

Mainly for reasons of competitiveness (and leakage effects), the criteria of harmonization across economic sectors has not been fully implemented. Roughly 60 per cent of Norwegian CO<sub>2</sub> emissions face CO<sub>2</sub> taxes while around 40 per cent is exempted at this stage. There are conflicts of interest between reducing CO<sub>2</sub> emissions at least cost and international cost competitiveness of industrial firms and sectors in Norway. Thus, international coordination of the implementation of CO<sub>2</sub> taxes is needed.

### **Effects on emissions and energy efficiency**

Norway's CO<sub>2</sub>-emissions increased steadily from 1960 to 1980. Throughout the 1980s, CO<sub>2</sub>-emissions were relatively stable, despite a steep increase in petroleum production and thus in the consumption of natural gas for energy purposes by this sector. This is primarily because the rise in emissions from the continental shelf has been offset by a drop in the consumption of fuel oils. From 1989 to 1992, precipitation levels were high and there were large supplies of cheap hydropower. This, combined with lower economic activity and the introduction of CO<sub>2</sub>-taxes, kept CO<sub>2</sub>-emissions below the 1989 level. In 1993, emissions reached about the same level as in 1989, and in 1994 they increased further, mainly as a result of higher consumption of fuel oils, particularly by the wood-processing industry.

In the long run the tax, or expectations of a tax, is expected to work through a change towards a more CO<sub>2</sub>-effective capital stock. This will take time, depending on the level of investment in new installations and the speed of the retrofitting process. The offshore petroleum sector may serve as an example. CO<sub>2</sub>-emissions from the petroleum sector increased by only 2.5% from 1990 to 1993, whereas petroleum production increased by 24% during the same period. The tax is expected to have contributed to making production more energy efficient and has encouraged development of projects and solutions aiming at reducing CO<sub>2</sub> emissions. Most of the emission reductions that have been developed and implemented by the petroleum industry the last couple of years were initiated before the introduction of the CO<sub>2</sub> tax and thus took place independent of the implementation of the tax. It could nevertheless be argued that a CO<sub>2</sub> tax the last few years has been part of the overall decision-making process, and might as such have contributed to an earlier implementation of some of the measures. Measures that were not necessarily economically favourable prior to the introduction of the tax have in some cases proved to be so after the tax became effective.

### **Carbon taxes in a small, open economy**

Norway and some other countries have introduced a CO<sub>2</sub>-tax. In the absence of more widely introduced CO<sub>2</sub>-taxes, exemptions have been granted for part of the industry, and different tax rates are applied for various reasons. To analyse the industry's competitive situation in different countries it is necessary to compare all taxes, subsidies, regulations and other factors. Weak competitiveness for the industry can have other explanations than different energy or CO<sub>2</sub>-taxes. So far there seems to be limited negative effects on Norwegian industry, with no dramatic changes in the competitive position, given the careful design of the tax.