

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

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

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

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
<b>DECOMPOSITION OF CO2 EMISSIONS REDUCTION (ktn of CO2 avoided in target year)</b>																	
<b>Industrial Sectors - Metals</b>																	
Total CO2 emissions reduction	0	-82	-68	-235	-384	-1001	-2034	-3771	-4608	-5302	-6407	-8013	-9895	-10930	-12511	-13779	-15383
Structural change and behavioural effects	0	-29	-57	-140	-278	-526	-618	-746	-900	-1131	-1688	-2835	-3421	-3670	-4001	-4315	-4845
Technological improvement	0	-2	-4	-10	-20	-36	-68	-112	-170	-212	-324	-529	-2606	-2324	-2994	-3635	-3797
Energy saving in heat uses	0	1	1	2	5	10	2	-8	-22	-84	-110	-147	-144	-215	-251	-282	-339
Specific Industrial processes	0	-2	-5	-13	-25	-46	-71	-103	-144	-125	-196	-351	-2419	-2054	-2655	-3249	-3362
Electrical Equipment	0	0	0	0	0	0	0	-1	-3	-4	-17	-31	-43	-55	-88	-104	-96
Change of fuel mix	0	-7	-14	-33	-62	-116	-203	-306	-395	-466	-502	-458	522	-389	-369	-291	-287
Change of emission factor of electricity and steam (supply effect)	0	-44	6	-52	-25	-323	-1145	-2606	-3143	-3493	-3893	-4191	-4390	-4548	-5147	-5538	-6454
<b>Industrial Sectors - Chemicals</b>																	
Total CO2 emissions reduction	0	-22	-202	55	-373	-525	-918	-2371	-3860	-4241	-4662	-4992	-5262	-5975	-6666	-7287	-8192
Structural change and behavioural effects	0	-2	-3	-2	-6	-30	-44	-68	-155	-213	-312	-364	-434	-593	-806	-1098	-1391
Technological improvement	0	-1	-4	-18	-32	-53	-113	-194	-244	-270	-365	-448	-475	-1055	-1222	-1308	-1391
Energy saving in heat uses	0	0	-1	-3	-5	-9	-19	-33	-45	-55	-74	-86	-93	-122	-151	-164	-176
Specific Industrial processes	0	-1	-3	-14	-25	-40	-87	-149	-180	-195	-267	-338	-359	-889	-1017	-1089	-1165
Electrical Equipment	0	0	0	-1	-2	-4	-8	-13	-19	-20	-23	-24	-23	-44	-54	-54	-50
Change of fuel mix	0	0	0	-1	-2	-4	-6	-9	-14	-16	-17	-17	-18	-18	-18	-18	-18
Change of emission factor of electricity and steam (supply effect)	0	-18	-194	75	-333	-438	-754	-2099	-3493	-3770	-4100	-4314	-4458	-4539	-4993	-5321	-5930
<b>Industrial Sectors - Materials</b>																	
Total CO2 emissions reduction	0	-43	-116	-47	-293	-607	-1385	-3079	-4387	-5095	-6021	-7027	-7872	-8732	-9801	-11436	-13200
Structural change and behavioural effects	0	-4	-9	-21	-43	-89	-172	-293	-442	-617	-809	-1104	-1325	-1496	-1615	-1714	-1773
Technological improvement	0	-4	-7	-22	-42	-81	-157	-272	-430	-621	-1004	-1498	-1980	-2518	-2952	-4148	-5176
Energy saving in heat uses	0	-1	-2	-6	-11	-22	-46	-85	-141	-214	-324	-442	-648	-809	-940	-1135	-1271
Specific Industrial processes	0	-2	-3	-9	-17	-33	-64	-112	-180	-277	-491	-819	-1051	-1350	-1625	-2577	-3376
Electrical Equipment	0	-1	-2	-7	-14	-26	-47	-75	-109	-130	-188	-237	-282	-359	-387	-435	-529
Change of fuel mix	0	-3	-6	-15	-29	-52	-89	-129	-166	-197	-222	-241	-257	-270	-279	-288	-289
Change of emission factor of electricity and steam (supply effect)	0	-32	-94	11	-180	-386	-966	-2386	-3350	-3660	-3987	-4183	-4309	-4449	-4955	-5286	-5962
<b>Industrial Sectors - Others</b>																	
Total CO2 emissions reduction	0	-103	-207	-86	-518	-1262	-3186	-7299	-10053	-11357	-13033	-14650	-15707	-16765	-18733	-20135	-22523
Structural change and behavioural effects	0	-2	-4	-9	-17	-39	-74	-124	-184	-255	-329	-408	-496	-585	-662	-777	-913
Technological improvement	0	-10	-20	-63	-120	-243	-462	-804	-1257	-1674	-2434	-3554	-4224	-4827	-5395	-5799	-6172
Energy saving in heat uses	0	-6	-13	-37	-71	-123	-249	-415	-615	-781	-1028	-1193	-1426	-1780	-2206	-2532	-2953
Specific Industrial processes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electrical Equipment	0	-4	-7	-25	-49	-120	-214	-389	-642	-893	-1407	-2361	-2797	-3047	-3189	-3267	-3218
Change of fuel mix	0	-1	-2	-4	-8	-16	-27	-40	-52	-61	-69	-76	-81	-84	-86	-88	-92
Change of emission factor of electricity and steam (supply effect)	0	-91	-182	-10	-372	-965	-2623	-6331	-8561	-9366	-10201	-10611	-10907	-11269	-12590	-13471	-15347
<b>Industrial Sectors - Total</b>																	
Total CO2 emissions reduction	0	-250	-593	-313	-1568	-3396	-7523	-16520	-22908	-25995	-30124	-34681	-38737	-42403	-47711	-52637	-59299
Structural change and behavioural effects	0	-38	-73	-171	-344	-685	-908	-1232	-1605	-2158	-2977	-4560	-5553	-6114	-6712	-7398	-8337
Technological improvement	0	-16	-35	-113	-214	-412	-801	-1382	-2100	-2777	-4127	-6029	-9285	-10724	-12563	-14890	-16536
Energy saving in heat uses	0	-7	-14	-43	-82	-144	-311	-541	-822	-1134	-1536	-1868	-2311	-2926	-3548	-4115	-4739
Specific Industrial processes	0	-5	-11	-36	-67	-119	-221	-364	-504	-597	-955	-1508	-3828	-4293	-5297	-6916	-7903
Electrical Equipment	0	-5	-9	-34	-65	-149	-268	-477	-774	-1047	-1636	-2653	-3145	-3505	-3718	-3860	-3894
Change of fuel mix	0	-11	-22	-53	-101	-187	-325	-484	-656	-770	-840	-792	166	-761	-752	-733	-734
Change of emission factor of electricity and steam (supply effect)	0	-184	-463	24	-910	-2111	-5489	-13422	-18546	-20289	-22181	-23299	-24065	-24805	-27683	-29616	-33693

