



PIRKANMAAN TEOLLISUUDEN HIILIDIOKSIDIPÄÄSTÖJEN VÄHENTÄMINEN

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EXECUTIVE SUMMARY

Aro T, Lund M, Laaksonen A, Pirkanmaan teollisuuden hiilidioksidipäästöjen vähentäminen. (Reduction of CO₂ emissions of manufacturing in Pirkanmaa region). Pirkanmaan liiton julkaisu D 89. 2007. 128 pages.

Since the late 80's the global warming and preventing climate change have been common concerns. After the millennium the force of tackling the global warming has grown along with the Kyoto Protocol entering into force, EU's decisions and the awakening of many other organisations.

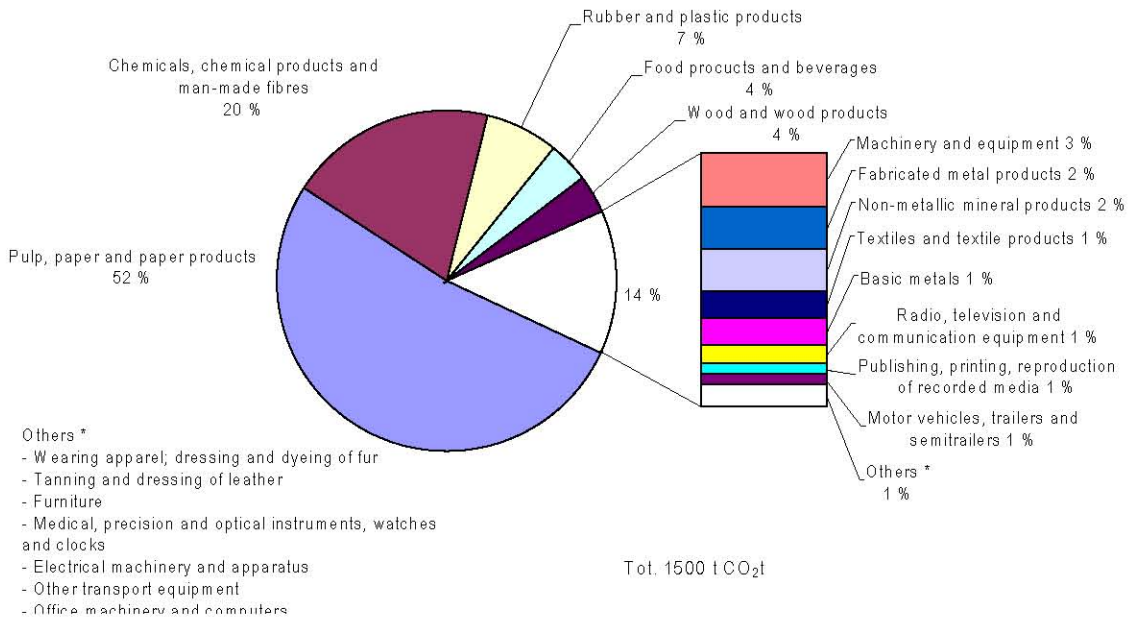
Finnish industry still has a remarkable share in the Finnish economy. This is where Finland differs from the most of the EU. Finnish industry is very energy intensive and that makes it challenging to reduce carbon dioxide emissions. In this report, the energy usage based carbon dioxide emissions are divided to the emissions originating from the combustion of fossil fuels and to the emissions from heat and electricity acquired by industry. Acquired heat and electricity are indirect emissions allocated for industries. The classification of industrial stats made by Statistics Finland has been used in the calculations. The goal of this project is to take a look at the energy related carbon dioxide emissions generated by different industrial sectors in Pirkanmaa region. The emissions are also compared between Pirkanmaa and the whole country. One objective is to discuss what opportunities the provincial aspect offers to the reduction of the industrial energy use related emissions. Of all the greenhouse gases the energy related emissions have the biggest impact and they represent 80% of Finland's greenhouse gas emissions. This is why they are a focal point of this project.

