# Summary

Denmark is in the midst of a fundamental transition towards a net-zero greenhouse-gas emission economy. Such a transition is bound to have repercussions throughout the broader economy, affecting government revenues, sectoral competitiveness as well as the disposable income of households. National policymakers need clear and consistent insight when evaluating policy options for sponsoring the shift to a net-zero emission economy. Insights that take both sectoral and technology effects (and their interactions) into account.

This thesis develops a novel method for consolidating these effects when evaluating climate and energy policies and the thesis applies this method within the Danish IntERACT model. Compared to the existing literature, the thesis offers a uniquely consistent full-form and full-link method for evaluating climate and energy policy. Full-link reflects the focus on understanding the interaction across more than one sector simultaneously, whereas full-form combines detailed data on technology and disaggregated economic structure.

In particular, the thesis demonstrates how the method overcomes issues of complexity and dimensionality, which limits the scope of previously suggested methods. Another significant contribution of the thesis is that the method accounts for the macroeconomic impact of the investment flow. The thesis exemplifies the importance of investment flows by considering the impact of a policy forcing the investment in carbon capture and storage (CCS) technology within the Danish concrete sector. This sector and technology-specific policy lead to a significant contraction in the Danish cement production, and in turn, to a carbon leakage effect of upwards of 88%. The policy experiment further shows that half of the policy-induced decline in GDP follows from the additional capital cost associated with coal CCS technology.

Another area where this thesis makes fundamental contributions to the literature relates to the modeling of energy efficiency within the residential and industrial sectors. Overall, these contributions are a testament to the ability of the IntERACT model to capture: (i) the technical potential for specific technologies, (ii) the barriers limiting the deployment of the technologies, and (iii) the macroeconomic feedback associated with the particular policy.

For the Danish residential sector, this thesis develops the IntERACT model to simulate the effect of energy efficiency policies on households' investment and heating demand behavior. The model results suggest that if Denmark aims at achieving substantial energy savings in residential heating, it would require a broad mix of policy instruments, which address various barriers that keep households from investing in energy efficiency retrofits. The comprehensiveness of the modeling framework ensures that the results capture both the rebound effect (from lower heating prices) as well as the overall effect on disposable income from such a broad mix of policy instruments.

For industrial sectors, the thesis demonstrates how energy efficiency policy can be evaluated by decomposing the results from the IntERACT model into distinct activity, price, and technical effects. The thesis shows the importance of including all three effects when assessing the net effect of an energy efficiency policy for industrial sectors. The thesis further demonstrates how the size of the price and activity effects varies greatly by sectors. Previous studies have sought to capture a few of these three effects endogenously. However, none have been able to combine all three effects simultaneously while also accounting for the interaction between them. Hence, this thesis represents a substantial leap forward in terms of conducting a comprehensive ex-ante evaluation of energy efficiency policy for industrial sectors, as well as for evaluating energy and climate policies in general.