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

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	
<b>DECOMPOSITION OF CO2 EMISSIONS REDUCTION (ktn of CO2 avoided in target year)</b>																		
<b>Services</b>																		
Total CO2 emissions reduction	0	-145	-29	-268	-945	-2364	-5595	-10664	-13171	-16601	-19841	-22489	-24846	-26917	-29240	-30902	-33825	
Structural change and behavioural effects	0	-10	-21	-65	-145	-268	-555	-924	-1447	-1991	-2524	-3044	-3588	-4109	-4545	-4998	-5514	
Technological improvement	0	-12	-33	-63	-751	-1224	-1879	-2503	-3046	-5212	-7129	-8842	-10514	-11916	-12308	-12262	-12976	
Space heating and cooling	0	-8	-25	-45	-238	-394	-796	-1283	-1628	-3410	-4809	-5702	-6739	-7375	-7674	-7556	-7807	
Other heat uses (water heating, cooking, etc.)	0	-3	-6	-13	-52	-179	-298	-335	-448	-552	-644	-730	-799	-864	-912	-975	-1036	
Electric uses	0	0	-2	-4	-460	-651	-785	-886	-970	-1251	-1677	-2410	-2976	-3677	-4521	-5371	-6132	
Change of fuel mix	0	2	4	9	16	33	52	73	96	123	149	178	203	224	109	-325	-268	
Change of emission factor of electricity and steam (supply effect)	0	-126	21	-149	-65	-904	-3213	-7310	-8774	-9522	-10338	-10781	-10947	-11115	-12496	-13316	-15066	
<b>Agriculture</b>																		
Total CO2 emissions reduction	0	-6	-2	-14	-37	-95	-224	-428	-537	-639	-789	-894	-995	-1079	-1177	-1258	-1389	
Structural change and behavioural effects	0	0	-1	-3	-7	-12	-26	-43	-68	-95	-122	-151	-181	-210	-237	-266	-299	
Technological improvement	0	0	-1	-2	-23	-38	-55	-72	-87	-114	-136	-161	-181	-209	-232	-261	-299	
Space heating and cooling	0	0	-1	-1	-5	-9	-16	-24	-30	-42	-50	-61	-74	-86	-100	-115	-133	
Other heat uses (water heating, cooking, etc.)	0	0	0	-1	-3	-5	-8	-11	-15	-20	-24	-29	-32	-36	-42	-48	-55	
Electric uses	0	0	0	0	-15	-24	-31	-37	-42	-53	-67	-87	-114	-136	-140	-144	-161	
Change of fuel mix	0	0	-1	-2	-5	-9	-19	-31	-46	-63	-80	-96	-112	-127	-141	-157	-175	
Change of emission factor of electricity and steam (supply effect)	0	-5	1	-6	-2	-35	-125	-282	-336	-367	-392	-406	-409	-417	-467	-494	-556	
<b>Households</b>																		
Total CO2 emissions reduction	0	-172	-64	-351	-471	-1654	-4684	-9835	-12902	-15615	-18629	-21495	-24925	-28958	-34443	-41010	-45240	
Structural change and behavioural effects	0	-21	-42	-108	-226	-416	-792	-1375	-2133	-2957	-3920	-4922	-5946	-6947	-7690	-8766	-10209	
Technological improvement	0	-20	-34	-76	-135	-245	-485	-804	-1539	-1269	-2225	-3363	-5342	-8007	-12238	-15681	-16144	
Space heating	0	-8	-14	-31	-59	-113	-235	-465	-774	-1242	-1846	-2601	-4168	-6159	-9755	-14748	-19659	
Other heat uses (water heating, cooking, air conditioning)	0	-9	-15	-35	-63	-115	-215	-345	-532	-82	-92	-356	-600	-987	-1306	-1445	-1532	
Electric appliances	0	-4	-6	-10	-13	-18	-25	-34	-45	-57	-72	-89	-109	-134	-164	-199	-240	
Change of fuel mix	0	-3	-6	-17	-38	-65	-116	-193	-289	-469	-769	-1169	-1819	-2819	-4219	-6019	-8519	
Change of emission factor of electricity and steam (supply effect)	0	-128	19	-150	-71	-929	-3291	-7463	-8942	-9819	-10804	-11369	-11698	-12014	-13419	-13225	-15374	
<b>Passenger Transport</b>																		
Total CO2 emissions reduction	0	-40	-47	-140	-251	-584	-1314	-2455	-4021	-5559	-7206	-9058	-11188	-13693	-17042	-23611	-33055	
Structural change and behavioural effects	0	-9	-18	-44	-87	-173	-345	-606	-922	-1388	-2018	-2672	-3341	-4052	-4735	-5471	-6261	
Technological improvement	0	-16	-32	-80	-158	-307	-595	-999	-1603	-2367	-3393	-4690	-6352	-8485	-11177	-14740	-19794	
Train transports	0	-3	-6	-14	-28	-51	-99	-169	-257	-419	-605	-809	-1062	-1195	-1251	-1041	-757	
Aviation / Navigation	0	-10	-21	-52	-102	-198	-373	-598	-947	-1427	-2141	-2910	-3842	-4955	-6377	-8148	-10417	
Road transports	0	-3	-6	-14	-29	-59	-123	-231	-399	-687	-1024	-1589	-2460	-3805	-6001	-9344	-14241	
Change of fuel mix	0	0	0	1	3	5	9	13	17	22	27	31	35	38	42	46	50	
Change of emission factor of electricity and steam (supply effect)	0	-15	3	-18	-7	-106	-379	-858	-1029	-1142	-1272	-1348	-1375	-1421	-1617	-1557	-1700	
<b>Goods Transport</b>																		
Total CO2 emissions reduction	0	-22	-37	-98	-189	-400	-845	-1543	-2376	-3456	-4604	-6045	-7829	-9461	-10709	-15840	-18214	
Structural change and behavioural effects	0	-15	-30	-74	-148	-297	-593	-1030	-1570	-2148	-2622	-3273	-4052	-4985	-5995	-7191	-8551	
Technological improvement	0	-4	-8	-19	-39	-80	-170	-325	-581	-1058	-1711	-2790	-4273	-6445	-9570	-14181	-20863	
Train transports	0	-1	-1	-3	-7	-12	-25	-41	-59	-83	-112	-138	-171	-211	-261	-321	-381	
Aviation / Navigation	0	0	0	0	-1	-1	-3	-5	-8	-13	-19	-28	-42	-60	-84	-114	-150	
Road transports	0	-3	-6	-16	-32	-66	-143	-279	-513	-962	-1580	-2624	-4060	-6134	-9119	-13552	-19914	
Change of fuel mix	0	0	0	0	0	0	0	-1	-1	-1	-2	-2	-3	-3	-3	-4	-4	
Change of emission factor of electricity and steam (supply effect)	0	-3	1	-4	-2	-23	-82	-187	-225	-248	-270	-280	-282	-261	-282	-293	-329	
<b>Final Energy Demand Sectors - Total</b>																		
Total CO2 emissions reduction	0	-636	-772	-1184	-3462	-8493	-20184	-41444	-55916	-67865	-81194	-94662	-108521	-122511	-140322	-165257	-191023	
Structural change and behavioural effects	0	-92	-185	-466	-957	-1851	-3219	-5210	-7745	-10738	-14182	-18322	-21881	-23184	-25772	-27851	-32171	
Technological improvement	0	-69	-143	-353	-1321	-2306	-3983	-6086	-9436	-13476	-19326	-26329	-36211	-46673	-56740	-73199	-87482	
Change of fuel mix	0	-12	-25	-63	-126	-226	-403	-627	-884	-1263	-1830	-2526	-3453	-4522	-5844	-7506	-9452	
Change of emission factor of electricity and steam (supply effect)	0	-462	-420	-302	-1058	-4109	-12579	-29522	-37851	-41387	-45256	-47484	-48776	-50032	-55965	-65502	-76671	

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

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	
<b>DECOMPOSITION OF CO2 EMISSIONS REDUCTION (ktn of CO2 avoided in target year)</b>																		
<b>Electricity production</b>																		
Total CO2 emissions reduction	0	-513	74	-674	-994	-4756	-14666	-31825	-38948	-45044	-51525	-56627	-60565	-65155	-72717	-80694	-89451	
Change of demand	0	-10	-22	-93	-817	-1262	-2018	-3010	-4366	-7191	-10106	-12842	-14777	-18102	-19980	-25523	-26591	
Production from non fossil fuels	0	-2	-4	-128	-303	-1122	-2406	-4516	-5149	-6082	-9624	-11784	-12528	-13553	-15041	-18855	-19284	
Large hydro	0	-1	-3	-89	-211	-763	-1574	-2755	-3048	-3517	-5263	-6154	-6443	-6948	-7559	-9083	-9235	
Small renewables	0	0	-1	-28	-67	-249	-590	-1200	-1383	-1647	-2769	-3643	-3996	-4315	-5221	-6755	-7030	
Biomass and waste	0	0	0	-10	-25	-110	-242	-561	-717	-918	-1592	-1988	-2089	-2290	-2262	-3016	-3018	
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	-454	201	-521	-303	-3057	-8928	-26396	-27245	-37028	-35409	-24244	-4285	-4463	-5108	-5243	-6238	
Technological improvement of fossil fuel plants	0	-49	-102	67	429	685	-1314	2097	-2189	5257	3615	-7756	-28975	-29037	-32588	-31073	-37338	
<b>Steam production</b>																		
Total CO2 emissions reduction	0	41	-516	284	-833	-541	253	-340	-2921	-3054	-3223	-3384	-3551	-3960	-4196	-4586	-4795	
Change of demand	0	-3	-6	-16	-31	-73	-137	-245	-353	-498	-677	-856	-1039	-1399	-1677	-1993	-2340	
Production from non fossil fuels	0	0	0	-1	8	-145	-236	-404	-701	-802	-870	-995	-991	-1125	-1516	-1507	-1470	
Technological improvement of fossil fuel plants and change of fuel mix	0	44	-509	300	-810	-324	626	309	-1867	-1754	-1676	-1533	-1520	-1436	-1004	-1087	-985	
<b>Other Supply Sectors production</b>																		
Total CO2 emissions reduction	0	-4	-10	-28	-92	-131	-184	-353	-517	-603	-750	-1008	-1284	-1418	-1503	-1734	-1966	
<b>Statistical Difference</b>																		
	0	-8	-15	-37	-69	-131	-159	-182	-206	-237	-324	-507	-706	-752	-916	-1017	-2028	
<b>Avoided CO2 Emissions - As in Final Report</b>																		
Total CO2 emissions reduction	0	-648	-798	-1250	-3623	-8755	-20527	-41980	-56639	-68706	-82268	-96177	-110511	-124681	-142740	-168008	-195016	
In Final Energy Demand	0	-168	-341	-822	-1700	-3303	-5916	-9497	-14339	-20102	-26846	-35149	-44985	-53985	-64108	-80717	-97322	
In Electricity and Steam Generation	0	-475	-446	-399	-1831	-5321	-14427	-32130	-41783	-48001	-54672	-60020	-64242	-69278	-77129	-85557	-95728	
In Other Energy Conversion Sectors	0	-4	-10	-28	-92	-131	-184	-353	-517	-603	-750	-1008	-1284	-1418	-1503	-1734	-1966	

