

**ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN
2010 FOR AUSTRIA**

**National Technical University of Athens
Primes Ver. 2 Energy Model**

Team: **Prof. P. Capros**
 Dr. L. Mantzos
 L. Vouyoukas (Consultant)
 K. Delkis
 D. Petrellis
 V. Panos (Computer Support)

9 March, 199

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900
DECOMPOSITION OF CO2 EMISSIONS REDUCTION (ktn of CO2 avoided in target year)																	
Industrial Sectors - Metals																	
Total CO2 emissions reduction	0	-8	-16	-40	-89	-186	-377	-639	-969	-1208	-1367	-1602	-2102	-2389	-2716	-2986	-3290
Structural change and behavioural effects	0	-4	-8	-19	-39	-75	-148	-253	-377	-487	-562	-654	-762	-807	-932	-1086	-1284
Technological improvement	0	-1	-1	-4	-8	-14	-27	-45	-70	-105	-146	-219	-274	-300	-321	-347	-374
Energy saving in heat uses	0	0	0	1	2	4	7	11	13	7	-12	-23	-48	-59	-63	-67	-73
Specific Industrial processes	0	-1	-2	-5	-9	-18	-33	-54	-80	-108	-128	-148	-166	-179	-189	-198	-204
Electrical Equipment	0	0	0	0	0	-1	-2	-3	-4	-4	-6	-8	-10	-12	-19	-22	-24
Change of fuel mix	0	-3	-5	-13	-25	-46	-82	-124	-164	-199	-227	-245	-314	-326	-331	-330	-339
Change of emission factor of electricity and steam (supply effect)	0	-1	-2	-4	-18	-50	-119	-217	-358	-417	-432	-424	-452	-455	-532	-552	-587
Industrial Sectors - Chemicals																	
Total CO2 emissions reduction	0	-1	-3	-6	-38	-93	-147	-178	-243	-294	-329	-356	-378	-418	-467	-524	-570
Structural change and behavioural effects	0	0	0	-1	-1	-3	-4	-6	-9	-12	-18	-20	-22	-32	-41	-46	-46
Technological improvement	0	0	-1	-2	-4	-7	-14	-22	-28	-39	-58	-72	-92	-126	-140	-150	-164
Energy saving in heat uses	0	0	0	0	0	0	0	-1	-1	-2	-2	-2	-3	-4	-4	-4	-4
Specific Industrial processes	0	0	0	-1	-3	-5	-9	-15	-19	-31	-50	-65	-85	-114	-126	-135	-150
Electrical Equipment	0	0	0	-1	-1	-2	-4	-6	-8	-6	-6	-5	-5	-9	-10	-10	-10
Change of fuel mix	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	0	8	2	-1	-1
Change of emission factor of electricity and steam (supply effect)	0	-1	-2	-3	-33	-82	-129	-152	-207	-245	-258	-266	-265	-278	-298	-332	-359
Industrial Sectors - Materials																	
Total CO2 emissions reduction	0	-3	-9	-19	-115	-263	-378	-394	-484	-602	-709	-837	-895	-1028	-1101	-1369	-1578
Structural change and behavioural effects	0	-1	-1	-3	-6	-13	-23	-38	-57	-76	-100	-132	-156	-174	-196	-213	-223
Technological improvement	0	-1	-2	-5	-10	-19	-36	-62	-93	-124	-179	-244	-304	-385	-451	-593	-716
Energy saving in heat uses	0	0	-1	-2	-4	-7	-13	-24	-39	-52	-72	-88	-109	-139	-172	-190	-211
Specific Industrial processes	0	0	-1	-2	-5	-8	-16	-26	-38	-53	-81	-122	-157	-200	-231	-352	-442
Electrical Equipment	0	0	0	-1	-2	-4	-8	-12	-16	-19	-27	-33	-38	-46	-48	-51	-63
Change of fuel mix	0	-1	-2	-5	-9	-16	-28	-42	-55	-66	-75	-81	-87	-90	-94	-95	-97
Change of emission factor of electricity and steam (supply effect)	0	-1	-4	-5	-91	-214	-290	-252	-279	-336	-354	-380	-348	-378	-360	-468	-542
Industrial Sectors - Others																	
Total CO2 emissions reduction	0	-3	-6	-14	-76	-177	-284	-352	-484	-578	-644	-698	-748	-832	-906	-1021	-1115
Structural change and behavioural effects	0	0	0	-1	-1	-3	-5	-7	-11	-15	-19	-25	-30	-34	-41	-49	-57
Technological improvement	0	-1	-2	-5	-11	-20	-37	-61	-89	-114	-159	-199	-259	-319	-363	-408	-445
Energy saving in heat uses	0	0	-1	-4	-8	-14	-27	-46	-63	-80	-100	-124	-152	-199	-238	-270	-303
Specific Industrial processes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electrical Equipment	0	0	-1	-2	-2	-6	-10	-16	-26	-35	-59	-75	-107	-120	-125	-137	-142
Change of fuel mix	0	0	-1	-2	-4	-7	-13	-19	-27	-32	-36	-39	-40	-41	-40	-41	-42
Change of emission factor of electricity and steam (supply effect)	0	-1	-3	-5	-61	-148	-230	-265	-357	-417	-430	-436	-420	-438	-462	-523	-572
Industrial Sectors - Total																	
Total CO2 emissions reduction	0	-16	-35	-78	-319	-719	-1186	-1563	-2180	-2683	-3049	-3493	-4124	-4667	-5190	-5900	-6554
Structural change and behavioural effects	0	-5	-10	-24	-46	-93	-180	-302	-451	-586	-694	-829	-968	-1038	-1201	-1388	-1609
Technological improvement	0	-3	-6	-17	-33	-61	-114	-190	-280	-382	-542	-793	-1229	-1630	-1874	-2168	-2407
Energy saving in heat uses	0	-1	-1	-4	-10	-17	-33	-59	-89	-127	-186	-237	-311	-400	-478	-532	-592
Specific Industrial processes	0	-1	-3	-8	-17	-31	-58	-95	-137	-192	-259	-435	-759	-1043	-1196	-1416	-1576
Electrical Equipment	0	-1	-1	-4	-6	-13	-23	-37	-54	-64	-97	-121	-160	-187	-200	-220	-239
Change of fuel mix	0	-4	-8	-20	-38	-70	-124	-186	-247	-299	-339	-366	-441	-449	-463	-468	-478
Change of emission factor of electricity and steam (supply effect)	0	-4	-11	-18	-202	-495	-767	-885	-1201	-1416	-1474	-1505	-1485	-1549	-1652	-1876	-2059

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900	
DECOMPOSITION OF CO2 EMISSIONS REDUCTION (ktn of CO2 avoided in target year)																		
Services																		
Total CO2 emissions reduction	0	-10	-18	-36	-97	-335	-817	-1282	-1925	-2314	-2552	-2718	-2975	-3180	-3585	-3825	-4055	
Structural change and behavioural effects	0	-2	-4	-11	-3	-58	-62	-95	-156	-238	-360	-513	-629	-721	-821	-965	-1069	
Technological improvement	0	-2	-5	-8	-18	-64	-263	-299	-331	-465	-571	-658	-760	-897	-993	-1111	-1248	
Space heating and cooling	0	-1	-3	-5	-12	-29	-101	-135	-167	-283	-368	-422	-471	-521	-587	-679	-751	
Other heat uses (water heating, cooking, etc.)	0	0	-1	-1	-2	-21	-46	-48	-58	-76	-89	-102	-113	-122	-124	-133	-141	
Electric uses	0	-1	-2	-2	-3	-15	-116	-115	-106	-106	-114	-134	-177	-253	-282	-299	-356	
Change of fuel mix	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-3	-3	4	
Change of emission factor of electricity and steam (supply effect)	0	-5	-9	-17	-76	-212	-492	-888	-1437	-1611	-1621	-1546	-1584	-1562	-1767	-1746	-1743	
Agriculture																		
Total CO2 emissions reduction	0	0	0	-1	-3	-9	-23	-39	-61	-70	-74	-77	-83	-85	-96	-99	-101	
Structural change and behavioural effects	0	0	0	0	0	0	0	0	0	0	-1	-2	-3	-3	-5	-5	-5	
Technological improvement	0	0	0	0	0	-1	-4	-5	-5	-6	-8	-13	-16	-18	-19	-20	-21	
Space heating and cooling	0	0	0	0	0	0	-1	-2	-2	-3	-3	-8	-10	-11	-10	-10	-10	
Other heat uses (water heating, cooking, etc.)	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-2	-2	
Electric uses	0	0	0	0	0	0	-3	-3	-3	-3	-3	-4	-5	-6	-7	-8	-8	
Change of fuel mix	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Change of emission factor of electricity and steam (supply effect)	0	0	0	-1	-3	-8	-19	-34	-56	-64	-65	-62	-64	-64	-74	-74	-75	
Households																		
Total CO2 emissions reduction	0	-17	-34	-80	-260	-593	-1033	-1490	-2119	-2769	-3352	-3929	-4861	-5551	-6637	-7908	-8548	
Structural change and behavioural effects	0	-8	-17	-43	-86	-168	-334	-574	-855	-1182	-1495	-1798	-2025	-2413	-2888	-3464	-3911	
Technological improvement	0	-2	-4	-10	-17	-57	-106	-179	-258	-373	-522	-695	-1289	-1491	-2020	-2637	-2313	
Space heating	0	-1	-2	-5	-9	-17	-36	-72	-119	-188	-285	-408	-1017	-1155	-1595	-1821	-1769	
Other heat uses (water heating, cooking, air conditioning)	0	-1	-2	-4	-7	-38	-67	-98	-127	-164	-204	-238	-206	-245	-266	-277	-280	
Electric appliances	0	0	-1	-1	-1	-1	-3	-9	-13	-22	-32	-48	-67	-92	-159	-539	-265	
Change of fuel mix	0	-3	-7	-16	-32	-63	-119	-193	-278	-365	-448	-524	-654	-713	-770	-828	-1124	
Change of emission factor of electricity and steam (supply effect)	0	-2	-7	-11	-125	-305	-475	-544	-727	-849	-886	-912	-893	-933	-959	-978	-1192	
Passenger Transport																		
Total CO2 emissions reduction	0	-8	-14	-35	-78	-164	-344	-613	-1068	-1462	-1791	-2138	-2556	-3030	-3647	-4637	-6012	
Structural change and behavioural effects	0	-2	-4	-11	-22	-43	-90	-174	-290	-433	-574	-721	-890	-1065	-1212	-1473	-1839	
Technological improvement	0	-4	-8	-20	-39	-76	-147	-246	-464	-667	-847	-1061	-1293	-1588	-1998	-3146	-4800	
Train transports	0	-1	-2	-4	-8	-14	-29	-52	-75	-107	-146	-188	-212	-230	-233	-197	-206	
Aviation / Navigation	0	-3	-5	-13	-26	-51	-97	-154	-320	-447	-535	-618	-691	-753	-804	-532	-793	
Road transports	0	-1	-1	-3	-5	-11	-22	-40	-68	-113	-166	-254	-390	-604	-960	-2416	-3801	
Change of fuel mix	0	0	0	0	0	-1	-2	-3	-4	-5	-7	-8	-10	-11	-12	-342	-15	
Change of emission factor of electricity and steam (supply effect)	0	-1	-2	-4	-16	-44	-104	-190	-310	-357	-363	-348	-364	-366	-425	-376	-359	
Goods Transport																		
Total CO2 emissions reduction	0	-9	-18	-43	-89	-170	-335	-570	-856	-1117	-1308	-1396	-1497	-819	-1038	-1583	-1919	
Structural change and behavioural effects	0	-8	-16	-39	-78	-146	-281	-470	-673	-870	-974	-932	-880	264	272	159	-6	
Technological improvement	0	-1	-1	-3	-5	-11	-22	-43	-97	-149	-238	-372	-523	-990	-1204	-1636	-1807	
Train transports	0	0	-1	-2	-3	-5	-10	-20	-47	-50	-64	-69	-72	-71	-71	-76	-81	
Aviation / Navigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Road transports	0	0	0	-1	-3	-5	-12	-24	-50	-99	-174	-303	-451	-918	-1132	-1560	-1727	
Change of fuel mix	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Change of emission factor of electricity and steam (supply effect)	0	0	-1	-1	-5	-14	-32	-56	-86	-98	-96	-92	-94	-93	-106	-105	-105	
Final Energy Demand Sectors - Total																		
Total CO2 emissions reduction	0	-59	-119	-272	-845	-1990	-3737	-5557	-8207	-10415	-12126	-13751	-16095	-17332	-20193	-23951	-27189	
Structural change and behavioural effects	0	-27	-51	-128	-236	-509	-947	-1616	-2426	-3309	-4097	-4795	-5395	-4977	-5854	-6436	-7438	
Technological improvement	0	-12	-24	-57	-113	-270	-656	-963	-1434	-2043	-2728	-3592	-5111	-6614	-8108	-10718	-12597	
Change of fuel mix	0	-7	-15	-36	-70	-134	-245	-382	-530	-670	-795	-899	-1105	-1174	-1248	-1641	-1614	
Change of emission factor of electricity and steam (supply effect)	0	-13	-29	-51	-426	-1077	-1889	-2597	-3817	-4393	-4506	-4466	-4484	-4567	-4983	-5156	-5533	

