

Two European Pathways

Two Pathways to Sustainable European Energy Systems are presented in brief, based on the results developed in the different research groups within the Pathways project. In some research groups energy models are used.

Main tasks in the Pathway project are:

- Develop “Pathways to Sustainable European Energy Systems”.
- Identify key measures -“bridging technologies”- for these Pathways.

Two possible pathways are presented in brief, based on the results developed in the different research groups within the Pathways project. In some research groups energy models are used. In cases where the results from the research groups were not enough to give a complete picture (e.g. in the transport sector), results from e.g. the Primes model of the European Commission were used.

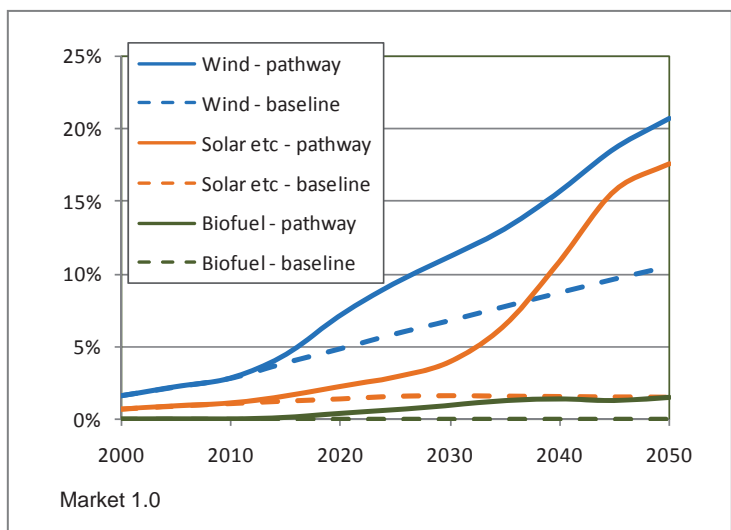
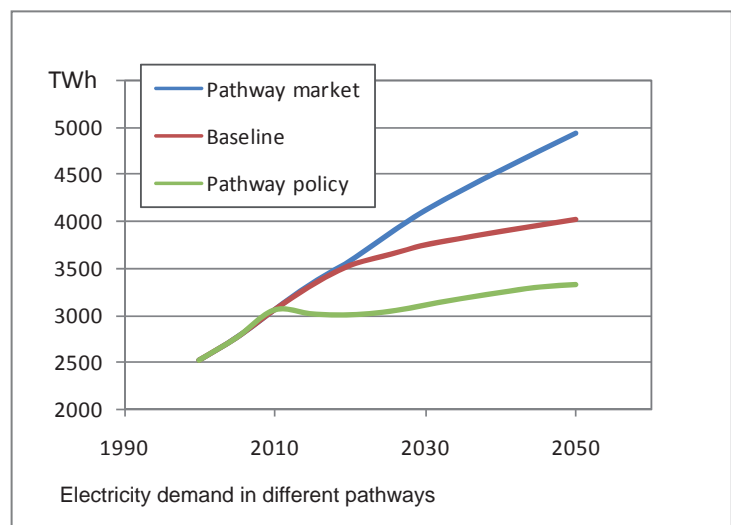
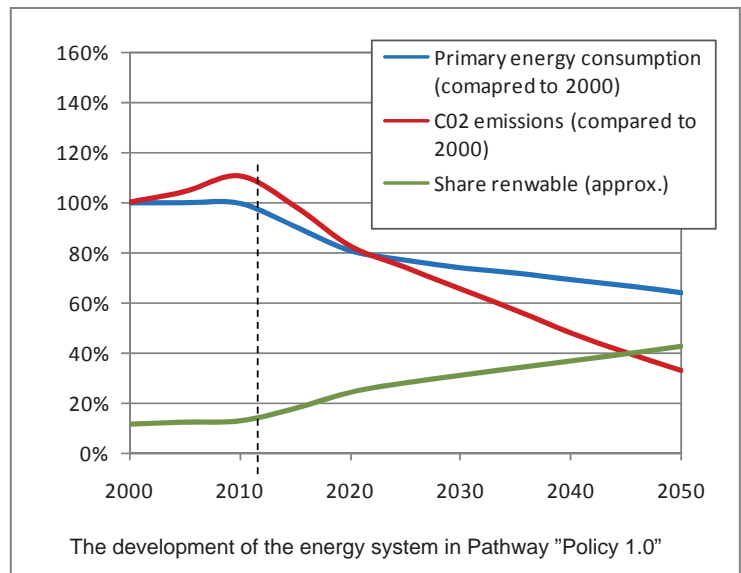
Pathway “Policy 1.0”

This pathway is based on a development that to a great part is policy driven: the “climate and energy package” of EU sets the aim for 2020. This policy package has the climate issue as the main focus, but also includes targets for share of renewable fuel and energy efficiency. However, a stimulus for system changes – e.g. conversion to clean electricity and expansion of district heating - is not included. After 2020, the policy driven development is assumed to continue until at least 2050 in this pathway.

