-9,37	-30,43	-48,34	-53,29	-46,0%	-37,72	-32,6%
Combined heat + power	-13,48	-12,65	-7,58	-4,57	-3,9%	-1,39	-1,2%
CO2 intensity fossil fuels	8,06	19,86	17,93	0,83	0,7%	-30,46	-26,3%
Total	-29,60	-58,50	-89,30	-119,30	-103,0%	-119,30	-103,0%

Index decomposition - Energy supply

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
Germany-KS95	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Population	-6,36	-8,54	-10,35	-11,41	-3,1%	-8,99	-2,5%
Electricity use per capita	-50,50	-52,32	-23,02	-16,23	-4,4%	32,83	9,0%
Renewable electricity	-146,68	-231,18	-272,53	-351,91	-96,4%	-364,77	-99,9%
Nuclear	43,78	86,68	86,68	86,68	23,7%	33,56	9,2%
Import	-12,26	-27,59	-37,07	-25,52	-7,0%	-5,67	-1,6%
Emission factor	18,45	-22,43	-30,94	-34,00	-9,3%	-39,34	-10,8%
Total	-153,57	-255,39	-287,23	-352,39	-96,5%	-352,39	-96,5%

Based on the following sources:

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Index decomposition - Overall

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
France-negaWatt	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0	0	0	0	0,0%	0,00	0,0%
Population	15,686314	24,65187	28,441448	29,412001	8,2%	17,365984	4,8%
Energy use per capita	-48,096132	-119,42142	-160,11646	-166,92472	-46,3%	-117,43365	-32,6%
Electrification	-8,5198378	-17,064568	-30,181018	-32,672971	-9,1%	-45,328179	-12,6%
Renewable fuels + heat	-20,138084	-45,837013	-76,188954	-106,89424	-29,7%	-125,87803	-34,9%
CO2 intensity power + heat	1,1806935	-7,7903372	-23,605411	-29,388968	-8,2%	-32,42324	-9,0%
CO2 intensity fossil fuels	-2,7214547	-13,953048	-24,203853	-29,042835	-8,1%	-31,814611	-8,8%
Total	-62,608501	-179,41451	-285,85425	-335,51173	-93,1%	-335,51173	-93,1%

Index decomposition - Transport

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
France-negaWatt	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	6,9915699	11,044651	12,652644	13,09197	0,0833293	8,1472876	0,0518568
Activity	-5,2940481	-11,759916	-15,116625	-15,62913	-0,0994781	-11,021692	-0,0701522
Energy intensity	-21,181178	-56,28622	-79,505153	-80,4092	-0,511798	-57,168137	-0,3638705
Electrification	-1,2061281	-5,5059923	-11,211332	-11,612402	-0,073912	-16,499454	-0,1050177
Biofuels	0,306646	-6,3845746	-22,582674	-38,799544	-0,2469559	-62,836096	-0,3999466
Hydrogen	0	0	0	0	0	0	0
CO2 intensity fossil fuels	-0,9965413	-7,1874678	-12,061339	-10,252893	-0,0652588	-4,2331086	-0,0269434
Total	-21,37968	-76,07952	-127,82448	-143,6112	-0,9140736	-143,6112	-0,9140736

Index decomposition - Buildings

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
France-negaWatt	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	3,86	5,91	6,79	7,02	7,6%	4,23	4,6%
Energy use per capita	-9,44	-26,29	-35,55	-37,38	-40,6%	-28,33	-30,8%
Electrification	-15,29	-29,42	-41,84	-53,11	0,0%	-59,24	0,0%
Renewable fuels + heat	-9,40	-20,97	-29,64	-38,72	-42,1%	-40,90	-44,4%
District heat	-4,50	-8,32	-10,64	-11,92	-12,9%	-14,22	-15,4%
CO2 intensity fossil fuels	-1,04	-2,38	-2,58	-3,31	-3,6%	-3,43	-3,7%
Total	-21,91	-52,18	-73,18	-86,77	-94,2%	-86,77	-94,2%

Index decomposition - Industry

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
France-negaWatt	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Population	2,92	4,53	5,34	5,55	7,7%	3,45	4,8%
Energy use per capita	-9,60	-17,72	-22,82	-24,76	-34,5%	-18,36	-25,6%
Electrification	-0,22	-1,23	-2,84	-3,45	-4,8%	-4,88	-6,8%
Renewable fuels + heat	-9,87	-16,61	-23,70	-32,54	-45,4%	-32,84	-45,8%
Combined heat + power	-2,97	-4,76	-6,59	-7,81	-10,9%	-9,47	-13,2%
CO2 intensity fossil fuels	-0,46	-1,97	-2,66	-3,91	-5,5%	-4,80	-6,7%
Total	-20,20	-37,76	-53,27	-66,92	-93,3%	-66,92	-93,3%