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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	
<b>DECOMPOSITION OF CO2 EMISSIONS REDUCTION (% contribution to avoid CO2 emissions in target year)</b>																		
<b>Industrial Sectors - Metals</b>																		
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	35.3	84.0	59.7	72.3	52.6	30.4	19.8	19.5	21.3	26.4	35.4	34.6	33.6	32.0	31.3	31.5	
Technological improvement	0	2.2	5.4	4.5	5.1	3.6	3.3	3.0	3.7	4.0	5.1	6.6	26.3	21.3	23.9	26.4	24.7	
Energy saving in heat uses	0	-0.7	-1.6	-1.0	-1.3	-1.0	-0.1	0.2	0.5	1.6	1.7	1.8	1.5	2.0	2.0	2.0	2.2	
Specific Industrial processes	0	3.0	7.3	5.6	6.5	4.6	3.5	2.7	3.1	2.4	3.1	4.4	24.4	18.8	21.2	23.6	21.9	
Electrical Equipment	0	-0.1	-0.3	-0.1	-0.1	0.0	0.0	0.0	0.1	0.1	0.3	0.4	0.4	0.5	0.7	0.8	0.6	
Change of fuel mix	0	8.5	20.0	13.9	16.1	11.6	10.0	8.1	8.6	8.8	7.8	5.7	-5.3	3.6	2.9	2.1	1.9	
Change of emission factor of electricity and steam (supply effect)	0	54.0	-9.4	22.0	6.4	32.2	56.3	69.1	68.2	65.9	60.8	52.3	44.4	41.6	41.1	40.2	42.0	
<b>Industrial Sectors - Chemicals</b>																		
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	10.8	1.7	-2.9	1.5	5.8	4.8	2.9	2.1	3.7	3.2	4.3	5.9	6.1	6.5	8.1	9.8	
Technological improvement	0	6.7	1.9	-31.8	8.6	10.1	12.4	8.2	6.3	6.4	7.8	9.0	9.0	17.7	18.3	17.9	17.0	
Energy saving in heat uses	0	1.7	0.4	-4.6	1.3	1.8	2.1	1.4	1.2	1.3	1.6	1.7	1.8	2.0	2.3	2.3	2.1	
Specific Industrial processes	0	4.8	1.5	-24.8	6.7	7.6	9.4	6.3	4.7	4.6	5.7	6.8	6.8	14.9	15.3	14.9	14.2	
Electrical Equipment	0	0.2	0.1	-2.3	0.6	0.7	0.9	0.5	0.5	0.5	0.5	0.4	0.7	0.8	0.7	0.6	0.6	
Change of fuel mix	0	1.0	0.2	-1.8	0.5	0.7	0.7	0.4	1.1	1.1	1.0	0.3	0.3	0.3	0.3	0.9	0.8	
Change of emission factor of electricity and steam (supply effect)	0	81.5	96.2	136.6	89.4	83.4	82.2	88.5	90.5	88.9	87.9	86.4	84.7	76.0	74.9	73.0	72.4	
<b>Industrial Sectors - Materials</b>																		
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	10.3	7.4	44.7	14.5	14.7	12.4	9.5	10.1	12.1	13.4	15.7	16.8	17.1	16.5	15.0	13.4	
Technological improvement	0	8.3	6.4	46.6	14.4	13.3	11.3	8.8	9.8	12.2	16.7	21.3	25.2	28.8	30.1	36.3	39.2	
Energy saving in heat uses	0	2.3	1.7	12.1	3.8	3.6	3.3	2.8	3.2	4.2	5.4	6.3	8.2	9.3	9.6	9.9	9.6	
Specific Industrial processes	0	3.8	2.8	18.9	5.9	5.4	4.6	3.6	4.1	5.4	8.2	11.7	13.3	15.5	16.6	22.5	25.6	
Electrical Equipment	0	2.3	1.8	15.6	4.7	4.2	3.4	2.4	2.5	3.1	3.4	3.6	4.1	4.0	3.8	4.0	4.0	
Change of fuel mix	0	7.3	5.3	31.6	9.7	8.6	6.4	4.2	3.8	3.9	3.7	3.4	3.3	3.1	2.8	2.5	2.2	
Change of emission factor of electricity and steam (supply effect)	0	74.1	80.8	-22.9	61.3	63.5	69.8	77.5	76.4	71.8	66.2	59.5	54.7	50.9	50.5	46.2	45.2	
<b>Industrial Sectors - Others</b>																		
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	1.9	1.7	9.9	3.3	3.1	2.3	1.7	1.8	2.2	2.5	2.8	3.2	3.5	3.5	3.9	4.1	
Technological improvement	0	9.3	9.4	72.8	23.2	19.2	14.5	11.0	12.5	14.7	18.7	24.3	26.9	28.8	28.8	28.8	27.4	
Energy saving in heat uses	0	5.6	6.1	43.4	13.7	9.7	7.8	5.7	6.1	6.9	7.9	8.1	9.1	10.6	11.8	12.6	13.1	
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	3.7	3.4	29.4	9.5	9.5	6.7	5.3	6.4	7.9	10.8	16.1	17.8	18.2	17.0	16.2	14.3	
Change of fuel mix	0	0.9	0.9	5.1	1.6	1.2	0.9	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	
Change of emission factor of electricity and steam (supply effect)	0	88.0	88.0	12.2	71.8	76.4	82.3	86.7	85.2	82.5	78.3	72.4	69.4	67.2	67.2	66.9	68.1	
<b>Industrial Sectors - Total</b>																		
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	15.0	12.2	54.8	21.9	20.2	12.1	7.5	7.0	8.3	9.9	13.1	14.3	14.4	14.1	14.1	14.1	
Technological improvement	0	6.6	5.8	36.0	13.7	12.1	10.6	8.4	9.2	10.7	13.7	17.4	24.0	25.3	26.3	28.3	27.9	
Energy saving in heat uses	0	2.6	2.4	13.8	5.2	4.3	4.1	3.3	3.6	4.4	5.1	5.4	6.0	6.9	7.4	7.8	8.0	
Specific Industrial processes	0	2.1	1.9	11.4	4.3	3.5	2.9	2.2	2.2	2.3	3.2	4.3	9.9	10.1	11.1	13.1	13.3	
Electrical Equipment	0	1.9	1.5	10.8	4.1	4.4	3.6	2.9	3.4	4.0	5.4	7.6	8.1	8.3	7.8	7.3	6.6	
Change of fuel mix	0	4.5	3.7	16.9	6.4	5.5	4.3	2.9	2.9	3.0	2.8	2.3	-0.4	1.8	1.6	1.4	1.2	
Change of emission factor of electricity and steam (supply effect)	0	73.9	78.2	-7.7	58.0	62.2	73.0	81.2	81.0	78.1	73.6	67.2	62.1	58.5	58.0	56.3	56.8	

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

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	
<b>DECOMPOSITION OF CO2 EMISSIONS REDUCTION (% contribution to avoid CO2 emissions in target year)</b>																		
<b>Services</b>																		
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	6.6	72.4	24.3	15.4	11.4	9.9	8.7	11.0	12.0	12.7	13.5	14.4	15.3	15.5	16.2	16.3	
Technological improvement	0	8.0	114.1	23.3	79.5	51.8	33.6	23.5	23.1	31.4	35.9	39.3	42.3	44.3	42.1	39.7	38.4	
Space heating and cooling	0	5.7	86.1	16.7	25.2	16.7	14.2	12.0	12.4	20.5	24.2	25.4	27.1	27.4	26.2	24.5	23.1	
Other heat uses (water heating, cooking, etc.)	0	2.0	22.0	5.0	5.5	7.6	5.3	3.1	3.4	3.3	3.2	3.2	3.2	3.2	3.1	3.2	3.1	
Electric uses	0	0.3	6.0	1.6	48.7	27.5	14.0	8.3	7.4	7.5	8.5	10.7	12.0	13.7	12.7	12.1	12.2	
Change of fuel mix	0	-1.5	-14.1	-3.3	-1.7	-1.4	-0.9	-0.7	-0.7	-0.7	-0.8	-0.8	-0.8	-0.8	-0.4	1.1	0.8	
Change of emission factor of electricity and steam (supply effect)	0	86.9	-72.4	55.6	6.9	38.3	57.4	68.5	66.6	57.4	52.1	47.9	44.1	41.3	42.7	43.1	44.5	
<b>Agriculture</b>																		
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	7.5	46.9	22.1	17.7	13.1	11.5	10.2	12.7	14.9	15.5	16.9	18.2	19.5	20.1	21.1	21.5	
Technological improvement	0	7.1	51.1	17.5	62.7	39.7	24.4	16.9	16.3	17.9	24.8	27.0	29.5	30.1	28.2	27.1	25.9	
Space heating and cooling	0	3.3	25.7	7.2	14.0	9.1	7.1	5.7	5.6	6.5	13.3	14.0	14.8	14.2	13.0	12.3	11.0	
Other heat uses (water heating, cooking, etc.)	0	3.1	18.6	6.7	7.8	5.1	3.4	2.6	2.8	3.1	3.1	3.2	3.3	3.3	3.3	3.4	3.2	
Electric uses	0	0.7	6.8	3.5	40.8	25.5	13.9	8.5	7.8	8.3	8.5	9.7	11.4	12.6	11.9	11.4	11.6	
Change of fuel mix	0	7.3	42.9	17.6	13.0	9.9	8.3	7.2	8.6	9.8	10.1	10.7	11.3	11.8	12.0	12.5	12.6	
Change of emission factor of electricity and steam (supply effect)	0	78.1	-40.9	42.8	6.6	37.3	55.8	65.7	62.4	57.4	49.6	45.4	41.1	38.6	39.6	39.3	40.0	
<b>Households</b>																		
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	12.0	65.8	30.8	48.1	25.1	16.9	14.0	16.5	18.9	21.0	22.9	23.9	24.0	22.3	21.4	22.6	
Technological improvement	0	11.8	53.3	21.7	28.7	14.8	10.3	8.2	11.9	8.1	11.9	15.6	21.4	27.7	35.5	38.2	35.7	
Space heating	0	4.5	21.1	9.0	12.5	6.8	5.0	4.7	6.0	8.0	9.9	12.1	16.7	21.3	28.3	21.3	21.4	
Other heat uses (water heating, cooking, air conditioning)	0	5.0	23.4	9.8	13.5	6.9	4.6	2.5	4.9	-1.2	0.5	1.7	2.4	3.4	3.8	3.5	3.4	
Electric appliances	0	2.4	8.8	2.9	2.7	1.1	0.8	1.0	1.0	1.3	1.5	1.9	2.3	3.0	3.4	13.4	10.9	
Change of fuel mix	0	1.7	10.0	4.9	8.1	3.9	2.5	2.0	2.2	10.1	9.0	8.6	7.8	6.9	3.2	8.1	7.8	
Change of emission factor of electricity and steam (supply effect)	0	74.5	-29.1	42.7	15.1	56.2	70.3	75.9	69.3	62.9	58.0	52.9	46.9	41.5	39.0	32.2	34.0	
<b>Passenger Transports</b>																		
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	22.5	37.7	31.2	34.6	29.6	26.3	24.7	22.9	25.0	28.0	29.5	29.9	29.6	27.8	16.4	14.5	
Technological improvement	0	40.9	68.6	56.8	63.0	52.6	45.3	40.7	51.8	54.8	54.7	55.9	58.1	60.3	63.0	72.1	80.5	
Train transports	0	7.7	12.1	9.9	11.0	8.7	7.6	6.9	6.4	7.5	8.4	8.9	9.5	8.7	7.3	4.4	2.3	
Aviation / Navigation	0	26.2	44.5	36.8	40.6	33.9	28.4	24.4	35.5	34.9	32.1	29.4	26.7	23.8	20.4	10.4	10.2	
Road transports	0	7.0	12.0	10.1	11.4	10.1	9.4	9.9	9.9	12.4	14.2	17.5	22.0	27.8	35.2	57.4	68.0	
Change of fuel mix	0	-0.3	-0.6	-0.5	-0.5	-0.5	-0.4	-0.4	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	4.9	-0.1	
Change of emission factor of electricity and steam (supply effect)	0	36.9	-5.7	12.5	2.9	18.2	28.8	35.0	25.6	20.5	17.6	14.9	12.3	10.4	9.5	6.6	5.1	
<b>Goods Transports</b>																		
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	68.1	80.8	76.3	78.4	74.2	70.1	66.8	66.1	62.2	56.9	49.2	41.8	18.5	17.3	16.1	16.6	
Technological improvement	0	17.4	20.7	19.8	20.7	20.0	20.1	21.1	24.4	30.6	37.2	46.1	54.6	78.7	80.0	82.0	81.5	
Train transports	0	3.2	3.6	3.4	3.5	3.1	2.9	2.7	2.5	2.4	2.4	2.3	2.2	2.9	2.8	2.0	1.9	
Aviation / Navigation	0	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.4	0.5	0.7	0.7	
Road transports	0	13.9	16.8	16.1	16.9	16.6	16.9	18.1	21.6	27.8	34.3	43.4	51.9	75.4	76.7	79.2	79.0	
Change of fuel mix	0	0.0	0.1	0.0	0.1	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	14.4	-1.6	3.9	0.8	5.8	9.8	12.1	9.5	7.2	5.9	4.6	3.6	2.8	2.6	1.9	1.8	
<b>Final Energy Demand Sectors - Total</b>																		
Total CO2 emissions reduction	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Structural change and behavioural effects	0	14.5	23.9	39.3	27.7	21.8	15.9	12.6	13.9	15.8	17.5	19.4	20.2	18.9	18.4	16.9	16.8	
Technological improvement	0	10.9	18.5	29.8	38.1	27.2	19.7	14.7	16.9	19.9	23.8	27.8	33.4	38.1	40.4	44.3	45.8	
Change of fuel mix	0	1.9	3.2	5.3	3.7	2.7	2.0	1.5	1.6	3.3	3.0	2.7	1.5	2.1	1.3	3.5	2.4	
Change of emission factor of electricity and steam (supply effect)	0	72.7	54.3	25.5	30.5	48.4	62.3	71.2	67.7	61.0	55.7	50.2	44.9	40.8	39.9	35.4	34.9	