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900	
DECOMPOSITION OF CO2 EMISSIONS REDUCTION (ktn of CO2 avoided in target year)																		
Electricity production																		
Total CO2 emissions reduction	0	-22	-37	-73	-270	-814	-1948	-3362	-5350	-6202	-6549	-6582	-6983	-7206	-8299	-8836	-8905	
Change of demand	0	-5	-8	-18	-22	-123	-302	-342	-404	-546	-784	-1030	-1225	-1446	-1658	-2296	-2122	
Production from non fossil fuels	0	-10	-16	-54	21	-464	-787	-1502	-3545	-4278	-4419	-4593	-4917	-5024	-5198	-4632	-4708	
Large hydro	0	-9	-15	-50	20	-427	-724	-1343	-2930	-3466	-3639	-3870	-4155	-4222	-4196	-3613	-3630	
Small renewables	0	0	-1	-2	1	-23	-43	-108	-270	-319	-320	-349	-361	-362	-340	-348	-395	
Biomass and waste	0	0	-1	-2	1	-14	-20	-51	-345	-493	-461	-375	-401	-440	-661	-672	-683	
Nuclear energy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Change of fossil fuel mix	0	-14	-14	-7	-183	-119	-1057	-609	-434	-487	-534	-382	-278	-290	-713	-633	-227	
Technological improvement of fossil fuel plants	0	6	1	5	-86	-107	198	-909	-967	-891	-811	-576	-564	-446	-730	-1275	-1847	
Steam production																		
Total CO2 emissions reduction	0	5	0	8	-168	-362	-198	488	1207	1375	1341	1120	1273	1140	1466	1104	911	
Change of demand	0	0	0	1	3	-1	3	20	31	55	16	-48	-97	-142	-262	-327	-360	
Production from non fossil fuels	0	1	1	1	-23	-43	-84	-149	-205	-249	-258	-260	-284	-293	-351	-355	-361	
Technological improvement of fossil fuel plants and change of fuel mix	0	4	0	6	-147	-318	-117	617	1381	1568	1583	1427	1654	1575	2078	1787	1632	
Other Supply Sectors production																		
Total CO2 emissions reduction	0	0	-1	-1	-3	-6	-11	-20	-29	-38	-44	-56	-81	-95	-110	-127	-138	
Statistical Difference																		
	0	-1	-2	-4	-17	-4	-4	-37	-50	-39	7	52	13	45	83	141	177	
Avoided CO2 Emissions - As in Final Report																		
Total CO2 emissions reduction	0	-60	-121	-278	-865	-2000	-3753	-5613	-8286	-10492	-12163	-13755	-16163	-17382	-20221	-23938	-27150	
In Final Energy Demand	0	-42	-84	-211	-424	-816	-1592	-2707	-4094	-5609	-6896	-8217	-10248	-11089	-13142	-15938	-18870	
In Electricity and Steam Generation	0	-17	-37	-66	-438	-1178	-2150	-2887	-4162	-4846	-5223	-5482	-5834	-6198	-6969	-7872	-8142	
In Other Energy Conversion Sectors	0	0	-1	-1	-3	-6	-11	-20	-29	-38	-44	-56	-81	-95	-110	-127	-138	

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900	
DECOMPOSITION OF CO2 EMISSIONS REDUCTION (% contribution to avoid CO2 emissions in target year)																		
Industrial Sectors - Metals																		
Total CO2 emissions reduction	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Structural change and behavioural effects	0	44.3	46.3	48.2	43.5	40.3	39.4	39.6	38.9	40.3	41.1	40.8	36.3	33.8	34.3	36.4	39.0	
Technological improvement	0	8.8	9.2	9.7	8.6	7.8	7.2	7.1	7.2	8.7	10.7	17.4	27.3	33.5	33.9	34.1	32.9	
Energy saving in heat uses	0	-2.9	-2.8	-2.8	-2.4	-2.2	-2.0	-1.7	-1.4	-0.6	0.9	1.4	2.3	2.5	2.3	2.2	2.2	
Specific Industrial processes	0	11.1	11.5	11.8	10.4	9.5	8.8	8.4	8.2	8.9	9.4	15.5	24.6	30.5	30.9	31.1	29.9	
Electrical Equipment	0	0.5	0.5	0.7	0.5	0.5	0.4	0.4	0.4	0.3	0.5	0.5	0.5	0.5	0.7	0.7	0.7	
Change of fuel mix	0	32.3	32.3	32.3	27.8	24.9	21.8	19.3	17.0	16.5	16.6	15.3	15.0	13.6	12.2	11.1	10.3	
Change of emission factor of electricity and steam (supply effect)	0	14.7	12.3	9.8	20.1	27.0	31.5	33.9	37.0	34.6	31.6	26.5	21.5	19.0	19.6	18.5	17.8	
Industrial Sectors - Chemicals																		
Total CO2 emissions reduction	0	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Structural change and behavioural effects	0	32.6	16.3	12.9	1.4	3.0	2.4	2.2	2.6	3.0	3.5	5.0	5.4	5.3	6.8	7.8	8.1	
Technological improvement	0	15.9	19.1	34.8	11.2	8.0	9.5	12.2	11.6	13.1	17.6	20.1	24.4	30.2	29.9	28.6	28.8	
Energy saving in heat uses	0	0.6	0.5	0.7	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.8	0.9	0.8	0.8	
Specific Industrial processes	0	9.6	12.5	23.2	7.6	5.4	6.4	8.2	8.0	10.6	15.3	18.1	22.5	27.2	26.9	25.8	26.3	
Electrical Equipment	0	5.6	6.1	10.8	3.4	2.5	2.9	3.6	3.2	2.1	1.7	1.4	1.3	2.2	2.1	1.9	1.7	
Change of fuel mix	0	2.1	1.8	2.2	0.6	0.5	0.5	0.6	0.5	0.5	0.4	0.1	-1.9	-0.4	-0.4	0.2	0.2	
Change of emission factor of electricity and steam (supply effect)	0	49.4	62.7	50.2	86.7	88.4	87.7	85.1	85.3	83.4	78.4	74.5	70.1	66.4	63.7	63.4	62.9	
Industrial Sectors - Materials																		
Total CO2 emissions reduction	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Structural change and behavioural effects	0	27.1	16.3	18.1	4.9	4.9	6.1	9.5	11.8	12.7	14.2	15.7	17.4	16.9	17.8	15.5	14.1	
Technological improvement	0	24.8	20.3	28.5	9.0	7.3	9.6	15.7	19.3	20.7	25.3	29.1	34.0	37.5	41.0	43.3	45.4	
Energy saving in heat uses	0	8.8	7.2	9.7	3.1	2.5	3.4	6.0	8.0	8.7	10.2	10.6	12.2	13.5	15.6	13.9	13.4	
Specific Industrial processes	0	11.1	9.2	12.3	4.0	3.2	4.2	6.6	7.9	8.8	11.4	14.6	17.6	19.5	21.0	25.7	28.0	
Electrical Equipment	0	4.8	3.9	6.4	2.0	1.6	2.0	3.1	3.4	3.2	3.7	3.9	4.2	4.5	4.3	3.8	4.0	
Change of fuel mix	0	27.3	20.7	24.3	7.6	6.2	7.5	10.7	11.3	10.9	10.5	9.7	9.7	8.8	8.5	6.9	6.1	
Change of emission factor of electricity and steam (supply effect)	0	20.8	42.7	29.1	78.5	81.6	76.7	64.1	57.6	55.8	50.0	45.4	38.9	36.8	32.7	34.2	34.3	
Industrial Sectors - Others																		
Total CO2 emissions reduction	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Structural change and behavioural effects	0	8.6	5.1	5.4	1.5	1.5	1.7	2.1	2.3	2.5	3.0	3.6	4.0	4.1	4.6	4.8	5.1	
Technological improvement	0	32.2	28.8	40.1	13.8	11.1	12.9	17.5	18.4	19.8	24.7	28.5	34.6	38.3	40.0	39.9	39.9	
Energy saving in heat uses	0	17.0	20.4	27.4	10.7	7.8	9.5	13.0	13.1	13.8	15.6	17.8	20.3	23.9	26.3	26.5	27.2	
Specific Industrial processes	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Electrical Equipment	0	15.2	8.4	12.7	3.1	3.2	3.4	4.5	5.4	6.0	9.1	10.7	14.3	14.4	13.8	13.4	12.7	
Change of fuel mix	0	16.1	13.2	15.0	5.1	4.1	4.5	5.4	5.5	5.6	5.6	5.6	5.3	4.9	4.4	4.0	3.7	
Change of emission factor of electricity and steam (supply effect)	0	43.1	52.9	39.5	79.6	83.3	80.9	75.1	73.7	72.1	66.7	62.4	56.1	52.7	51.0	51.3	51.3	
Industrial Sectors - Total																		
Total CO2 emissions reduction	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Structural change and behavioural effects	0	33.5	28.3	30.8	14.4	13.0	15.2	19.3	20.7	21.9	22.7	23.7	23.5	22.3	23.1	23.5	24.6	
Technological improvement	0	16.8	16.5	21.4	10.3	8.4	9.6	12.2	12.9	14.2	17.8	22.7	29.8	34.9	36.1	36.7	36.7	
Energy saving in heat uses	0	3.3	4.3	5.7	3.0	2.3	2.8	3.8	4.1	4.7	6.1	6.8	7.5	8.6	9.2	9.0	9.0	
Specific Industrial processes	0	9.1	8.9	10.8	5.3	4.3	4.9	6.0	6.3	7.2	8.5	12.5	18.4	22.3	23.0	24.0	24.1	
Electrical Equipment	0	4.4	3.3	4.9	2.0	1.8	1.9	2.4	2.5	2.4	3.2	3.5	3.9	4.0	3.9	3.7	3.6	
Change of fuel mix	0	25.9	23.1	25.0	11.8	9.8	10.5	11.9	11.3	11.1	11.1	10.5	10.7	9.6	8.9	7.9	7.3	
Change of emission factor of electricity and steam (supply effect)	0	23.8	32.0	22.8	63.5	68.8	64.7	56.6	55.1	52.8	48.3	43.1	36.0	33.2	31.8	31.8	31.4	