Index decomposition - Energy supply

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
France-negaWatt	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Population	1,79	2,97	3,41	3,47	9,4%	1,31	3,6%
Electricity use per capita	-6,98	-15,24	-17,44	-17,26	-47,0%	-5,15	-14,0%
Renewable electricity	-17,98	-51,08	-78,48	-84,60	-230,5%	-46,17	-125,8%
Nuclear	38,79	66,91	78,43	78,43	213,7%	18,72	51,0%
Import	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Emission factor	-14,16	-15,81	-15,78	-15,95	-43,5%	-4,61	-12,6%
Total	1,46	-12,24	-29,86	-35,91	-97,8%	-35,91	-97,8%

Based on the following sources:

IMAGE 450-NucOff-OPT: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

PRIMES HiEffHiRES: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

France-negaWatt: "Scenario négaWatt 2050" (négaWatt Association 2014),

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Index decomposition - Overall							
Italy-DDPP-DRS	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	-4,53	-6,80	-1,7%	-6,80	-1,7%
Population	18,03	22,06	23,25	22,67	5,6%	13,44	3,3%
Energy use per capita	-81,19	-106,76	-136,84	-154,41	-38,2%	-127,76	-31,6%
Electrification	8,17	7,46	1,02	-17,45	-4,3%	-18,93	-4,7%
Renewable fuels + heat	-9,69	-13,53	-18,40	-21,79	-5,4%	-20,49	-5,1%
CO2 intensity power + heat	-62,82	-91,56	-131,18	-146,52	-36,2%	-149,47	-36,9%
CO2 intensity fossil fuels	7,54	9,24	7,65	-12,71	-3,1%	-26,99	-6,7%
Total	-119,96	-173,09	-259,02	-337,01	-83,3%	-337,01	-83,3%

Index decomposition - Transport							
Italy-DDPP-DRS	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	3,75	5,21	5,71	5,45	4,6%	3,40	2,9%
Activity	-0,35	7,45	6,09	0,60	0,5%	-3,40	-2,9%
Energy intensity	-21,14	-34,57	-47,67	-53,53	-45,4%	-41,48	-35,2%
Electrification	-2,52	-5,60	-9,55	-13,10	-11,1%	-13,42	-11,4%
Biofuels	-1,62	-1,24	-3,24	-21,91	-18,6%	-26,61	-22,5%
Hydrogen	0,00	0,00	-0,33	-1,33	-1,1%	-1,62	-1,4%
CO2 intensity fossil fuels	0,37	0,11	-0,62	-2,57	-2,2%	-3,25	-2,8%
Total	-21,51	-28,64	-49,61	-86,40	-73,2%	-86,40	-73,2%

Index decomposition - Buildings							
Italy-DDPP-DRS	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	3,75	5,21	5,71	5,45	7,1%	3,40	4,4%
Energy use per capita	-27,88	-47,22	-56,57	-62,69	-81,6%	-47,01	-61,2%
Electrification	-11,22	-34,27	-63,46	-115,13		-118,67	
Renewable fuels + heat	-5,67	-9,89	-15,63	-21,81	-28,4%	-27,43	-35,7%
District heat	-2,07	-2,23	-4,09	-5,40	-7,0%	-7,56	-9,8%
CO2 intensity fossil fuels	-10,06	-16,51	-28,68	-61,16	-79,6%	-65,60	-85,4%
Total	-45,41	-92,78	-143,01	-233,53	-303,9%	-227,89	-296,6%

Index decomposition - Industry							
Italy-DDPP-DRS	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	-0,53	-0,80	-1,4%	-0,80	-1,4%
Population	1,79	2,49	2,74	2,58	4,5%	1,97	3,5%
Energy use per capita	-4,55	-6,07	-13,30	-17,08	-30,1%	-16,34	-28,8%
Electrification	-2,79	-0,17	1,30	-9,51	-16,8%	-10,93	-19,3%
Renewable fuels + heat	-3,00	-4,73	-5,58	-6,26	-11,0%	-6,01	-10,6%
Combined heat + power	-2,89	-4,61	-4,67	-5,05	-8,9%	-4,75	-8,4%
CO2 intensity fossil fuels	0,24	0,02	-0,13	2,74	4,8%	3,48	6,1%
Total	-11,20	-13,07	-20,16	-33,37	-58,8%	-33,37	-58,8%

Index decomposition - Energy supply

	2010-2020	2010-2030	2010-2040	2010-2050	2010-2050	2010-2050	2010-2050
Italy-DDPP-DRS	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	-4,00	-6,00	-4,4%	-6,00	-4,4%
Population	3,76	4,83	5,05	4,98	3,7%	2,40	1,8%
Electricity use per capita	-7,84	-5,92	-5,51	-2,64	-1,9%	8,80	6,5%
Renewable electricity	-40,77	-55,61	-91,88	-110,61	-81,4%	-136,54	-100,5%
Nuclear	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Import	5,01	6,86	7,80	10,53	7,7%	5,80	4,3%
Emission factor	-13,47	-29,83	-33,30	-29,40	-21,6%	-7,60	-5,6%
Total	-53,31	-79,67	-121,84	-133,15	-98,0%	-133,15	-98,0%

Based on the following sources:

IMAGE 450-NucOff-OPT: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

PRIMES HiEffHiRES: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

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Index decomposition - Overall							
	2010-2015	2010-2020	2010-2025	2010-2030	2010-2030	2010-2030	2010-2030
UK-ZCB2030	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Population	16,88	29,04	35,42	35,70	6,2%	5,03	0,9%
Energy use per capita	-111,15	-184,62	-232,26	-235,18	-40,9%	-37,79	-6,6%
Electrification	19,75	29,89	19,52	-24,57	-4,3%	-162,48	-28,3%
Renewable fuels + heat	-22,05	-52,09	-88,41	-135,14	-23,5%	-182,54	-31,8%
CO2 intensity power + heat	-42,66	-99,29	-181,82	-218,77	-38,1%	-197,60	-34,4%
CO2 intensity fossil fuels	3,51	3,35	3,40	3,60	0,6%	1,02	0,2%
Total	-135,72	-273,71	-444,16	-574,35	-100,0%	-574,35	-100,0%

Index decomposition - Transport							
	2010-2015	2010-2020	2010-2025	2010-2030	2010-2030	2010-2030	2010-2030
UK-ZCB2030	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	6,22	10,72	13,21	13,33	6,4%	1,81	0,9%
Activity	-13,45	-23,45	-29,28	-29,58	-14,2%	-4,20	-2,0%
Energy intensity	-25,68	-58,22	-85,91	-88,46	-42,5%	-19,25	-9,3%
Electrification	-2,92	-7,53	-14,07	-31,64	-15,2%	-62,78	-30,2%
Biofuels	-6,48	-17,17	-32,26	-53,03	-25,5%	-73,74	-35,5%
Hydrogen	-0,98	-2,53	-4,74	-19,58	-9,4%	-53,34	-25,7%
CO2 intensity fossil fuels	0,00	0,00	0,00	1,04	0,5%	3,57	1,7%
Total	-43,29	-98,17	-153,05	-207,93	-100,0%	-207,93	-100,0%

Index decomposition - Buildings							
	2010-2015	2010-2020	2010-2025	2010-2030	2010-2030	2010-2030	2010-2030
UK-ZCB2030	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
Population	3,27	5,37	6,53	6,59	5,4%	1,06	0,9%
Energy use per capita	-30,03	-41,05	-48,34	-48,82	-40,0%	-7,75	-6,4%
Electrification	-19,43	-36,09	-55,54	-80,70		-115,45	
Renewable fuels + heat	-8,41	-18,22	-29,67	-42,70	-35,0%	-58,91	-48,3%
District heat	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
CO2 intensity fossil fuels	0,86	0,86	0,86	0,87	0,7%	0,09	0,1%
Total	-45,33	-70,91	-96,48	-122,06	-100,0%	-122,06	-100,0%

Index decomposition - Industry							
	2010-2015	2010-2020	2010-2025	2010-2030	2010-2030	2010-2030	2010-2030
UK-ZCB2030	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Population	1,49	2,55	3,14	3,17	6,3%	0,47	0,9%
Energy use per capita	-2,08	-3,95	-5,08	-5,14	-10,2%	-0,83	-1,6%
Electrification	-3,84	-9,47	-15,37	-21,78	-43,2%	-24,68	-48,9%
Renewable fuels + heat	-5,09	-11,48	-18,05	-24,59	-48,8%	-25,23	-50,0%
Combined heat + power	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
CO2 intensity fossil fuels	-2,00	-2,14	-2,10	-2,10	-4,2%	-0,17	-0,3%
Total	-11,52	-24,49	-37,47	-50,44	-100,0%	-50,44	-100,0%

Index decomposition - Energy supply

	2010-2015	2010-2020	2010-2025	2010-2030	2010-2030	2010-2030	2010-2030
UK-ZCB2030	w/ steps	w/ steps	w/ steps	w/ steps	w/ steps	w/o steps	w/o steps
	Mt CO2/a	Mt CO2/a	Mt CO2/a	Mt CO2/a	%	Mt CO2/a	%
CO2 capture + sequestration	0,00	0,00	0,00	0,00	0,0%	0,00	0,0%
Population	5,89	10,37	12,52	12,60	6,5%	1,71	0,9%
Electricity use per capita	20,74	42,08	50,89	51,07	26,3%	6,36	3,3%
Renewable electricity	-31,25	-75,64	-171,51	-210,88	-108,7%	-200,16	-103,2%
Nuclear	2,89	16,41	24,31	24,49	12,6%	2,31	1,2%
Import	-3,33	-3,33	-3,33	-1,16	-0,6%	2,19	1,1%
Emission factor	-30,52	-70,04	-70,04	-70,04	-36,1%	-6,34	-3,3%
Total	-35,58	-80,15	-157,16	-193,93	-100,0%	-193,93	-100,0%

Based on the following sources:

IMAGE 450-NucOff-OPT: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

PRIMES HiEffHiRES: AMPERE database, <https://tntcat.iiasa.ac.at/AMPEREDB/dsd?Action=htmlpage&page=welcome>

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