

# Leakage of greenhouse gas emissions and Danish climate policy

Ulrik Beck\* Peter Kjær Kruse-Andersen† Louis Birk Stewart‡

## Abstract

Danish climate policy reduces emissions of greenhouse gases (CO<sub>2</sub>e) in Denmark but may increase CO<sub>2</sub>e emissions abroad. This phenomenon is known as CO<sub>2</sub>e leakage. CO<sub>2</sub>e leakage implies that Danish climate policy has a smaller impact on global greenhouse gas reductions than on domestic reductions. The so-called leakage rate expresses the share of domestic reductions in emissions that is replaced by increased foreign emissions.

We calculate leakage rates for the Danish economy using a modified version of the GTAP-E model, which is a global general equilibrium model. We find a leakage rate between 45% and 53%. This is higher than what the existing literature suggests. One main driver of this difference is that we explicitly account for the effect of the EU emissions trading scheme (EU ETS). This has a substantial impact on leakage rates since a reduction in Danish emissions leads an increase in emissions in the rest of the EU.

We also calculate leakage rates for different sectors of the Danish economy. The results indicate large differences in leakage rates for different sectors. Leakage rates are high for energy-intensive manufacturing and for electricity and heating, which are all part of the EU ETS. Leakage rates are generally lower for sectors not covered by the EU ETS. A notable exception is Danish agriculture, which has a higher leakage rate. A main driver of this effect is that global food consumption is less affected by changes in income and prices than other products.

Finally, we analyse the impacts of a Danish climate policy, which aims to cost-efficiently reduce global emissions. We find that, despite the high agricultural leakage rate, the agricultural sector should still contribute to the overall reduction under a leakage-adjusted climate policy. This reflects socio-economic benefits associated with reducing greenhouse gas emissions for this sector specifically, in the form of a better aquatic environment and less air pollution.

The presentation is based on a chapter on CO<sub>2</sub>e leakage from the most recent report from The Danish Environmental Economic Council.

\* Incentive

† University of Copenhagen

‡ The Danish Council on Climate Change