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900	
DECOMPOSITION OF CO2 EMISSIONS REDUCTION (% contribution to avoid CO2 emissions in target year)																		
Services																		
Total CO2 emissions reduction	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Structural change and behavioural effects	0	25.0	23.6	29.6	3.4	17.5	7.6	7.4	8.1	10.3	14.1	18.9	21.2	22.7	22.9	25.2	26.4	
Technological improvement	0	19.2	26.9	22.3	18.4	19.2	32.2	23.3	17.2	20.1	22.4	24.2	25.6	28.2	27.7	29.1	30.8	
Space heating and cooling	0	10.6	14.8	13.0	12.9	8.7	12.4	10.6	8.7	12.2	14.4	15.5	15.8	16.4	16.4	17.8	18.5	
Other heat uses (water heating, cooking, etc.)	0	2.3	3.0	2.8	2.0	6.2	5.6	3.7	3.0	3.3	3.5	3.7	3.8	3.8	3.5	3.5	3.5	
Electric uses	0	6.3	9.2	6.5	3.5	4.4	14.2	9.0	5.5	4.6	4.4	4.9	6.0	8.0	7.9	7.8	8.8	
Change of fuel mix	0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	
Change of emission factor of electricity and steam (supply effect)	0	55.7	49.4	48.0	78.1	63.3	60.2	69.3	74.7	69.6	63.5	56.9	53.3	49.1	49.3	45.6	43.0	
Agriculture																		
Total CO2 emissions reduction	0	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Structural change and behavioural effects	0	5.8	4.2	5.6	-7.5	5.1	0.0	-0.5	-0.1	0.2	1.2	2.9	3.4	3.4	3.6	4.8	4.8	
Technological improvement	0	11.8	17.6	15.1	8.3	8.6	16.8	12.0	8.1	8.7	10.2	16.7	19.1	21.3	19.4	20.0	20.7	
Space heating and cooling	0	4.2	6.7	5.3	4.3	3.3	4.2	4.1	3.1	3.8	4.7	10.3	11.8	12.5	10.8	10.6	10.2	
Other heat uses (water heating, cooking, etc.)	0	0.6	1.0	1.2	1.4	0.6	1.5	1.1	0.7	0.8	0.9	1.0	1.1	1.3	1.3	1.6	2.2	
Electric uses	0	7.0	9.9	8.6	2.6	4.8	11.1	6.8	4.3	4.1	4.6	5.5	6.2	7.5	7.3	7.9	8.3	
Change of fuel mix	0	0.9	1.0	1.4	0.7	0.5	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	
Change of emission factor of electricity and steam (supply effect)	0	81.5	77.1	77.9	98.4	85.8	82.9	88.2	91.8	90.9	88.3	80.0	77.2	75.0	76.7	74.9	74.0	
Households																		
Total CO2 emissions reduction	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	
Structural change and behavioural effects	0	51.4	49.1	53.6	33.0	28.4	32.3	38.5	40.4	42.7	44.6	45.8	41.7	43.5	43.5	43.8	45.7	
Technological improvement	0	14.7	11.8	12.1	6.7	9.6	10.3	12.0	12.2	13.5	15.6	17.7	26.5	26.9	30.4	33.4	27.1	
Space heating	0	6.2	5.3	5.8	3.4	2.9	3.5	4.8	5.6	6.8	8.5	10.4	20.9	20.8	24.0	23.0	20.7	
Other heat uses (water heating, cooking, air conditioning)	0	5.8	4.8	5.0	2.8	6.5	6.4	6.6	6.0	5.9	6.1	6.1	4.2	4.4	4.0	3.5	3.3	
Electric appliances	0	2.7	1.7	1.3	0.5	0.2	0.3	0.6	0.6	0.8	1.0	1.2	1.4	1.7	2.4	6.8	3.1	
Change of fuel mix	0	20.1	19.2	20.5	12.4	10.6	11.5	13.0	13.1	13.2	13.4	13.3	13.4	12.9	11.6	10.5	13.2	
Change of emission factor of electricity and steam (supply effect)	0	13.9	19.9	13.8	47.9	51.4	45.9	36.5	34.3	30.6	26.4	23.2	18.4	16.8	14.4	12.4	13.9	
Passenger Transports																		
Total CO2 emissions reduction	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Structural change and behavioural effects	0	30.1	30.9	31.8	28.9	26.1	26.3	28.5	27.2	29.6	32.1	33.7	34.8	35.2	33.2	16.7	14.0	
Technological improvement	0	54.6	55.9	57.4	50.5	46.5	42.9	40.2	43.4	45.6	47.3	49.6	50.6	52.4	54.8	67.8	79.8	
Train transports	0	11.5	10.9	11.1	9.7	8.8	8.4	8.4	7.1	7.3	8.2	8.8	8.3	7.6	6.4	4.2	3.4	
Aviation / Navigation	0	36.3	37.8	38.8	34.0	31.3	28.1	25.2	30.0	30.6	29.9	28.9	27.0	24.9	22.1	11.5	13.2	
Road transports	0	6.9	7.2	7.5	6.8	6.5	6.4	6.6	6.4	7.7	9.3	11.9	15.3	19.9	26.3	52.1	63.2	
Change of fuel mix	0	0.5	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	7.4	0.2	
Change of emission factor of electricity and steam (supply effect)	0	14.7	12.6	10.2	20.2	26.9	30.4	30.9	29.0	24.4	20.3	16.3	14.2	12.1	11.7	8.1	6.0	
Goods Transports																		
Total CO2 emissions reduction	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Structural change and behavioural effects	0	89.8	90.5	91.1	88.3	85.8	84.0	82.5	78.6	77.9	74.4	66.7	58.7	-32.2	-26.2	-10.0	0.3	
Technological improvement	0	6.4	6.3	6.4	6.2	6.2	6.5	7.6	11.3	13.3	18.2	26.7	35.0	120.8	116.0	103.4	94.2	
Train transports	0	3.7	3.5	3.5	3.3	3.1	3.0	3.4	5.5	4.5	4.9	5.0	4.8	8.7	6.9	4.8	4.2	
Aviation / Navigation	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Road transports	0	2.7	2.8	2.9	2.9	3.1	3.5	4.2	5.8	8.9	13.3	21.7	30.1	112.1	109.1	98.6	90.0	
Change of fuel mix	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Change of emission factor of electricity and steam (supply effect)	0	3.7	3.2	2.5	5.4	8.0	9.5	9.9	10.1	8.7	7.4	6.6	6.3	11.4	10.2	6.7	5.5	
Final Energy Demand Sectors - Total																		
Total CO2 emissions reduction	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Structural change and behavioural effects	0	45.4	43.1	46.9	27.9	25.6	25.4	29.1	29.6	31.8	33.8	34.9	33.5	28.7	29.0	26.9	27.4	
Technological improvement	0	19.8	19.9	21.0	13.4	13.6	17.6	17.3	17.5	19.6	22.5	26.1	31.8	38.2	40.2	44.8	46.3	
Change of fuel mix	0	12.7	12.4	13.3	8.3	6.7	6.6	6.9	6.5	6.4	6.6	6.5	6.9	6.8	6.2	6.9	5.9	
Change of emission factor of electricity and steam (supply effect)	0	22.2	24.6	18.8	50.4	54.1	50.5	46.7	46.5	42.2	37.2	32.5	27.9	26.4	24.7	21.5	20.3	