The project target is to build foundations for starting a regional carbon dioxide reduction programme. The study is limited to D-sectors of the industrial statistics; the manufacturing industry. Fishing industry, farming, forestry, mining, construction and supply of electricity, gas and water are excluded from the study. Fuels used by industrial vehicles are also left out. The project is one of the contributors to the establishment of the Pirkanmaa region energy programme.

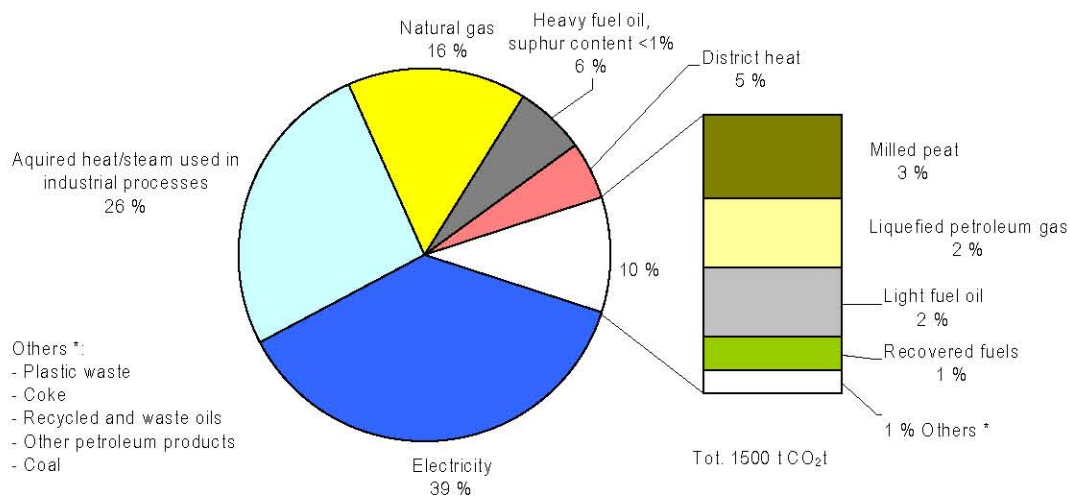
The energy usage based carbon dioxide emissions were estimated from the industrial statistics and they were completed by data from other public sources. When estimating the emissions of industrial sectors both fossil fuels use related as well as emissions related to the acquired heat and electricity used by the companies were considered. As a result the energy usage related carbon dioxide emissions from industry in Pirkanmaa was 1,5 million tons in the year 2004.

The distribution of carbon dioxide emissions in both Pirkanmaa and the whole country was calculated based on the industrial statistics from 2004. The distributions between industrial sectors and emission sources are visualised in the following diagrams. Clearly the biggest CO₂ emitting sector is the manufacture of pulp, paper and paper products. The labour intensive sectors, such as the manufacture of machinery and equipment and the manufacture of fabricated metal products are the source of the least emissions.

CO₂ distribution for industry of Pirkanmaa



CO₂-sources for industry of Pirkanmaa



The project intended to develop a target oriented approach to reducing the CO₂ emissions from industry. To make the task easier the sectors and companies were classified into: building energy users (HVAC and lightning), process heat users, process electricity users and direct combustion users. Different CO₂ reduction strategies can be built for each of these four categories. Also some key parameters, as a tool of the target oriented approach, were studied and calculated for the industrial sectors, for example:

- District heat usage / total energy usage, %
- Value added / total energy usage, 1000€/GWh
- Value added / CO₂ emissions, 1000€/1000t CO₂
- Value added / electricity usage, 1000€/MWh or GWh
- Employment / CO₂ emissions, number of employees/100t CO₂
- Employment / electricity usage, number of employees /GWh

The key parameters were also suitable for comparing sectors' and companies' other characteristics in relation to their CO₂ emissions. These comparisons showed for example that industry in Pirkanmaa region is less energy intensive than Finnish industry on average.

The development of the typical basic industrial techniques was evaluated on the basis of the past development and current outlooks until 2020. It was found that there is energy saving potential, but it will not become a reality without a major increase of human resources and tangible investments. The year 2020 is already so close that mere renewal of production and buildings is not enough to achieve the saving objectives. A significant amount of technologies being used today will still be in use in 2020. Improving of energy efficiency must be seen as a continuous and comprehensive process instead of playing tricks; for example by categorical acquisitions of equipment which from a narrow point of view might falsely seem like a good way to improve the efficiency.