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

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	
<b>DECOMPOSITION OF CO2 EMISSIONS REDUCTION (% contribution to avoid CO2 emissions in target year)</b>																		
<b>Electricity production</b>																		
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	1.9	-29.4	13.7	82.2	26.5	13.8	9.5	11.2	16.0	19.6	22.7	24.4	27.8	27.5	31.6	29.7	
Production from non fossil fuels	0	0.3	-5.5	19.0	30.4	23.6	16.4	14.2	13.2	13.5	18.7	20.8	20.7	20.8	20.7	23.4	21.6	
Large hydro	0	0.2	-3.9	13.2	21.2	16.0	10.7	8.7	7.8	7.8	10.2	10.9	10.6	10.7	10.4	11.3	10.3	
Small renewables	0	0.1	-1.2	4.2	6.8	5.2	4.0	3.8	3.6	3.7	5.4	6.4	6.6	6.6	7.2	8.4	7.9	
Biomass and waste	0	0.0	-0.4	1.5	2.5	2.3	1.7	1.8	1.8	2.0	3.1	3.5	3.4	3.5	3.1	3.7	3.4	
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	88.3	272.5	77.3	30.5	64.3	60.9	82.9	70.0	82.2	68.7	42.8	7.1	6.8	7.0	6.5	7.0	
Technological improvement of fossil fuel plants	0	9.5	-137.6	-10.0	-43.2	-14.4	9.0	-6.6	5.6	-11.7	-7.0	13.7	47.8	44.6	44.8	38.5	41.7	
<b>Steam production</b>																		
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	-8.3	1.2	-5.6	3.7	13.4	-54.4	72.2	12.1	16.3	21.0	25.3	29.3	35.3	40.0	43.5	48.8	
Production from non fossil fuels	0	-0.7	0.1	-0.3	-0.9	26.7	-93.2	118.7	24.0	26.3	27.0	29.4	27.9	28.4	36.1	32.9	30.7	
Technological improvement of fossil fuel plants and change of fuel mix	0	109.1	98.7	105.9	97.2	59.9	247.7	-90.9	63.9	57.5	52.0	45.3	42.8	36.3	23.9	23.7	20.5	
<b>Other Supply Sectors production</b>																		
Total CO2 emissions reduction	0	0.6	1.3	2.3	2.6	1.5	0.9	0.8	0.9	0.9	0.9	1.0	1.2	1.1	1.1	1.0	1.0	
<b>Statistical Difference</b>																		
Total CO2 emissions reduction	0	1.2	1.9	3.0	1.9	1.5	0.8	0.4	0.4	0.3	0.4	0.5	0.6	0.6	0.6	0.6	1.0	
<b>Avoided CO2 Emissions - As in Final Report</b>																		
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	26.0	42.8	65.8	46.9	37.7	28.8	22.6	25.3	29.3	32.6	36.5	40.7	43.3	44.9	48.0	49.9	
In Electricity and Steam Generation	0	73.4	56.0	31.9	50.5	60.8	70.3	76.5	73.8	69.9	66.5	62.4	58.1	55.6	54.0	50.9	49.1	
In Other Energy Conversion Sectors	0	0.6	1.3	2.3	2.6	1.5	0.9	0.8	0.9	0.9	0.9	1.0	1.2	1.1	1.1	1.0	1.0	

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

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	
<b>Heavy Industry</b>																		
Specific energy Consumption of Process Technology (toe per tn of output)																		
Iron and Steel	0.380	0.380	0.380	0.380	0.379	0.379	0.378	0.378	0.377	0.379	0.379	0.378	0.342	0.314	0.297	0.276	0.269	
Basic aluminium	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.027	1.021	0.988	0.946	
Other processing of non ferrous	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	
Chemicals	0.268	0.268	0.268	0.268	0.267	0.266	0.264	0.262	0.259	0.256	0.252	0.248	0.244	0.230	0.225	0.218	0.211	
Cement Production	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.041	0.041	0.041	0.041	0.040	0.039	0.039	0.039	0.039	0.035	
Glass basic processing	0.207	0.207	0.207	0.207	0.207	0.206	0.206	0.206	0.205	0.203	0.200	0.197	0.195	0.193	0.178	0.163	0.155	
Pulp and Paper	0.074	0.074	0.074	0.073	0.073	0.073	0.073	0.072	0.072	0.071	0.071	0.070	0.069	0.066	0.064	0.061	0.059	
Structural Change in basic processing (%)																		
Electric steelworks	68.8	68.9	69.0	69.3	69.8	70.7	70.6	70.5	70.4	70.5	72.3	76.9	80.9	81.4	83.5	86.1	89.4	
Aluminium recycling	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.7	85.7	85.6	85.5	85.4	85.3	85.3	84.8	82.3	80.4	
Glass recycling	63.5	63.5	63.5	63.5	63.5	63.6	63.7	63.9	64.2	64.3	63.9	63.4	63.3	63.5	63.8	64.6	65.6	
Paper recycling	92.5	92.5	92.5	92.5	92.5	92.6	92.6	92.6	92.6	92.6	92.6	92.6	92.7	92.7	92.7	92.7	92.7	
Fuel Mix																		
electrotechnologies																		
% of mechanical processing in chemistry	76.0	76.0	76.1	76.4	76.7	77.2	78.4	79.8	80.9	81.2	83.8	85.5	86.7	88.1	89.2	90.0	90.8	
% of electric furnaces non ferrous	90.3	90.3	90.4	90.4	90.4	90.4	90.5	90.6	90.7	90.7	90.8	90.8	90.8	91.0	91.0	90.0	89.5	
% of mechanical processing glass production	13.4	13.4	13.4	13.5	13.5	13.6	13.7	13.9	14.1	14.2	14.5	14.7	15.0	15.5	16.1	17.1	18.1	
% of mechanical processing in paper and pulp	62.0	62.1	62.1	62.1	62.2	62.3	62.5	62.7	62.7	62.7	62.1	61.9	62.1	62.6	63.1	63.8	64.8	
% of heat pumps in specific heat uses	4.3	4.3	4.4	4.6	4.9	5.4	6.6	8.8	12.3	15.8	23.5	45.0	53.4	59.2	63.4	67.2	70.9	
natural gas directly substituting other fossil fuels (% in specific uses)	57.3	57.4	57.4	57.6	58.0	58.6	59.3	60.1	61.0	61.7	62.5	63.3	64.0	64.3	64.2	64.1	64.5	
market share of steam (% in industrial demand)	23.8	23.8	23.8	23.8	23.9	23.9	23.9	24.0	24.0	24.0	24.2	24.6	25.1	25.0	25.1	25.5	25.7	
Contribution of CHP for industrial Steam Production (%)	86.3	86.3	86.3	86.3	86.2	86.2	86.1	86.4	86.3	86.1	86.1	85.9	85.6	85.7	85.5	84.9	84.9	
<b>Equipment efficiency of electrical and cross-cutting technologies (index)</b>																		
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	103.2	103.6	104.3	105.3	106.3	107.8	
Electric Furnaces	100	100.0	100.0	100.1	100.1	100.3	100.5	100.7	101.2	101.9	102.8	105.0	109.0	111.4	113.0	114.2	118.7	
Industrial Motors, Air Compressors, Lighting, etc.																		
Motor Drives	100	100.0	100.0	100.0	100.1	100.1	100.3	100.4	100.6	100.7	101.2	101.6	102.2	103.3	104.8	106.2	107.7	
Air Compressors	100	100.0	100.1	100.2	100.3	100.5	101.0	101.7	102.4	102.8	103.8	104.4	105.7	106.8	107.7	108.5	109.2	
Lighting	100	100.1	100.1	100.3	100.6	101.2	102.2	103.6	105.3	106.5	110.9	117.1	126.3	135.3	140.4	144.4	147.6	
Electric Equipment in Households																		
Refrigerators	100	100.0	100.1	100.1	100.2	100.2	100.5	101.1	101.6	102.4	103.1	103.8	104.4	104.9	105.5	120.0	107.8	
Washing machines	100	100.1	100.1	100.2	100.3	100.4	100.7	101.9	102.8	104.2	105.3	106.4	107.3	108.1	108.8	109.4	110.1	
Lighting	100	100.0	100.0	100.0	100.0	100.0	100.0	100.2	100.3	100.6	101.1	102.2	104.4	109.0	115.3	467.6	476.3	
TV and similar	100	100.0	100.0	100.0	100.0	100.0	100.1	100.2	100.3	100.5	100.8	101.1	101.4	101.7	101.9	102.1	102.4	
Water heating	100	100.1	100.1	100.2	100.4	100.8	101.4	101.6	104.6	106.9	108.8	110.6	112.1	113.3	114.8	115.9	116.9	
Air Conditioning	100	100.1	100.1	100.1	100.2	100.2	100.4	101.2	101.8	103.2	105.7	112.3	117.5	134.3	154.9	160.3	163.5	
Electric Equipment in Tertiary																		
Offices	100	100.2	100.5	100.9	115.1	119.5	121.8	123.2	124.2	127.7	135.0	152.6	170.3	199.9	208.5	214.7	254.5	
Agriculture	100	100.0	100.1	100.1	102.9	104.3	105.2	105.9	106.5	108.0	110.2	113.9	119.2	124.4	126.3	127.7	132.2	