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900	
DECOMPOSITION OF CO2 EMISSIONS REDUCTION (% contribution to avoid CO2 emissions in target year)																		
Electricity production																		
Total CO2 emissions reduction	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Change of demand	0	21.1	22.5	24.2	8.2	15.1	15.5	10.2	7.5	8.8	12.0	15.6	17.5	20.1	20.0	26.0	23.8	
Production from non fossil fuels	0	43.6	43.2	73.4	-7.9	57.0	40.4	44.7	66.3	69.0	67.5	69.8	70.4	69.7	62.6	52.4	52.9	
Large hydro	0	40.5	40.2	68.2	-7.3	52.5	37.2	39.9	54.8	55.9	55.6	58.8	59.5	58.6	50.6	40.9	40.8	
Small renewables	0	1.4	1.4	2.5	-0.3	2.8	2.2	3.2	5.1	5.1	4.9	5.3	5.2	5.0	4.1	3.9	4.4	
Biomass and waste	0	1.6	1.6	2.7	-0.3	1.7	1.0	1.5	6.4	7.9	7.0	5.7	5.7	6.1	8.0	7.6	7.7	
Nuclear energy	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Change of fossil fuel mix	0	63.9	38.0	9.0	67.9	14.7	54.2	18.1	8.1	7.9	8.2	5.8	4.0	4.0	8.6	7.2	2.6	
Technological improvement of fossil fuel plants	0	-28.5	-3.7	-6.6	31.8	13.2	-10.1	27.0	18.1	14.4	12.4	8.8	8.1	6.2	8.8	14.4	20.7	
Steam production																		
Total CO2 emissions reduction	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Change of demand	0	-2.2	41.4	7.2	-1.6	0.4	-1.6	4.0	2.5	4.0	1.2	-4.2	-7.6	-12.5	-17.9	-29.6	-39.5	
Production from non fossil fuels	0	11.6	176.2	16.7	13.9	11.8	42.3	-30.6	-17.0	-18.1	-19.2	-23.2	-22.3	-25.7	-24.0	-32.2	-39.6	
Technological improvement of fossil fuel plants and change of fuel mix	0	90.6	-117.6	76.2	87.7	87.8	59.3	126.6	114.4	114.1	118.1	127.4	129.9	138.1	141.8	161.8	179.1	
Other Supply Sectors production																		
Total CO2 emissions reduction	0	0.4	0.5	0.5	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	
Statistical Difference																		
	0	1.1	1.5	1.6	1.9	0.2	0.1	0.7	0.6	0.4	-0.1	-0.4	-0.1	-0.3	-0.4	-0.6	-0.7	
Avoided CO2 Emissions - As in Final Report																		
Total CO2 emissions reduction	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
In Final Energy Demand	0	70.2	69.4	75.9	49.0	40.8	42.4	48.2	49.4	53.5	56.7	59.7	63.4	63.8	65.0	66.6	69.5	
In Electricity and Steam Generation	0	29.4	30.1	23.6	50.6	58.9	57.3	51.4	50.2	46.2	42.9	39.9	36.1	35.7	34.5	32.9	30.0	
In Other Energy Conversion Sectors	0	0.4	0.5	0.5	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900	
Heavy Industry																		
Specific energy Consumption of Process Technology (toe per tn of output)																		
Iron and Steel	0.332	0.332	0.332	0.332	0.332	0.331	0.330	0.329	0.327	0.325	0.323	0.315	0.289	0.270	0.260	0.250	0.241	
Basic aluminium	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.053	0.063	0.077	0.091	
Other processing of non ferrous	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	
Chemicals	0.158	0.158	0.158	0.158	0.158	0.157	0.157	0.156	0.155	0.153	0.150	0.147	0.144	0.139	0.136	0.132	0.129	
Cement Production	0.033	0.033	0.033	0.033	0.033	0.033	0.032	0.032	0.032	0.032	0.032	0.031	0.030	0.030	0.030	0.030	0.027	
Glass basic processing	0.151	0.151	0.151	0.151	0.151	0.150	0.150	0.150	0.149	0.149	0.147	0.145	0.143	0.143	0.130	0.120	0.114	
Pulp and Paper	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.040	0.040	0.039	0.039	0.038	0.037	0.036	0.035	
Structural Change in basic processing (%)																		
Electric steelworks	18.5	18.5	18.6	18.8	19.1	19.6	20.8	22.5	24.6	26.3	27.0	28.7	32.4	34.1	38.3	44.0	51.8	
Aluminium recycling	94.7	94.7	94.7	94.7	94.7	94.7	94.7	94.7	94.6	94.6	94.6	94.6	94.5	95.5	96.1	96.8	97.3	
Glass recycling	76.9	76.9	76.9	76.9	76.9	77.0	77.0	77.1	77.3	77.4	77.3	77.0	76.9	76.9	77.1	77.6	78.2	
Paper recycling	72.8	72.9	72.9	72.9	72.9	72.9	72.9	72.9	72.9	73.0	73.0	73.0	73.1	73.1	73.2	73.3	73.3	
Fuel Mix																		
electrotechnologies																		
% of mechanical processing in chemistry	78.7	78.7	78.7	78.6	78.6	78.6	78.6	78.7	78.8	81.5	85.2	88.3	90.2	91.5	92.1	92.8	94.0	
% of electric furnaces non ferrous	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
% of mechanical processing glass production	20.7	20.7	20.7	20.8	20.9	20.9	21.1	21.5	21.8	22.2	22.7	22.9	23.2	23.9	24.4	25.7	27.4	
% of mechanical processing in paper and pulp	71.1	71.1	71.1	71.0	71.0	70.9	70.7	70.5	70.2	70.0	69.7	69.7	69.7	69.6	69.8	70.1	70.4	
% of heat pumps in specific heat uses	4.6	4.6	4.6	4.8	5.1	5.6	6.6	8.4	11.0	13.3	19.7	24.7	44.0	51.9	57.0	61.6	65.7	
natural gas directly substituting other fossil fuels (% in specific uses)	40.7	40.8	40.9	41.3	41.7	42.6	44.1	45.8	47.5	48.7	49.6	50.4	51.2	51.7	52.0	52.6	53.1	
market share of steam (% in industrial demand)	21.3	21.3	21.3	21.3	21.4	21.4	21.5	21.6	21.7	21.9	22.1	22.3	23.0	23.4	23.4	23.8	24.1	
Contribution of CHP for industrial Steam Production (%)	88.1	88.0	88.0	87.9	88.1	89.7	84.2	67.2	43.0	33.7	29.9	32.3	26.7	28.5	13.5	20.5	24.4	
Equipment efficiency of electrical and cross-cutting technologies (index)																		
Industrial Furnaces																		
Process Furnaces	100	100.0	100.0	100.1	100.2	100.3	100.6	101.1	101.6	101.9	102.6	103.1	103.5	104.3	104.9	105.7	107.0	
Electric Furnaces	100	100.0	100.0	100.1	100.2	100.4	100.7	101.2	101.9	102.7	103.3	104.3	113.5	119.8	123.5	127.0	130.1	
Industrial Motors, Air Compressors, Lighting, etc.																		
Motor Drives	100	100.0	100.0	100.0	100.1	100.2	100.3	100.5	100.7	100.9	101.3	101.8	102.3	102.9	103.5	104.1	104.7	
Air Compressors	100	100.0	100.0	100.1	100.3	100.5	100.9	101.5	102.1	102.5	103.4	104.2	105.2	106.2	107.7	108.6	109.4	
Lighting	100	100.1	100.1	100.3	100.6	101.1	102.1	103.4	105.1	106.3	110.0	115.1	121.3	131.3	136.8	140.9	144.0	
Electric Equipment in Households																		
Refrigerators	100	100.0	100.0	100.1	100.1	100.1	100.2	100.3	100.5	100.8	101.3	101.7	102.2	102.7	103.3	108.5	117.4	
Washing machines	100	100.1	100.1	100.1	100.1	100.2	100.3	101.0	101.5	102.3	103.1	103.8	104.5	105.2	105.9	106.6	128.5	
Lighting	100	100.0	100.0	100.1	100.1	100.1	100.2	100.6	100.9	101.7	102.9	104.9	107.6	111.7	123.9	455.3	128.3	
TV and similar	100	100.0	100.0	100.0	100.0	100.0	100.1	100.2	100.3	100.5	100.8	101.0	101.3	101.5	101.8	102.1	104.7	
Water heating	100	100.1	100.1	100.2	100.4	102.5	104.4	106.8	108.9	112.0	115.8	120.5	124.0	128.6	130.9	132.0	132.7	
Air Conditioning	100	100.0	100.0	100.1	100.1	100.0	100.1	100.5	100.8	101.5	102.5	103.9	105.7	124.1	131.0	156.9	161.7	
Electric Equipment in Tertiary																		
Offices	100	100.1	100.3	100.4	101.1	104.4	137.1	138.7	139.2	140.3	142.2	146.7	159.4	187.8	210.5	225.8	266.7	
Agriculture	100	100.0	100.1	100.1	100.3	100.9	106.8	107.4	107.8	108.6	109.8	111.4	113.8	118.1	121.0	123.7	126.4	