Pathway “Market 1.0”

An alternative pathway is based on a development that to a higher degree is market driven. The aim for reduction of carbon emissions is the same as in Pathway “Policy 1.0”, but the measures to reach the target are more supply oriented. In this pathway, system changes of the energy system are important. The system changes include increased use of electricity and district heating. Production of electricity can be carbon free by 2050 and the heat production can be carbon lean by this. Hence, a shift to these energy sources is a path for sustainability.

In Pathway “Market 1.0”, there are no separate targets for energy efficiency and renewable energy as in the policy driven pathway. Exclusion of policy driven energy efficiency targets is motivated by the fact that policy driven energy efficiency has shown to be difficult: the result is often far less than estimated potential. Hence, the measures in this pathway are focused on the supply side instead of the demand side. Also the share of renewable alternatives is assumed to be market driven in this pathway and only the renewable alternatives which are compatible to fossil alternatives with CO₂ charge are included.

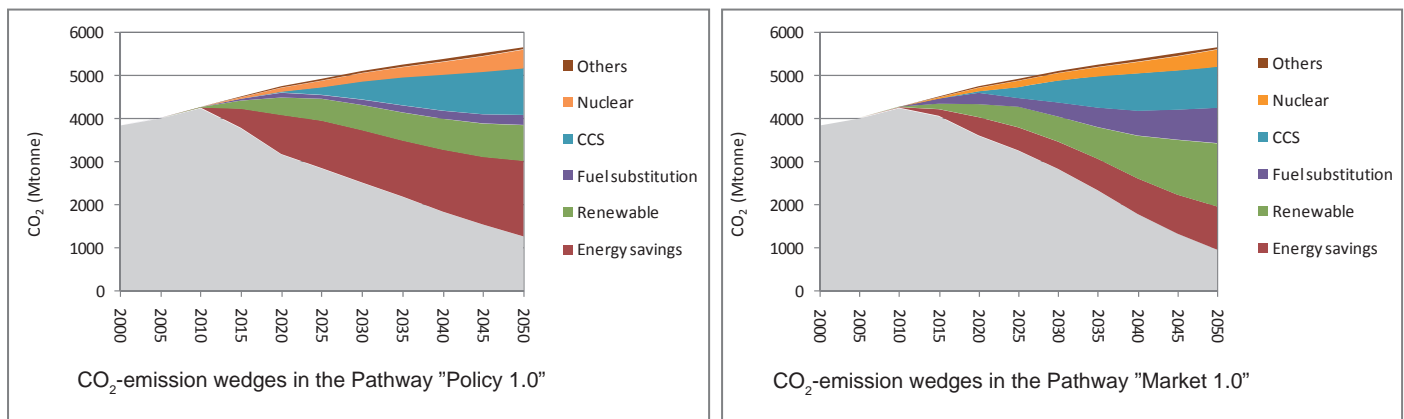


Bridging technologies in Pathways



Total CO₂ emissions “wedges” in all sectors, by type of measures

The measures that decrease the CO₂ emissions in the two pathways are presented in the two figures as “wedges”. As can be seen, “Policy 1.0” is much more dependent on energy efficiency measures than “Market 1.0”, which is more supply side oriented.



The most important measures to decrease the CO₂ emissions

Below, the ten most important measures to decrease the CO₂ emissions to 2020 and 2050 are presented and ranked qualitatively in order of importance (importance=decrease most in tones CO₂). As can be seen, energy efficiency measures top the list in

Patway Policy 1.0			Patway Market 1.0		
2020	2030	2050	2020	2030	2050
Energy efficiency measures					
182	218	326	0	0	0
314	414	547	0	0	0
48	61	101	48	61	101
120	207	309	49	82	138
259	318	425	189	225	290
Renewable energy					
47	65	53	70	141	355
35	73	147	27	88	541
46	70	116	37	115	233
46	66	111	36	52	86
99	140	163	82	110	124
Other measures					
96	199	429	84	177	395
20	355	949	35	444	823
52	0	0	184	0	0
37	79	149	45	93	184
0	0	0	61	141	256
1	16	49	39	240	641

“Policy 1.0”. In “Market 1.0”, measures are much more supply side oriented, but the most cost effective energy efficiency measures are still implemented.

The CO₂ reduction (Mtonne) for the different measures and years in the two different pathways. The color intensity (from yellow to green) indicates the relative importance of a measure in that year and pathway. Energy efficiency measures dominate in the policy pathway, while the market pathway is much more supplier oriented