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

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
<b>Low enthalpy heat uses (index)</b>																	
Industrial heat uses	100	100.0	100.0	100.1	100.2	100.4	100.9	101.6	102.7	104.2	105.9	107.8	113.2	117.5	119.9	122.1	124.1
Buildings (thermal integrity, efficiency of heat generation)																	
Houses																	
efficiency of heat generation	100	100.0	100.0	100.0	100.1	100.2	100.4	100.7	101.2	101.9	103.0	104.3	107.4	111.5	117.2	120.1	123.3
thermal integrity	100	100.0	100.0	100.1	100.1	100.2	100.4	100.7	101.2	101.6	102.2	102.9	103.6	104.4	105.2	106.1	107.3
Offices																	
efficiency of heat generation	100	100.1	100.2	100.3	100.6	101.4	103.8	107.2	109.5	119.8	128.0	135.5	142.1	145.6	150.0	153.8	157.1
thermal integrity	100	100.0	100.0	100.1	100.1	100.3	100.6	101.0	101.6	102.3	103.1	103.9	104.7	105.6	106.4	107.3	108.6
Agriculture																	
efficiency of heat generation	100	100.0	100.0	100.0	100.1	100.2	100.7	101.3	101.8	102.7	107.6	109.5	111.5	112.1	112.4	112.6	112.7
thermal integrity	100	100.0	100.0	100.1	100.1	100.3	100.5	100.9	101.5	102.1	102.9	103.7	104.5	105.4	106.2	107.2	108.5
<b>Transports</b>																	
Passenger Cars (efficiency index)	100	100.0	100.0	100.0	100.0	100.1	100.1	100.3	100.4	100.8	101.2	101.8	102.9	104.7	107.9	121.9	141.5
Trucks (efficiency index)	100	100.0	100.0	100.0	100.1	100.2	100.3	100.7	101.2	102.3	103.9	106.6	110.6	119.8	123.5	141.7	151.4
Transport modes for passengers (% of transport activity)																	
Passenger Cars	75.0	75.0	75.0	75.0	75.0	75.0	74.9	74.9	74.8	74.6	74.2	73.9	73.6	73.2	73.1	78.9	81.3
Train transport	8.3	8.3	8.3	8.3	8.3	8.3	8.4	8.5	8.6	8.9	9.4	9.8	10.2	10.4	10.5	8.2	6.6
Transport modes for goods (% of transport activity)																	
Train transport	13.6	13.6	13.6	13.6	13.7	13.8	13.9	14.2	14.5	14.8	14.8	14.8	14.8	13.3	12.9	12.7	12.6
<b>Renewables in Final Energy (%)</b>																	
Biomass	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.2
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
<b>Power Generation</b>																	
Fuel Mix in Thermal (electricity from gas over thermal production)	74.2	74.5	73.8	74.7	74.4	75.9	80.4	91.9	95.0	97.6	98.6	99.6	99.6	99.6	99.6	99.5	99.5
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)	16.7	16.7	16.7	16.7	16.8	17.3	18.1	19.5	20.0	20.6	23.0	24.8	26.0	26.9	28.4	31.8	32.9
hydro of utilities (as % over total production)	11.7	11.7	11.7	11.7	11.7	11.8	11.8	11.9	11.8	11.9	12.6	13.0	13.4	13.8	14.3	15.3	15.8
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	0.4	0.4
biomass (as % over total production)	1.4	1.4	1.4	1.4	1.4	1.7	1.8	2.4	2.8	3.1	3.8	4.2	4.3	4.6	4.3	5.1	5.2
wind energy and other renewables (as % over total production)	3.6	3.6	3.6	3.6	3.6	3.8	4.3	5.1	5.3	5.5	6.5	7.6	8.2	8.5	9.8	11.0	11.6
CHP indicators																	
Steam/electricity ratio from CHP	1.71	1.72	1.72	1.71	1.70	1.71	1.76	1.80	1.80	1.78	1.63	1.62	1.52	1.49	1.06	1.05	0.58
% of electricity from CHP	16.5	16.5	16.5	16.5	16.7	16.7	16.2	15.8	15.8	16.2	17.8	18.2	19.6	20.0	27.9	29.4	52.2
% of steam from chp	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7
<b>Implications for other policies</b>																	
Import dependency (percent)	89.0	89.0	89.0	89.0	89.0	88.7	88.3	87.7	87.1	86.7	85.9	85.1	84.5	84.0	82.8	81.5	80.3
Market Liberalisation (% of utilities production)	80.3	80.4	80.5	80.5	80.5	80.5	80.6	80.5	80.2	80.0	78.0	77.0	76.3	76.1	73.0	72.3	65.9

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

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	
<b>ADDITIONAL SYSTEM COSTS INCLUDING CARBON VALUE (mio Eur'90)</b>																		
Total area in the marginal cost abatement curve as % of GDP	0	1	1	2	14	65	301	944	1531	2134	2948	3921	5068	6343	8149	11687	17089	
	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.08%	0.12%	0.17%	0.24%	0.31%	0.41%	0.51%	0.65%	0.94%	1.37%	
<b>COST ANALYSIS BY SECTOR</b>																		
<b>Industrial Sectors - Metals</b>																		
Average cost of Sectoral Production excluding Carbon Value																		
Eur'90 per tn of output	484	484	484	483	483	483	482	482	481	479	477	475	470	464	461	455	452	
% change from Baseline	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.4	-0.6	-1.0	-1.4	-1.9	-2.8	-4.0	-4.7	-5.8	-6.5	
Average cost of Sectoral Production including Carbon Value																		
Eur'90 per tn of output	484	484	484	485	486	488	491	496	502	510	518	524	528	532	536	541	549	
% change from Baseline	0.0	0.0	0.1	0.2	0.4	0.9	1.6	2.6	3.9	5.4	7.0	8.5	9.1	10.1	10.8	11.9	13.5	
Structure of costs (%)																		
Non energy costs	84.1	84.1	84.1	84.0	83.9	83.7	83.2	82.5	81.6	80.5	79.7	79.3	79.2	78.6	78.3	77.7	76.9	
Technology and fuel costs	15.9	15.8	15.8	15.7	15.6	15.3	15.0	14.6	14.1	13.4	12.5	11.2	9.8	8.6	7.7	6.5	5.5	
Carbon value cost	0.0	0.0	0.1	0.2	0.5	0.9	1.8	2.9	4.3	6.1	7.9	9.5	11.0	12.8	14.0	15.8	17.6	
<b>Industrial Sectors - Chemicals</b>																		
Average cost of Sectoral Production excluding Carbon Value																		
Eur'90 per tn of output	455	455	455	455	455	455	455	454	455	454	453	453	452	450	448	447	447	
% change from Baseline	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	-0.4	-0.6	-0.8	-1.2	-1.5	-1.8	-1.8	
Average cost of Sectoral Production including Carbon Value																		
Eur'90 per tn of output	455	455	456	456	456	457	458	460	462	465	468	471	475	476	479	483	488	
% change from Baseline	0.0	0.0	0.0	0.1	0.1	0.3	0.6	1.0	1.5	2.1	2.7	3.4	4.2	4.6	5.1	6.0	7.2	
Structure of costs (%)																		
Non energy costs	77.5	77.5	77.5	77.4	77.4	77.2	77.1	76.7	76.4	75.9	75.5	74.9	74.4	74.1	73.8	73.2	72.5	
Technology and fuel costs	22.5	22.5	22.5	22.5	22.4	22.4	22.2	22.1	22.0	21.8	21.5	21.2	20.8	20.3	19.9	19.4	19.1	
Carbon value cost	0.0	0.0	0.0	0.1	0.2	0.4	0.7	1.2	1.6	2.3	3.0	3.9	4.8	5.6	6.3	7.3	8.5	
<b>Industrial Sectors - Materials</b>																		
Average cost of Sectoral Production excluding Carbon Value																		
Eur'90 per tn of output	320	320	320	320	320	320	320	321	321	322	321	318	317	316	316	315	316	
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.5	0.4	-0.5	-1.0	-1.2	-1.3	-1.4	-1.1	
Average cost of Sectoral Production including Carbon Value																		
Eur'90 per tn of output	320	320	320	320	321	322	324	326	329	333	337	338	342	346	352	357	367	
% change from Baseline	0.0	0.0	0.1	0.1	0.3	0.6	1.1	1.9	3.0	4.2	5.3	5.8	6.9	8.3	9.9	11.7	14.6	
Structure of costs (%)																		
Non energy costs	86.7	86.7	86.6	86.6	86.5	86.3	86.0	85.5	84.8	84.1	83.2	82.2	81.2	80.2	79.2	78.1	76.6	
Technology and fuel costs	13.3	13.3	13.3	13.3	13.2	13.2	13.0	12.9	12.7	12.4	12.1	11.8	11.5	11.0	10.6	10.1	9.7	
Carbon value cost	0.0	0.0	0.1	0.1	0.3	0.5	1.0	1.7	2.5	3.5	4.7	6.0	7.4	8.8	10.2	11.8	13.7	
<b>Industrial Sectors - Others</b>																		
Average cost of Sectoral Production excluding Carbon Value																		
Eur'90 per tn of output	2737	2737	2737	2737	2737	2737	2737	2737	2737	2737	2737	2737	2737	2736	2736	2736	2738	
% change from Baseline	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	
Average cost of Sectoral Production including Carbon Value																		
Eur'90 per tn of output	2737	2737	2737	2737	2738	2738	2740	2741	2743	2746	2748	2751	2754	2757	2760	2765	2771	
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.2	
Structure of costs (%)																		
Non energy costs	98.6	98.6	98.6	98.6	98.6	98.5	98.5	98.4	98.4	98.3	98.2	98.1	98.0	97.9	97.8	97.6	97.4	
Technology and fuel costs	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.4	
Carbon value cost	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.2	