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900
Low enthalpy heat uses (index)																	
Industrial heat uses	100	100.0	100.1	100.2	100.4	100.7	101.3	102.3	103.7	105.4	107.3	109.1	111.3	117.8	120.2	122.2	124.1
Buildings (thermal integrity, efficiency of heat generation)																	
Houses																	
efficiency of heat generation	100	100.0	100.0	100.0	100.0	100.1	100.2	100.4	100.7	101.2	101.8	102.8	106.8	108.6	113.8	118.3	120.7
thermal integrity	100	100.0	100.0	100.1	100.1	100.3	100.6	100.9	101.4	102.0	102.9	103.8	104.7	105.6	106.5	107.6	108.6
Offices																	
efficiency of heat generation	100	100.0	100.0	100.1	100.2	100.4	101.0	101.7	102.4	106.2	109.0	110.3	111.0	111.3	111.5	111.7	111.8
thermal integrity	100	100.0	100.0	100.1	100.0	100.4	100.4	100.6	101.1	101.7	102.6	103.7	104.7	105.5	106.5	107.8	108.9
Agriculture																	
efficiency of heat generation	100	100.0	100.0	100.0	100.1	100.2	100.5	100.9	101.2	101.8	102.5	105.8	107.4	108.2	108.4	108.7	108.8
thermal integrity	100	100.0	100.0	100.0	99.9	100.2	100.0	99.9	100.0	100.1	100.4	101.0	101.2	101.3	101.6	102.2	102.3
Transports																	
Passenger Cars (efficiency index)	100	100.0	100.0	100.0	100.0	100.1	100.2	100.3	100.5	100.8	101.2	101.9	102.9	104.7	107.9	124.7	144.1
Trucks (efficiency index)	100	100.0	100.0	100.0	100.1	100.1	100.2	100.5	101.1	102.2	104.1	107.3	111.2	121.9	128.5	144.7	153.5
Transport modes for passengers (% of transport activity)																	
Passenger Cars	67.4	67.4	67.4	67.4	67.4	67.4	67.3	67.1	66.7	66.2	65.9	65.5	65.0	64.5	64.4	72.5	75.7
Train transport	13.3	13.3	13.3	13.4	13.4	13.4	13.6	14.0	14.5	15.2	15.7	16.2	16.7	17.1	17.3	12.9	11.5
Transport modes for goods (% of transport activity)																	
Train transport	87.1	87.1	87.1	87.2	87.2	87.4	87.7	88.1	88.6	89.0	89.2	89.0	88.7	85.1	84.8	84.9	85.2
Renewables in Final Energy (%)																	
Biomass	6.9	6.9	6.9	6.9	7.0	7.1	7.3	7.5	7.9	8.2	8.5	8.8	9.2	9.5	10.2	11.1	12.0
Solar energy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Power Generation																	
Fuel Mix in Thermal (electricity from gas over thermal production)	81.4	81.5	81.5	81.4	82.6	82.8	88.7	92.2	90.6	91.3	91.5	90.5	89.7	89.7	92.0	90.6	90.6
Contribution of Nuclear (% over total production)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables (as % over total production)	62.5	62.5	62.5	62.6	62.4	63.7	64.7	66.9	73.0	75.3	75.8	76.3	77.3	77.7	79.1	78.2	78.7
hydro of utilities (as % over total production)	58.1	58.2	58.2	58.2	58.2	58.7	59.5	59.8	60.3	61.0	62.4	64.2	65.3	65.3	63.8	61.0	60.7
hydro of other generators (as % over total production)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
biomass (as % over total production)	2.3	2.3	2.3	2.3	2.1	1.9	1.6	2.3	7.1	8.7	7.9	6.2	6.3	6.8	10.1	11.3	11.4
wind energy and other renewables (as % over total production)	2.0	2.0	2.0	2.0	2.0	3.1	3.5	4.8	5.5	5.5	5.4	5.7	5.6	5.5	5.1	5.8	6.5
CHP indicators																	
Steam/electricity ratio from CHP	1.57	1.58	1.58	1.58	1.53	1.53	1.50	1.44	1.51	1.53	1.48	1.59	1.50	1.39	1.40	1.49	1.36
% of electricity from CHP	16.2	16.1	16.1	16.1	16.8	17.3	17.0	14.9	10.5	9.2	8.8	8.6	8.1	9.0	6.2	7.3	8.4
% of steam from chp	58.8	58.7	58.7	58.7	59.3	60.6	57.3	47.9	34.9	30.1	27.6	29.1	25.7	26.4	18.4	21.9	23.7
Implications for other policies																	
Import dependency (percent)	69.0	69.0	69.0	68.9	68.8	68.2	67.7	66.4	63.4	62.1	61.8	61.5	60.4	59.8	57.7	56.0	53.7
Market Liberalisation (% of utilities production)	84.6	84.6	84.5	84.4	82.9	81.3	81.2	80.8	81.8	81.9	82.5	83.0	83.2	82.6	84.3	83.4	82.1

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900	
ADDITIONAL SYSTEM COSTS INCLUDING CARBON VALUE (mio Eur'90)																		
Total area in the marginal cost abatement curve as % of GDP	0 0.00%	0 0.00%	0 0.00%	1 0.00%	4 0.00%	15 0.01%	50 0.03%	106 0.06%	213 0.11%	323 0.17%	423 0.22%	535 0.28%	727 0.38%	837 0.44%	1121 0.59%	1641 0.86%	2284 1.20%	
COST ANALYSIS BY SECTOR																		
Industrial Sectors - Metals																		
Average cost of Sectoral Production excluding Carbon Value																		
Eur'90 per tn of output	432	432	432	433	433	434	435	437	440	441	443	443	443	441	445	447	448	
% change from Baseline	0.0	0.0	0.0	0.1	0.2	0.3	0.6	1.1	1.7	2.1	2.4	2.6	2.5	2.1	2.9	3.3	3.6	
Average cost of Sectoral Production including Carbon Value																		
Eur'90 per tn of output	432	433	433	434	436	439	446	455	466	478	492	505	513	522	533	548	564	
% change from Baseline	0.0	0.1	0.2	0.4	0.8	1.6	3.1	5.1	7.8	10.6	13.7	16.9	18.6	20.7	23.4	26.8	30.4	
Structure of costs (%)																		
Non energy costs	80.4	80.3	80.2	80.1	79.9	79.4	78.5	77.3	75.9	74.4	72.6	71.0	70.4	69.5	68.4	67.1	66.1	
Technology and fuel costs	19.6	19.6	19.6	19.6	19.5	19.4	19.1	18.8	18.5	18.0	17.4	16.8	16.0	15.1	15.0	14.4	13.3	
Carbon value cost	0.0	0.1	0.1	0.3	0.6	1.2	2.4	3.9	5.6	7.6	10.0	12.2	13.6	15.4	16.6	18.5	20.6	
Industrial Sectors - Chemicals																		
Average cost of Sectoral Production excluding Carbon Value																		
Eur'90 per tn of output	378	378	378	378	378	379	379	379	379	379	380	381	381	380	381	382	381	
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.5	0.7	0.6	0.5	0.8	1.0	0.6	
Average cost of Sectoral Production including Carbon Value																		
Eur'90 per tn of output	378	378	378	379	379	379	380	381	382	384	386	389	391	392	395	398	400	
% change from Baseline	0.0	0.0	0.0	0.1	0.1	0.3	0.4	0.7	1.1	1.5	2.1	2.9	3.3	3.6	4.4	5.2	5.7	
Structure of costs (%)																		
Non energy costs	88.8	88.8	88.8	88.8	88.7	88.6	88.4	88.2	87.9	87.6	87.0	86.4	86.0	85.7	85.1	84.5	84.1	
Technology and fuel costs	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.1	11.2	11.2	11.4	11.6	11.4	11.2	11.4	11.5	11.1	
Carbon value cost	0.0	0.0	0.0	0.1	0.1	0.2	0.4	0.6	0.9	1.2	1.6	2.1	2.6	3.0	3.5	4.0	4.8	
Industrial Sectors - Materials																		
Average cost of Sectoral Production excluding Carbon Value																		
Eur'90 per tn of output	716	716	716	716	717	717	718	720	721	723	725	725	725	725	726	728	727	
% change from Baseline	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.7	1.0	1.2	1.2	1.2	1.3	1.4	1.6	1.5	
Average cost of Sectoral Production including Carbon Value																		
Eur'90 per tn of output	716	716	716	717	717	719	721	724	728	732	737	741	745	749	755	762	769	
% change from Baseline	0.0	0.0	0.0	0.1	0.2	0.3	0.6	1.1	1.6	2.2	3.0	3.5	4.0	4.6	5.5	6.4	7.3	
Structure of costs (%)																		
Non energy costs	94.1	94.1	94.1	94.0	94.0	93.9	93.8	93.6	93.2	93.0	92.6	92.1	91.7	91.3	90.7	90.1	89.6	
Technology and fuel costs	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.6	5.5	5.4	5.4	5.0	
Carbon value cost	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.6	0.9	1.2	1.7	2.1	2.7	3.2	3.9	4.5	5.4	
Industrial Sectors - Others																		
Average cost of Sectoral Production excluding Carbon Value																		
Eur'90 per tn of output	2770	2770	2770	2770	2770	2770	2770	2770	2771	2771	2771	2772	2772	2771	2772	2773	2773	
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Average cost of Sectoral Production including Carbon Value																		
Eur'90 per tn of output	2770	2770	2770	2770	2770	2771	2771	2772	2773	2774	2776	2778	2779	2781	2783	2786	2789	
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7		
Structure of costs (%)																		
Non energy costs	99.2	99.2	99.2	99.2	99.2	99.2	99.2	99.1	99.1	99.1	99.0	98.9	98.9	98.9	98.8	98.7	98.6	
Technology and fuel costs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Carbon value cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	