The CO₂ reduction potential of whole Finnish industry has been estimated very seldom. Countries and regions differ from each other. Applying international reduction potential estimates directly to Finnish conditions can be misleading if there is little knowledge about the scope of their application.

In Pirkanmaa region about 70% of industry's energy related CO₂ emissions are indirect. This means that these emissions come from acquired electricity and heat. Companies have only limited possibilities to influence the specific emissions of indirect emissions. In practice, the best way to reduce indirect emissions is to improve energy efficiency. Biofuels are rarely used. Only the manufacturing of pulp, paper and paper products and the manufacturing of wood and wood products use a significant amount of biofuels compared to their total energy use.

Six companies as cases participated in the project. The opportunities to improve their energy efficiency were studied through energy audits and interviews. The companies represented different sectors and they differed also in their energy use intensity. The audits found that energy savings potentials were between 4 and 20% depending on the companies. This also implies economical reduction of corresponding amounts of CO₂. One should keep in mind that this is just an estimate. In reality the savings potentials can be either higher or smaller.

There are huge differences between industrial sectors in how much certain CO₂ reduction demands would affect the economy of a company. For less energy intensive sectors the effect of the emission reduction costs would be minor. Correspondingly, for energy intensive sectors the consequences would be much more severe. For example for the most energy intensive company participating in this project the value of reducing 20% emissions (while the price of the emission allowance is 30€) would represent over one percent of the company's turnover. For the least energy intensive company this share would be only about one hundredth percent of its turnover.

It is important to remember that the energy consumption will grow due to the growth of production. A currently reasonable target for emission reduction might be hard to reach in 5 or 10 years. A relative emission reduction will not be a real improvement if at the same time the amount of absolute emissions increases along with the production growth.

The structure of the industry has an influence on how much CO₂ emissions is “needed” to create a certain amount of employment opportunities or added value. For example, the manufacturing of machinery and equipment produces even 20 times more jobs and wealth than the manufacturing of pulp, paper and paper products with the same amount of CO₂ emissions. Deducing from this, the structure of industry should be steered towards sectors like the machinery and equipment. In this way the industry could reduce a remarkable portion of current emissions. In fact, many industrialized countries have already done this. For example, in some countries a large part of the steel industry which produces significant amounts of CO₂ emissions has been shut down or moved abroad. Nevertheless global warming is indeed a global problem. This is the reason why this kind of simplified and short-sighted thinking does not however solve the problem; moving a CO₂ emission source to another location does not change anything. On the contrary, the situation might take a turn to the worse direction if more emissions are produced in the new location. Moving emitting sources from one place to another is a wrong way of dealing with global warming in both Finnish regional politics as well as global politics.

The positions of countries or provinces in the “food chain of CO₂” vary a lot depending on their position in the industrial system or in the production chain of an end product. Without all the bits and pieces of the production chain, the end product will not find its way to the market. This is why every part of production is as important as the other, despite of the fact how much energy is consumed or the greenhouse gases emitted.

The province level is ideal for the reduction of carbon dioxide emissions. A province is small enough to be fully comprehended and to have an adequate local knowledge to analyze the results reliably. It allows more practical insight than if the whole country or even a larger area was studied.

In addition to improving energy efficiency, it is possible to reduce emissions by replacing heavy fuel oil with biofuels and natural gas in energy production. Small scale heat and power cogeneration is also a relevant possibility especially for the sectors that need heat in the production. In addition, companies’ decisions on location of investments can influence the investment opportunities for small scale heat and power cogeneration plants. The use of natural gas as the least polluting of the fossil fuels is already typical in Pirkanmaa region. This gives opportunities for CO₂ efficient energy production.

The goal of this project was to create foundations for regional carbon dioxide reduction programme for industry. The most important thing is to provide both human and financial resources to companies; both manufacturing ones as well as those companies which support manufacturers in their aims to reduce the emissions. The Finnish government could give a hand with more than just energy investment support and energy audits; in this case a carrot might work better than a stick.