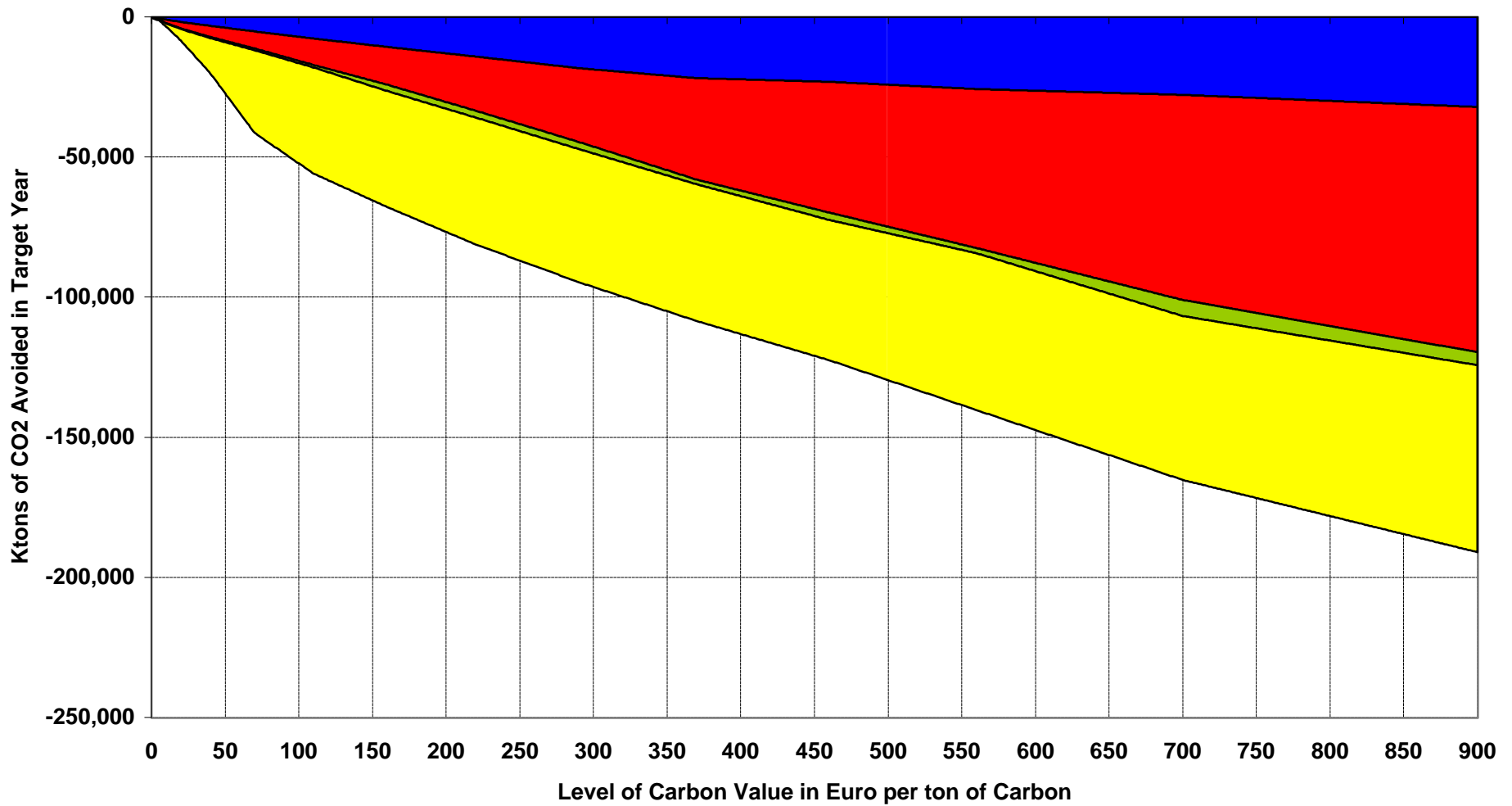
**ANALYSIS OF ENERGY SYSTEM CHANGES TO REDUCE CO2 EMISSIONS IN 2010 FOR ITALY**

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	
<b>Services</b>																		
Average cost of Energy Service excluding Carbon Value																		
Eur'90 per unit of energy service	4345	4344	4344	4343	4332	4323	4315	4311	4311	4283	4263	4253	4246	4249	4261	4270	4385	
% change from Baseline	0.0	0.0	0.0	0.0	-0.3	-0.5	-0.7	-0.8	-0.8	-1.4	-1.9	-2.1	-2.3	-2.2	-1.9	-1.7	0.9	
Average cost of Energy Service including Carbon Value																		
Eur'90 per unit of energy service	4345	4345	4346	4349	4343	4346	4358	4378	4412	4418	4435	4463	4496	4540	4588	4653	4817	
% change from Baseline	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.8	1.6	1.7	2.1	2.7	3.5	4.5	5.6	7.1	10.9	
Structure of costs (%)																		
Non energy costs	63.5	63.5	63.5	63.4	63.6	63.5	63.3	63.0	62.5	62.4	62.2	61.8	61.3	60.7	60.0	59.1	57.1	
Technology and fuel costs	36.5	36.5	36.5	36.4	36.2	35.9	35.7	35.4	35.2	34.5	34.0	33.5	33.1	32.9	32.9	32.6	33.9	
Carbon value cost	0.0	0.0	0.1	0.1	0.3	0.5	1.0	1.5	2.3	3.1	3.9	4.7	5.6	6.4	7.1	8.2	9.0	
<b>Agriculture</b>																		
Average cost of Energy Service excluding Carbon Value																		
Eur'90 per unit of energy service	7716	7715	7714	7714	7698	7690	7686	7685	7688	7684	7665	7656	7650	7657	7677	7704	7800	
% change from Baseline	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.4	-0.4	-0.4	-0.4	-0.7	-0.8	-0.9	-0.8	-0.5	-0.2	1.1	
Average cost of Energy Service including Carbon Value																		
Eur'90 per unit of energy service	7716	7716	7717	7719	7709	7711	7727	7751	7788	7823	7843	7880	7923	7985	8056	8158	8338	
% change from Baseline	0.0	0.0	0.0	0.0	-0.1	-0.1	0.2	0.5	0.9	1.4	1.7	2.1	2.7	3.5	4.4	5.7	8.1	
Structure of costs (%)																		
Non energy costs	82.4	82.4	82.4	82.4	82.4	82.4	82.2	82.0	81.7	81.4	81.2	80.9	80.5	80.0	79.4	78.6	77.2	
Technology and fuel costs	17.6	17.6	17.6	17.5	17.5	17.4	17.3	17.1	17.0	16.8	16.5	16.3	16.1	15.9	15.9	15.9	16.3	
Carbon value cost	0.0	0.0	0.0	0.1	0.1	0.3	0.5	0.8	1.3	1.8	2.3	2.8	3.5	4.1	4.7	5.6	6.5	
<b>Households</b>																		
Average cost of Energy Service excluding Carbon Value																		
Eur'90 per unit of energy service	349	349	348	348	348	348	347	346	345	343	341	339	335	330	327	324	323	
% change from Baseline	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.5	-0.6	-1.0	-1.6	-2.1	-2.9	-4.0	-5.3	-6.1	-7.1	-7.3	
Average cost of Energy Service including Carbon Value																		
Eur'90 per unit of energy service	349	349	349	349	350	351	354	358	362	367	374	380	386	391	396	402	418	
% change from Baseline	0.0	0.0	0.1	0.2	0.4	0.8	1.4	2.6	3.9	5.4	7.2	9.1	10.6	12.1	13.6	15.4	20.0	
Structure of costs (%)																		
Non energy costs	23.5	23.4	23.4	23.4	23.3	23.2	23.0	22.7	22.3	21.9	21.4	20.9	20.5	20.2	19.9	19.5	18.7	
Technology and fuel costs	76.5	76.5	76.5	76.3	76.2	75.8	75.0	74.1	72.9	71.5	69.9	68.1	66.2	64.3	62.7	61.0	58.6	
Carbon value cost	0.0	0.1	0.1	0.3	0.5	1.0	1.9	3.2	4.8	6.6	8.7	10.9	13.3	15.5	17.4	19.5	22.7	
<b>Passenger Transports</b>																		
Average cost of Energy Service excluding Carbon Value																		
Eur'90 per 1000 passenger-km	216	216	216	216	216	216	216	216	216	216	215	215	215	217	236	252		
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.4	-0.5	-0.4	0.2	9.0	16.4		
Average cost of Energy Service including Carbon Value																		
Eur'90 per 1000 passenger-km	216	216	216	216	217	217	217	218	219	220	221	222	224	226	229	250	268	
% change from Baseline	0.0	0.0	0.0	0.1	0.1	0.3	0.5	0.9	1.3	1.8	2.2	2.8	3.6	4.5	5.9	15.6	23.7	
Structure of costs (%)																		
Non energy costs	8.9	8.9	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.7	8.7	8.6	7.4	6.6	
Technology and fuel costs	91.1	91.1	91.1	91.1	91.0	90.9	90.7	90.4	89.9	89.4	88.8	88.1	87.4	86.6	86.0	86.9	87.4	
Carbon value cost	0.0	0.0	0.0	0.1	0.1	0.2	0.5	0.8	1.3	1.8	2.5	3.2	3.9	4.7	5.4	5.7	5.9	
<b>Goods Transports</b>																		
Average cost of Energy Service excluding Carbon Value																		
Eur'90 per 1000 tonne-km	105	105	105	105	105	105	105	105	104	104	103	102	101	102	101	98	96	
% change from Baseline	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.4	-0.7	-1.0	-1.6	-2.1	-2.8	-3.8	-3.5	-4.2	-7.0	-9.1	
Average cost of Energy Service including Carbon Value																		
Eur'90 per 1000 tonne-km	105	106	106	106	106	106	107	107	109	110	111	113	114	117	120	118	120	
% change from Baseline	0.0	0.0	0.1	0.1	0.3	0.6	1.1	1.9	2.9	4.1	5.6	7.1	8.3	11.2	13.3	12.0	13.8	
Structure of costs (%)																		
Non energy costs	38.7	38.7	38.7	38.6	38.6	38.5	38.4	38.1	37.8	37.5	37.0	36.5	36.0	34.3	33.5	34.1	33.5	
Technology and fuel costs	61.3	61.3	61.3	61.2	61.0	60.7	60.2	59.3	58.3	57.0	55.7	54.3	52.7	52.5	51.0	48.9	46.3	
Carbon value cost	0.0	0.0	0.1	0.2	0.4	0.7	1.5	2.5	3.9	5.5	7.3	9.2	11.2	13.2	15.4	17.0	20.2	