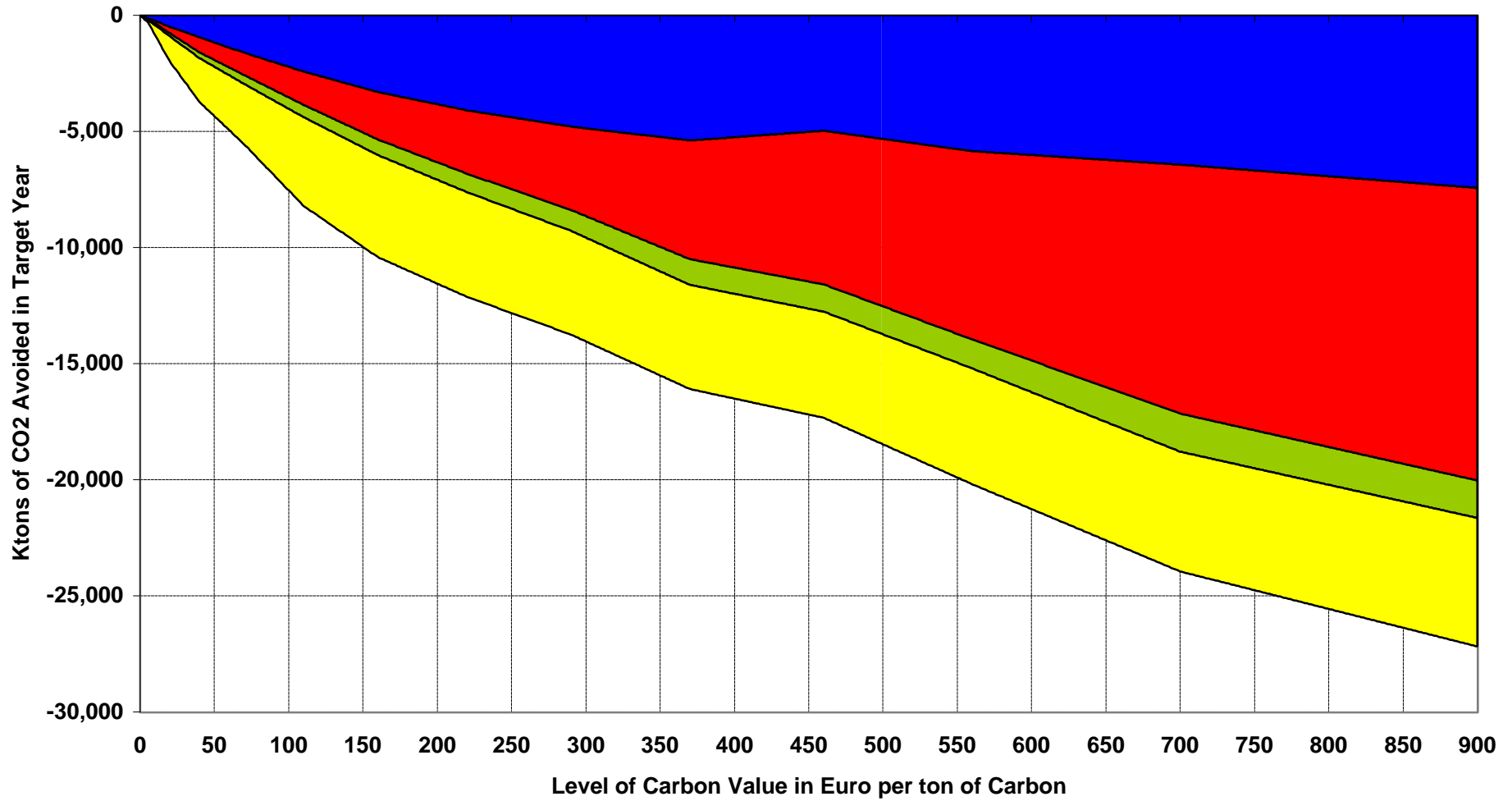
ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900
Services																	
Average cost of Energy Service excluding Carbon Value																	
Eur'90 per unit of energy service	4289	4289	4288	4287	4278	4284	4240	4220	4212	4188	4181	4191	4186	4166	4178	4186	4216
% change from Baseline	0.0	0.0	0.0	0.0	-0.3	-0.1	-1.2	-1.6	-1.8	-2.4	-2.5	-2.3	-2.4	-2.9	-2.6	-2.4	-1.7
Average cost of Energy Service including Carbon Value																	
Eur'90 per unit of energy service	4289	4290	4290	4292	4288	4304	4277	4281	4300	4310	4345	4406	4452	4490	4549	4638	4778
% change from Baseline	0.0	0.0	0.0	0.1	0.0	0.3	-0.3	-0.2	0.2	0.5	1.3	2.7	3.8	4.7	6.0	8.1	11.4
Structure of costs (%)																	
Non energy costs	68.2	68.2	68.2	68.1	68.2	67.9	68.4	68.3	68.0	67.8	67.3	66.3	65.5	64.9	64.0	62.7	60.8
Technology and fuel costs	31.8	31.8	31.8	31.8	31.6	31.6	30.7	30.2	29.9	29.3	29.0	28.9	28.5	27.9	27.9	27.6	27.5
Carbon value cost	0.0	0.0	0.0	0.1	0.2	0.5	0.9	1.4	2.1	2.8	3.8	4.9	6.0	7.2	8.1	9.7	11.8
Agriculture																	
Average cost of Energy Service excluding Carbon Value																	
Eur'90 per unit of energy service	6298	6298	6297	6296	6287	6296	6257	6237	6230	6218	6216	6214	6204	6178	6191	6196	6190
% change from Baseline	0.0	0.0	0.0	0.0	-0.2	0.0	-0.7	-1.0	-1.1	-1.3	-1.3	-1.3	-1.5	-1.9	-1.7	-1.6	-1.7
Average cost of Energy Service including Carbon Value																	
Eur'90 per unit of energy service	6298	6298	6298	6299	6292	6305	6274	6264	6265	6263	6276	6291	6297	6290	6308	6338	6364
% change from Baseline	0.0	0.0	0.0	0.0	-0.1	0.1	-0.4	-0.5	-0.5	-0.6	-0.3	-0.1	0.0	-0.1	0.1	0.6	1.1
Structure of costs (%)																	
Non energy costs	83.2	83.2	83.2	83.2	83.3	83.1	83.4	83.5	83.5	83.5	83.3	83.1	83.0	83.1	82.8	82.4	82.1
Technology and fuel costs	16.8	16.7	16.7	16.7	16.6	16.7	16.3	16.0	15.9	15.8	15.7	15.7	15.5	15.2	15.3	15.3	15.2
Carbon value cost	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.7	1.0	1.2	1.5	1.8	1.9	2.2	2.7
Households																	
Average cost of Energy Service excluding Carbon Value																	
Eur'90 per unit of energy service	302	302	302	301	301	301	300	298	296	293	291	289	285	283	279	275	279
% change from Baseline	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.6	-1.3	-2.0	-3.0	-3.5	-4.1	-5.4	-6.2	-7.5	-8.8	-7.4
Average cost of Energy Service including Carbon Value																	
Eur'90 per unit of energy service	302	302	302	302	302	304	305	307	309	311	316	321	322	326	326	327	341
% change from Baseline	0.0	0.0	0.1	0.2	0.3	0.6	1.1	1.7	2.5	3.2	4.7	6.4	6.9	8.2	8.2	8.3	13.0
Structure of costs (%)																	
Non energy costs	26.7	26.7	26.7	26.6	26.6	26.5	26.3	26.2	25.9	25.7	25.2	24.6	24.3	24.0	23.9	23.8	22.8
Technology and fuel costs	73.3	73.3	73.2	73.1	72.9	72.6	71.9	70.9	69.7	68.3	67.0	65.6	64.2	62.7	61.5	60.4	59.2
Carbon value cost	0.0	0.0	0.1	0.2	0.5	0.9	1.7	2.9	4.4	6.1	7.9	9.8	11.5	13.3	14.6	15.8	18.0
Passenger Transports																	
Average cost of Energy Service excluding Carbon Value																	
Eur'90 per 1000 passenger-km	187	187	187	187	187	187	187	186	186	185	185	184	184	183	184	205	219
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.6	-1.0	-1.2	-1.4	-1.7	-1.9	-1.5	9.8	17.4
Average cost of Energy Service including Carbon Value																	
Eur'90 per 1000 passenger-km	187	187	187	187	187	188	188	189	189	190	191	193	194	196	199	222	239
% change from Baseline	0.0	0.0	0.0	0.1	0.2	0.3	0.6	0.9	1.2	1.6	2.3	3.1	3.8	4.8	6.3	18.7	27.6
Structure of costs (%)																	
Non energy costs	11.7	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.7	11.6	11.6	11.5	11.5	11.3	9.3	8.3
Technology and fuel costs	88.3	88.3	88.3	88.2	88.2	88.0	87.7	87.2	86.6	85.8	85.0	84.1	83.1	82.2	81.4	83.1	83.7
Carbon value cost	0.0	0.0	0.0	0.1	0.2	0.3	0.7	1.2	1.8	2.5	3.4	4.3	5.3	6.4	7.3	7.6	8.0
Goods Transports																	
Average cost of Energy Service excluding Carbon Value																	
Eur'90 per 1000 tonne-km	127	127	127	127	126	126	124	121	118	115	114	114	114	130	129	125	121
% change from Baseline	0.0	-0.1	-0.2	-0.4	-0.8	-1.4	-2.8	-4.8	-7.2	-9.4	-10.7	-10.6	-10.6	2.3	1.6	-1.7	-5.3
Average cost of Energy Service including Carbon Value																	
Eur'90 per 1000 tonne-km	127	127	127	127	127	127	126	125	124	123	124	128	131	156	160	159	160
% change from Baseline	0.0	0.0	-0.1	-0.2	-0.3	-0.5	-1.0	-1.8	-2.7	-3.2	-2.4	0.2	2.9	22.4	25.3	24.4	25.7
Structure of costs (%)																	
Non energy costs	37.7	37.7	37.7	37.8	37.9	37.9	38.2	38.5	38.9	39.2	38.9	37.9	36.8	30.6	29.9	30.1	29.8
Technology and fuel costs	62.3	62.2	62.2	62.0	61.7	61.1	60.0	58.4	56.4	54.4	52.6	51.4	50.0	52.9	51.2	48.9	45.5
Carbon value cost	0.0	0.0	0.1	0.2	0.5	0.9	1.8	3.1	4.6	6.4	8.4	10.7	13.1	16.5	18.9	21.0	24.6

ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR AUSTRIA

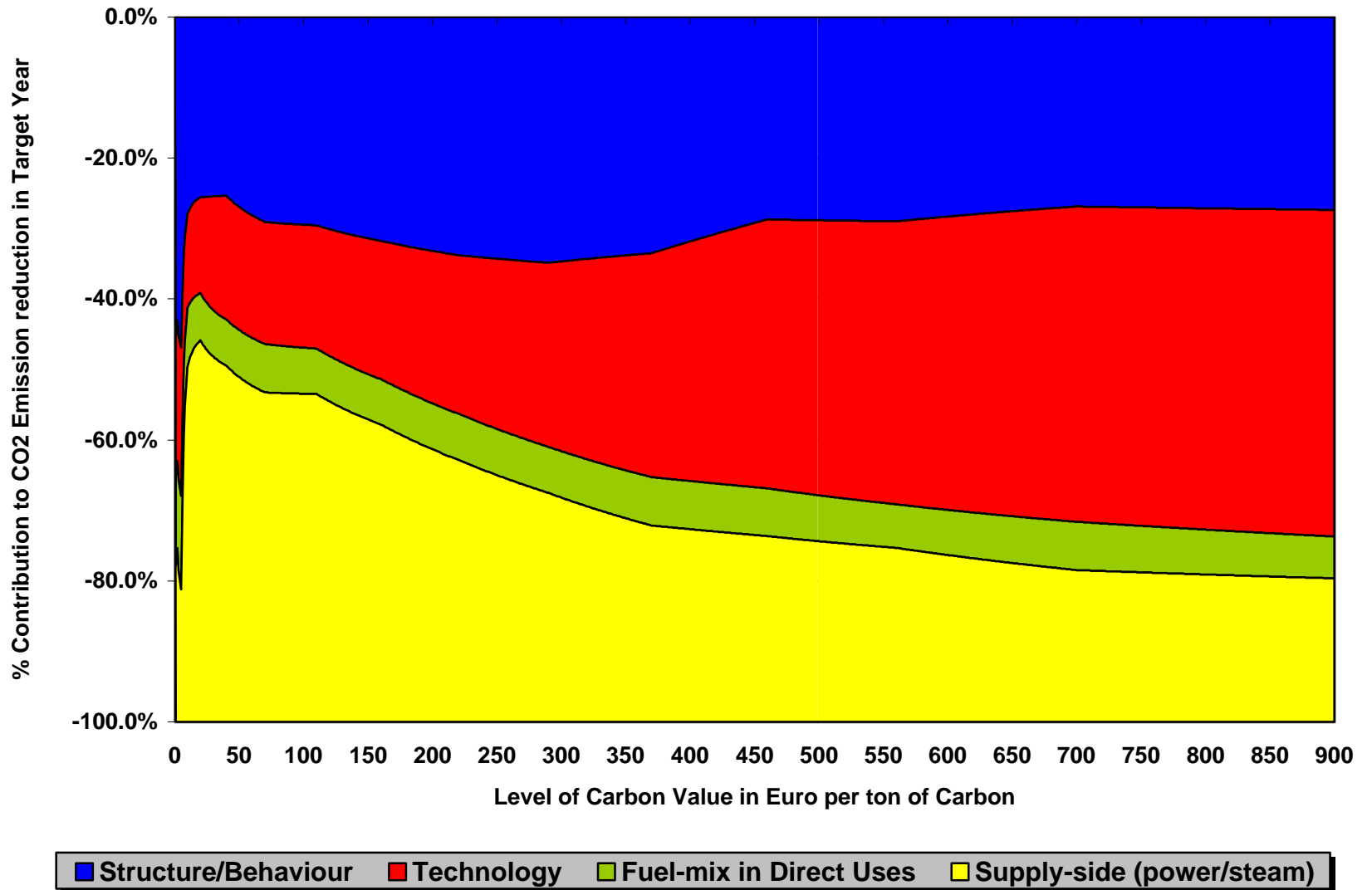
Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900	
Electricity and Steam production																		
Average cost of production excluding Carbon Value																		
mEur'90 per kWh+kWhth	44	44	44	44	44	44	44	44	45	45	45	46	46	47	49	51	52	
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.6	2.3	3.2	4.1	5.0	6.8	10.2	15.7	18.6	
Average cost of production including Carbon Value																		
mEur'90 per kWh+kWhth	44	44	44	44	44	45	46	47	49	50	53	55	58	62	66	72	78	
% change from Baseline	0.0	0.0	0.2	0.5	0.9	2.0	3.9	6.8	10.2	14.3	19.5	25.7	32.5	40.5	49.5	63.0	77.3	
Structure of costs (%)																		
Annual Capital cost	43.2	43.2	43.1	43.0	42.8	42.8	42.5	41.9	41.4	40.4	39.2	37.8	36.4	35.1	34.5	34.7	32.6	
O & M costs	17.5	17.5	17.5	17.4	17.3	17.1	16.8	16.2	15.7	15.1	14.6	13.9	13.4	12.9	12.6	12.6	11.5	
Transm. \$ Distr. Costs	24.5	24.5	24.5	24.4	24.3	23.8	23.4	22.8	22.5	21.5	20.5	19.5	18.5	17.3	16.1	14.1	13.5	
Fuel Costs	14.8	14.8	14.7	14.7	14.6	14.3	13.8	13.2	12.6	12.3	12.0	11.4	11.1	10.7	10.3	9.8	9.2	
Carbon value costs	0.0	0.0	0.2	0.5	0.9	2.0	3.5	5.7	7.8	10.5	13.7	17.2	20.8	23.9	26.3	29.0	33.1	
Investment expenditure for Electricity and Steam production																		
000mio Eur'90 spent in 1995 to 2010	6584	6581	6579	6583	6572	6671	6606	6748	6952	6931	6748	6582	6435	6469	6716	7192	7582	
% change from Baseline	0.0	-0.1	-0.1	0.0	-0.2	1.3	0.3	2.5	5.6	5.3	2.5	0.0	-2.3	-1.8	2.0	9.2	15.2	
Investment expenditure for Electricity and Steam production per kWh produced in 2010																		
mEur'90 per kWh+kWhth	69.6	69.6	69.7	69.9	70.2	72.4	73.7	77.6	83.3	87.5	91.5	96.7	102.5	112.3	129.0	160.7	188.7	
% change from Baseline	0.0	0.1	0.2	0.6	0.9	4.0	6.0	11.5	19.8	25.8	31.6	39.0	47.3	61.4	85.5	131.0	171.3	
Electricity tariffs (mEur'90 per kWh - includes effect of carbon value for electricity production)																		
Sectoral Average	57	57	57	57	57	59	59	59	60	60	63	68	71	74	77	83	87	
Industry	43	43	44	44	44	45	46	48	50	52	56	60	63	65	71	77	81	
Tertiary	62	62	62	62	62	63	62	61	62	62	65	69	72	73	73	78	80	
Households	76	76	76	76	76	77	77	75	74	72	76	82	85	89	93	100	105	
Transports	51	51	51	52	52	53	54	54	55	55	59	63	67	70	74	82	86	
Others	54	54	54	54	54	55	56	56	56	56	60	65	68	71	76	85	90	
Electricity tariffs (% change from Baseline)																		
Sectoral Average	0.0	0.1	0.2	0.4	0.2	2.6	2.7	2.6	4.3	4.8	10.9	19.5	24.1	28.9	34.8	45.2	52.4	
Industry	0.0	0.2	0.5	0.9	1.6	4.2	6.9	10.4	16.4	20.6	28.6	38.8	44.8	50.8	64.2	78.3	87.1	
Tertiary	0.0	0.0	0.2	0.2	-1.0	2.1	-0.3	-1.4	-1.0	-0.2	3.9	11.4	15.1	17.4	17.1	26.1	29.0	
Households	0.0	0.0	0.0	0.0	-0.1	1.4	1.2	-1.3	-2.4	-5.3	0.5	8.4	12.3	17.7	21.9	32.3	37.7	
Transports	0.0	0.2	0.2	0.6	1.0	3.7	5.7	5.7	6.4	7.0	14.3	23.8	30.1	37.1	44.5	60.2	68.8	
Others	0.0	0.0	0.2	0.6	0.9	3.0	4.9	4.1	4.5	4.9	11.4	21.3	26.2	33.5	42.6	58.5	67.3	