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

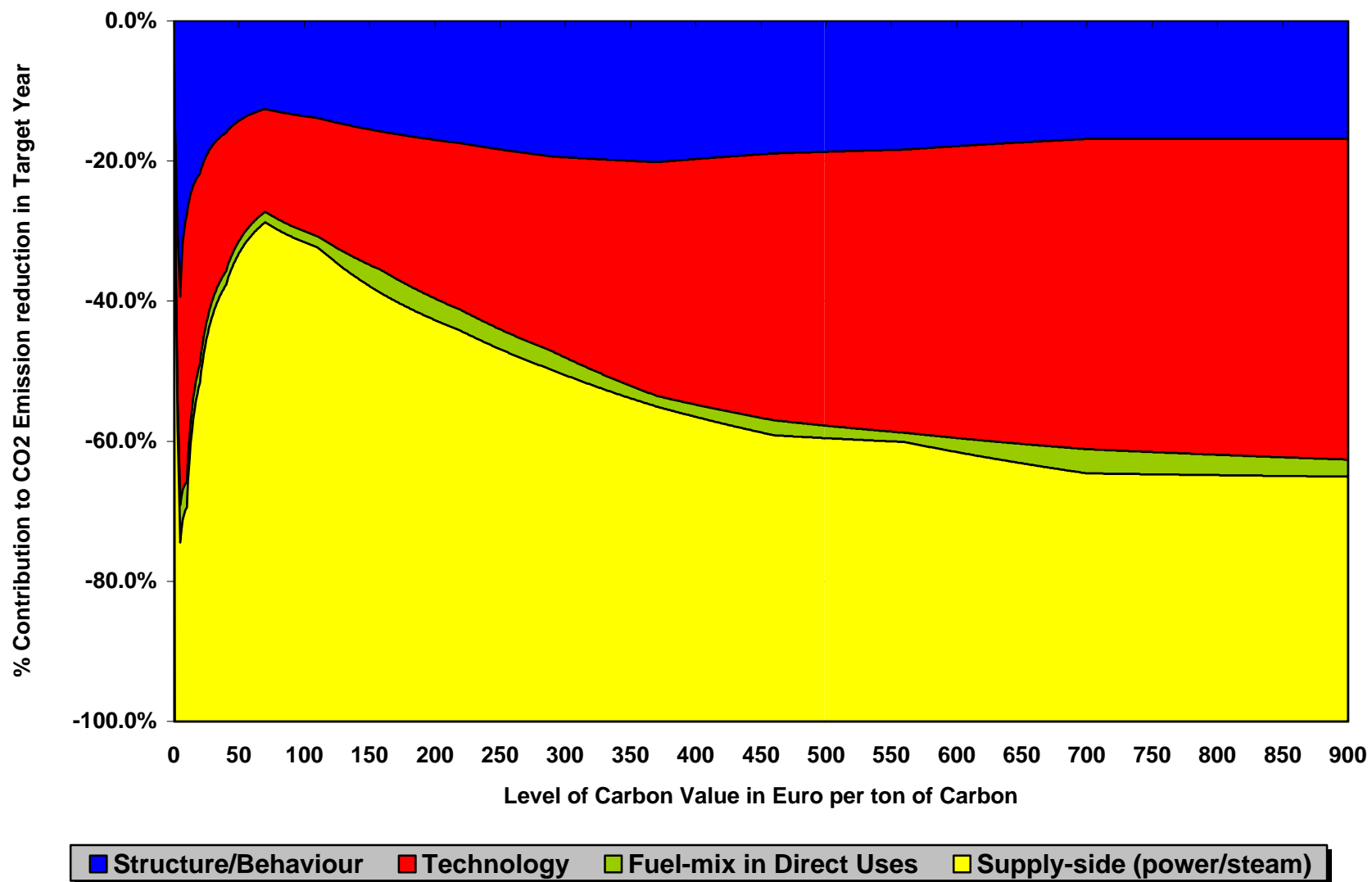
Level of Carbon Value (in Eur'90/ton of Carbon)	0	1	2	5	10	20	40	70	110	160	220	290	370	460	560	700	900
<b>Electricity and Steam production</b>																	
Average cost of production excluding Carbon Value																	
mEur'90 per kWh+kWhth	45	45	45	45	45	45	46	47	47	48	48	49	49	50	52	53	59
% change from Baseline	0.0	0.0	0.0	0.0	0.0	0.2	0.9	3.1	4.6	5.5	6.8	8.2	8.8	10.4	14.8	17.7	29.1
Average cost of production including Carbon Value																	
mEur'90 per kWh+kWhth	45	45	46	46	46	47	49	52	55	59	63	68	73	79	85	92	104
% change from Baseline	0.0	0.2	0.4	1.1	2.0	4.2	8.4	14.8	21.9	29.6	38.9	49.2	60.3	73.3	86.8	103.5	129.4
<b>Structure of costs (%)</b>																	
Annual Capital cost	31.6	31.5	31.4	31.2	31.0	30.5	30.5	30.6	29.3	28.3	27.5	26.6	25.3	24.2	24.7	24.4	25.4
O & M costs	15.9	15.9	15.8	15.7	15.6	15.3	14.9	14.4	13.8	13.1	12.6	11.8	11.2	10.6	10.9	10.4	11.3
Transm. \$ Distr. Costs	23.0	22.9	22.9	22.7	22.3	21.8	21.0	19.8	18.7	17.5	16.1	14.9	13.8	12.6	11.5	9.9	8.4
Fuel Costs	29.8	29.7	29.7	29.5	29.2	28.6	26.7	24.8	23.9	22.5	20.8	19.2	17.6	16.3	14.4	13.1	11.4
Carbon value costs	0.0	0.2	0.4	1.1	1.9	3.8	6.9	10.2	14.1	18.6	23.1	27.5	32.1	36.3	38.5	42.2	43.7
Investment expenditure for Electricity and Steam production																	
000mio Eur'90 spent in 1995 to 2010	36461	36494	36495	36575	36385	36532	38805	42502	43238	43566	44451	44537	44385	43490	48098	48323	59903
% change from Baseline	0.0	0.1	0.1	0.3	-0.2	0.2	6.4	16.6	18.6	19.5	21.9	22.1	21.7	19.3	31.9	32.5	64.3
Investment expenditure per Electricity and Steam production per KWh produced in 2010																	
mEur'90 per kWh+kWhth	77.2	77.3	77.4	77.8	78.1	79.5	86.5	98.3	105.0	112.8	123.9	134.6	146.0	158.0	191.8	222.8	318.3
% change from Baseline	0.0	0.2	0.3	0.9	1.3	3.0	12.2	27.5	36.1	46.2	60.5	74.4	89.3	104.8	148.6	188.8	312.6
<b>Electricity tariffs (mEur'90 per kWh - includes effect of carbon value for electricity production)</b>																	
Sectoral Average	61	61	61	61	62	63	65	68	72	77	81	87	92	99	105	113	127
Industry	50	51	51	51	51	53	55	58	62	67	71	77	83	90	95	104	116
Tertiary	69	69	69	70	70	71	73	75	79	83	88	93	98	104	111	119	135
Households	73	73	73	73	74	75	77	80	85	89	95	100	106	112	120	128	146
Transports	56	56	56	57	57	58	60	64	69	74	79	85	91	97	105	113	132
Others	55	55	56	56	57	58	60	64	68	73	78	84	90	96	103	111	129
<b>Electricity tariffs (% change from Baseline)</b>																	
Sectoral Average	0.0	0.2	0.3	0.7	1.6	3.3	6.5	11.7	18.4	25.4	33.3	42.0	51.6	61.9	71.7	84.5	108.7
Industry	0.0	0.2	0.4	0.8	1.8	4.4	8.3	14.9	22.8	31.9	41.3	52.8	65.1	77.8	87.9	106.0	130.6
Tertiary	0.0	0.1	0.1	0.6	1.3	2.2	5.1	9.1	14.6	20.7	27.5	33.9	42.1	50.9	60.3	71.6	95.5
Households	0.0	0.1	0.3	0.8	1.9	3.2	5.8	10.4	16.8	22.4	29.9	37.4	45.1	54.1	64.3	75.1	99.9
Transports	0.0	0.2	0.4	1.1	2.1	3.9	8.1	14.5	22.7	31.5	40.4	51.2	62.4	74.2	87.3	102.9	135.2
Others	0.0	0.2	0.5	1.4	3.1	5.4	9.1	15.4	23.9	31.7	41.1	51.3	62.1	73.2	86.6	101.6	133.2

### ITALY: CO2 Emission Reduction - Decomposition

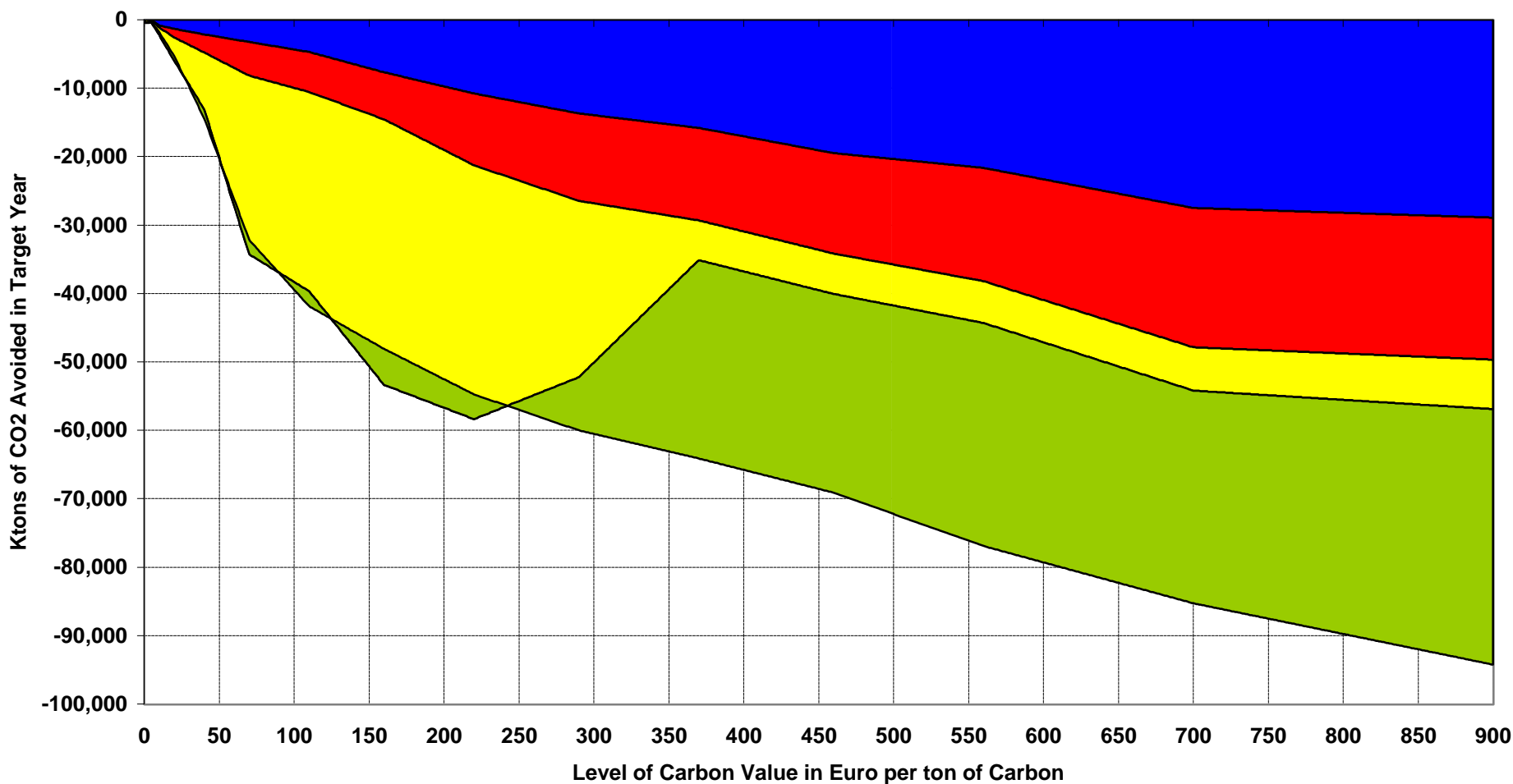


■ Structure/Behaviour   ■ Technology   ■ Fuel-mix in Direct Uses   ■ Supply-side (power/steam)

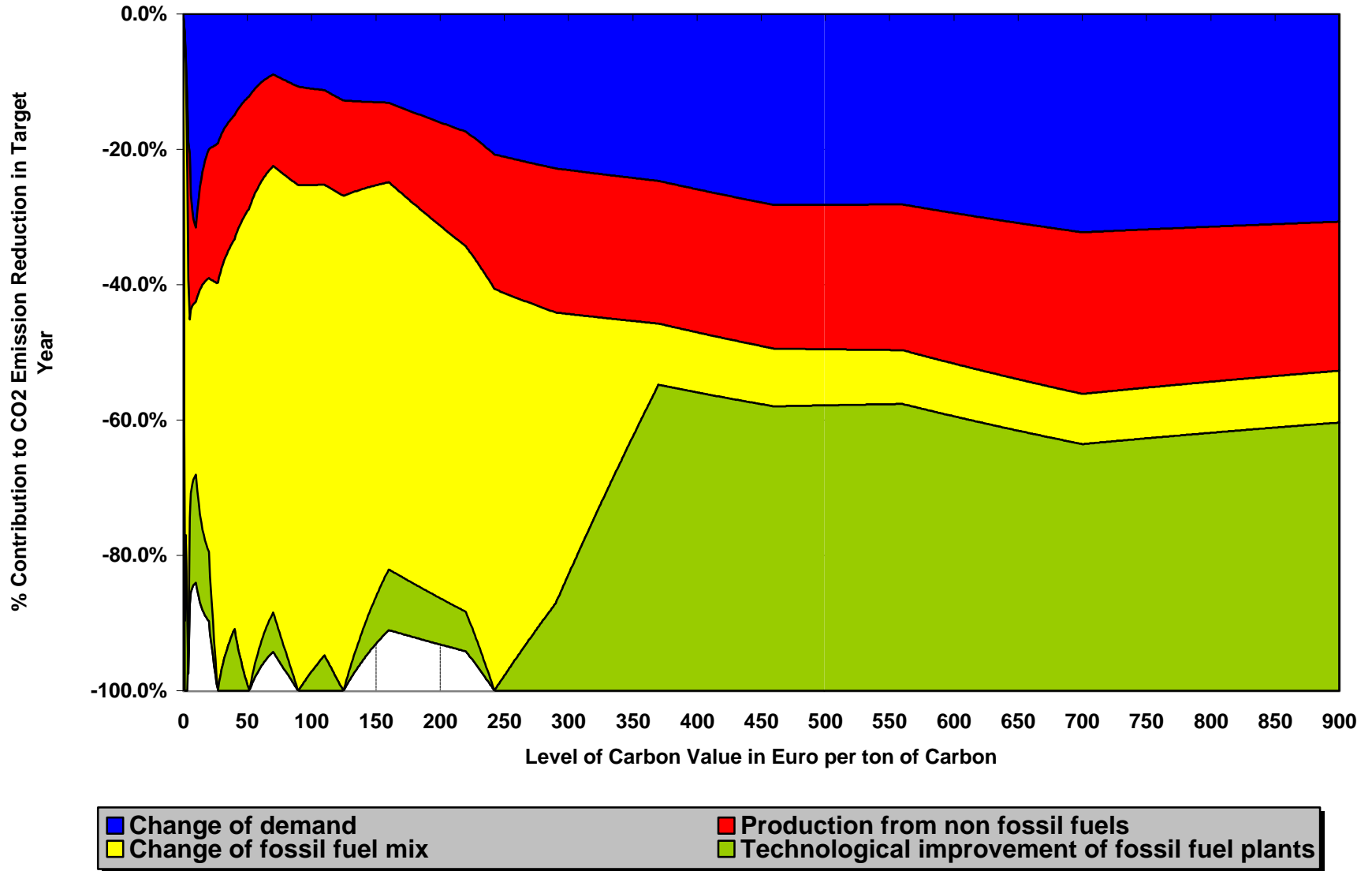
### ITALY: CO2 Emission Reduction - Decomposition in Percentage



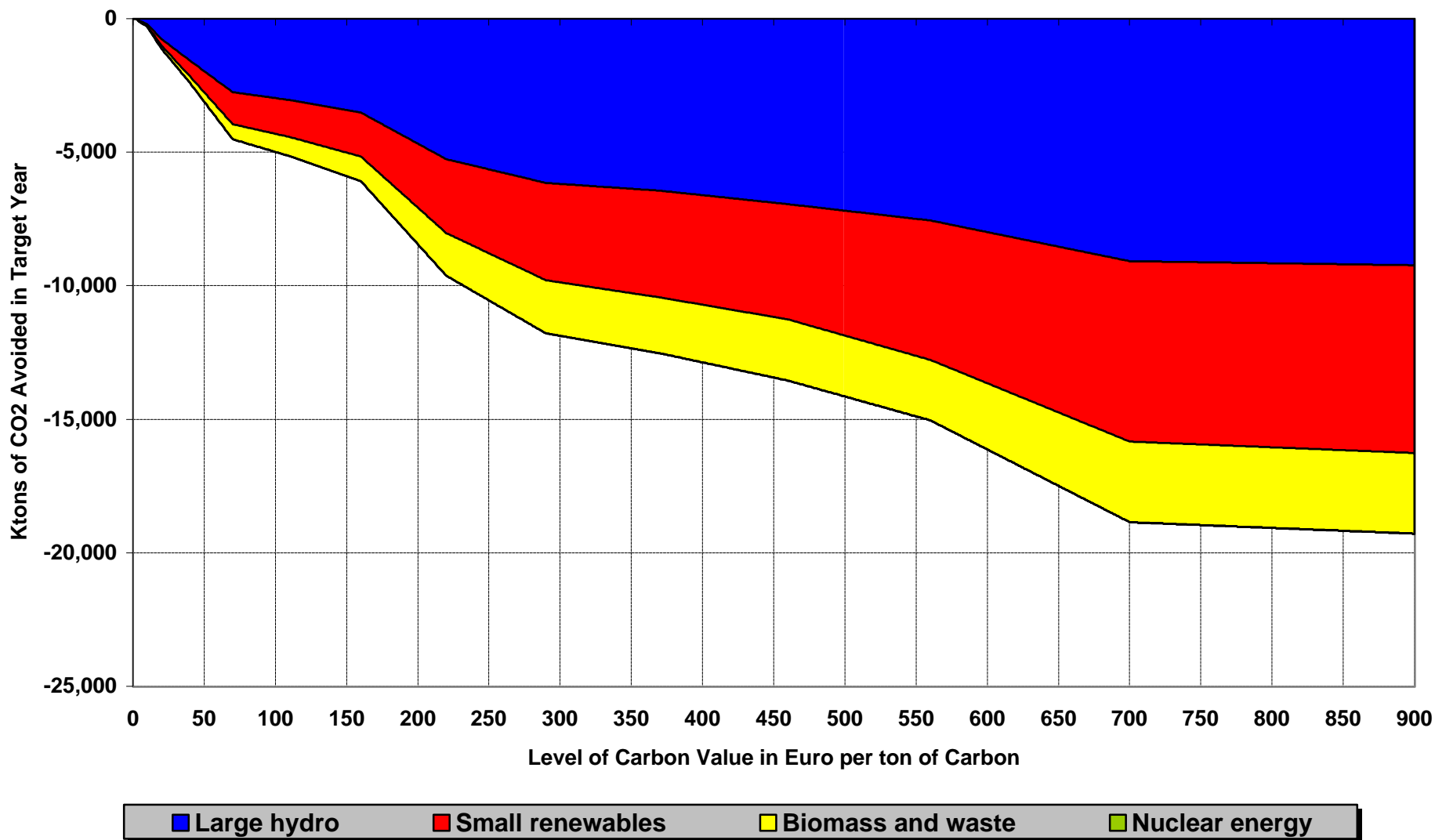
### ITALY: CO2 Emission Reduction in Power and Steam Generation - Decomposition



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



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



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