AUSTRIA: CO2 Emission Reduction - Decomposition

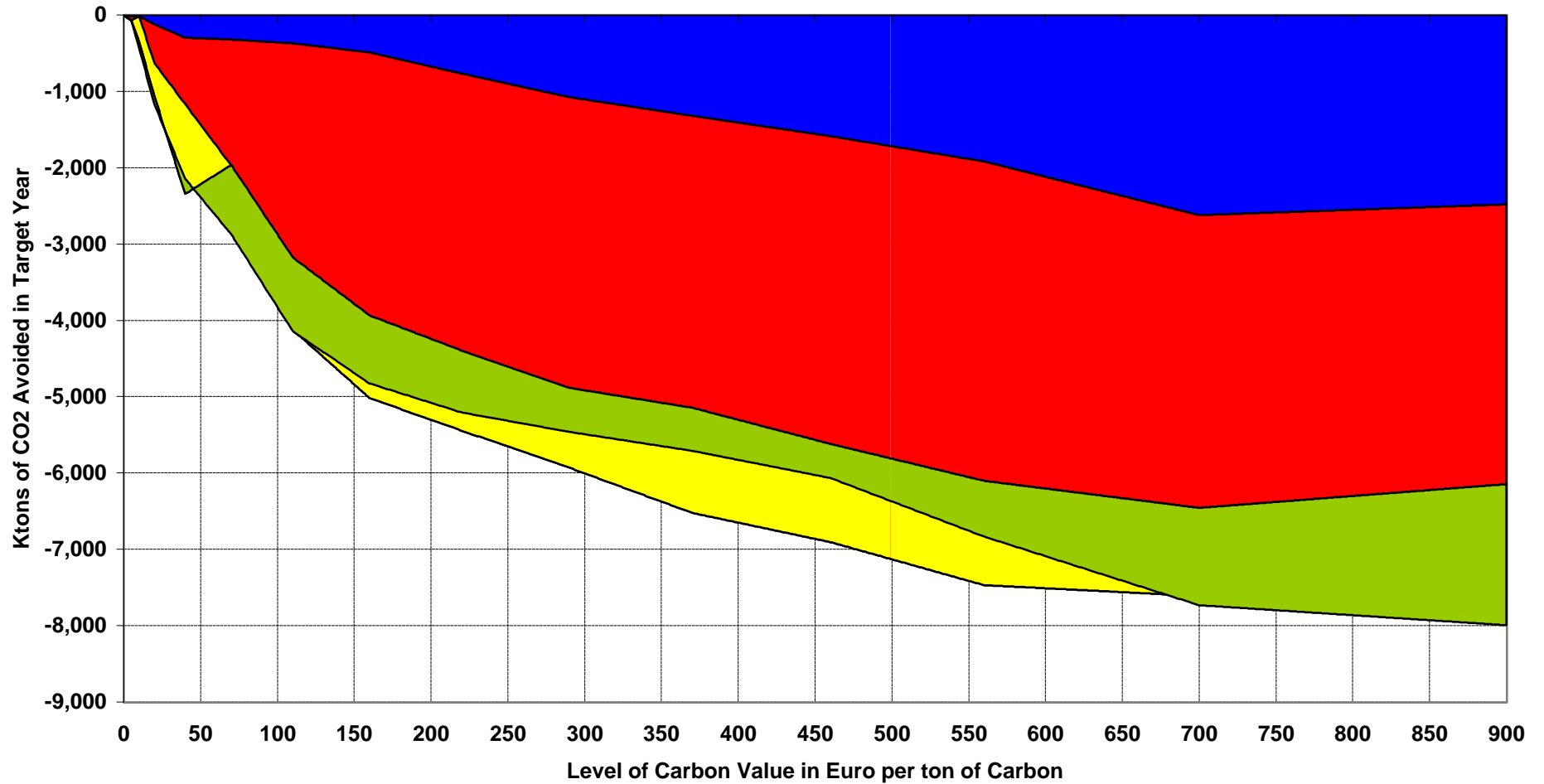


■ Structure/Behaviour ■ Technology ■ Fuel-mix in Direct Uses ■ Supply-side (power/steam)

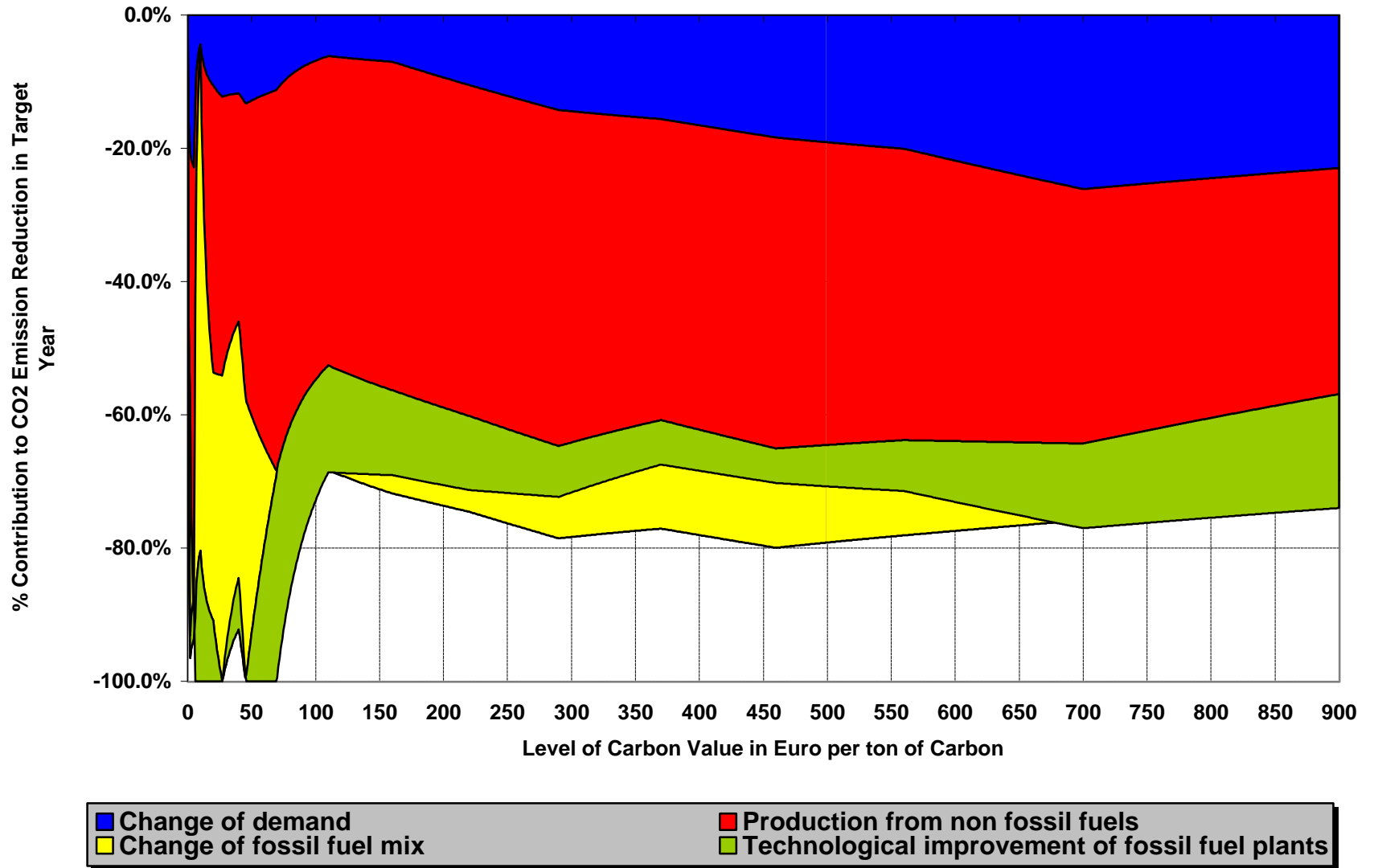
AUSTRIA: CO2 Emission Reduction - Decomposition in Percentage



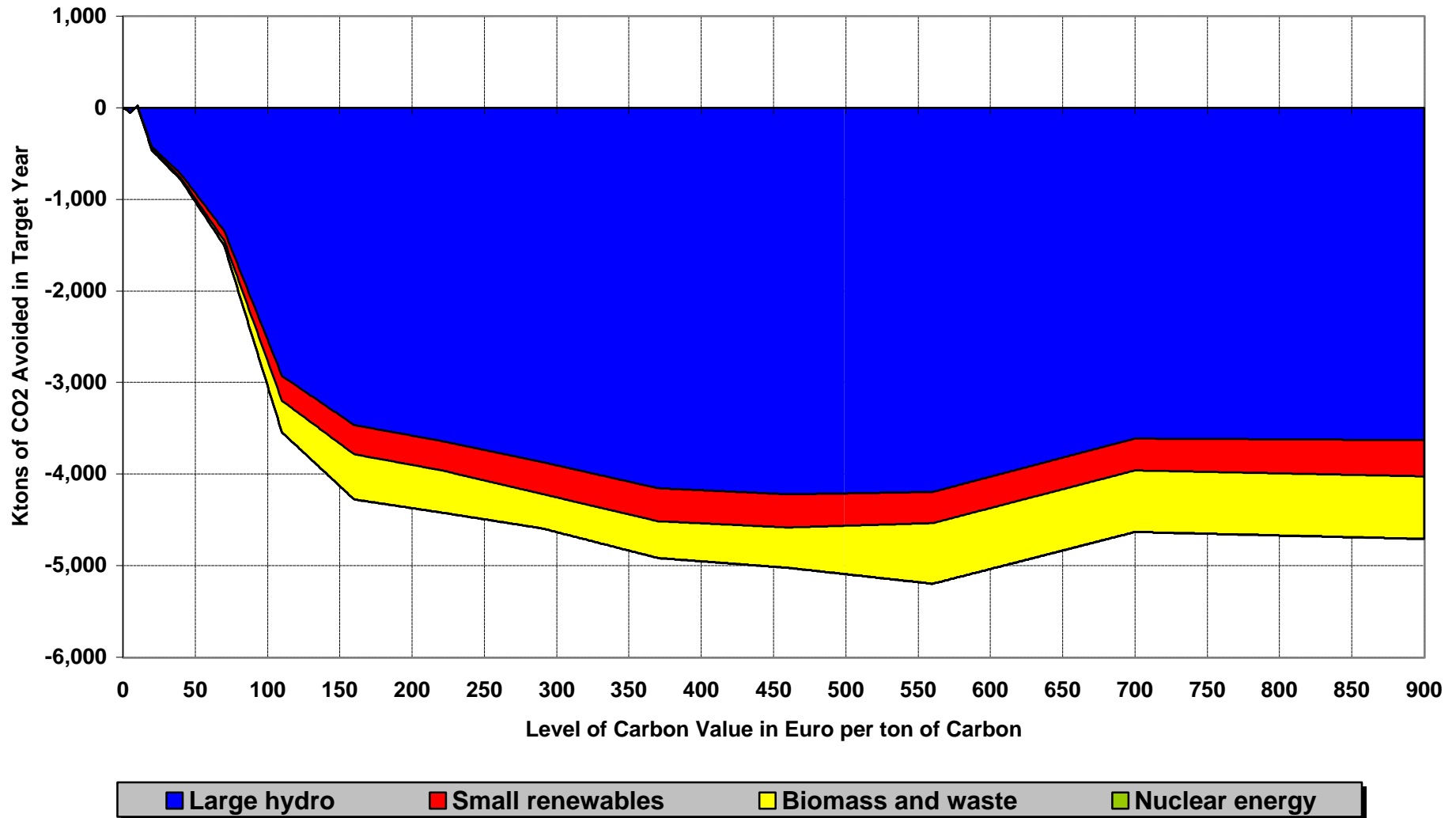
AUSTRIA: CO2 Emission Reduction in Power and Steam Generation - Decomposition



AUSTRIA: CO2 Emission Reduction in Power and Steam Generation - Decomposition in %



AUSTRIA: CO2 Emission Reduction - Contribution of Non-Fossil Fuel in Power and Steam



AUSTRIA: CO2 Emission Reduction - Contribution of Non-Fossil Fuel in Power and Steam - in %

