Preface

Economic development and increasing prosperity around the globe go hand in hand with a continuous surge in the demand for energy. This increase in the demand for energy has profound implications for energy security and climate change, and it also raises questions regarding the sustainability of economic development itself. The need to maximize efficiency in usage of limited and often non-renewable resources has been at the centre of a substantive collection of applied research in energy economics, and has caught the attention of policy-makers.

The mitigation of the adverse effects of increasing energy consumption through the promotion of efficient energy usage is associated with large investments in new energy-saving technologies, both in the energy sector as well as in the various end-use sectors. One would suspect that continuously rising energy prices cause firms to adopt such technologies instantaneously upon availability. However, this is often not the case. This phenomenon constitutes a rather fascinating paradox, which is generally known as the ‘energy-efficiency paradox’: even although energy-efficient technologies are available and cost-effective, producers are reluctant to adopt such technologies. The paradoxical phenomenon occurs in energy-intensive sectors, such as aluminium, chemicals, paper and steel industries, but also in energy-extensive sectors of the economy such as the light industry and the service sector. The latter sectors are of vital importance when it comes to meeting ambitious energy usage and associated CO₂ emission targets, for instance in relation to worldwide climate change concerns. The energy-extensive sectors are responsible for no less than 20 per cent of the economy-wide energy consumption, and are therefore a segment of economic activities that can, or should not be ignored. Not surprisingly, there is substantial knowledge about energy consumption in energy-intensive sectors of the economy. Knowledge and expertise regarding energy usage in energy-extensive sectors, in particular in view of the ‘energy-efficiency paradox’ is, however, largely lacking.

The research collected in this volume therefore starts from the observation that the adoption of energy-saving technologies is often a lengthy process and that, in fact, many firms do not or only slowly invest in best-practice cost-effective technologies. We have brought together a group of

13 authors to investigate trends in energy usage, investment behaviour and energy policy design in view of the goal of promoting energy efficiency. In this research we have paid particular attention to the energy-extensive sectors of the economy, specifically the light industry and the service sector, and to the role of small and medium-sized firms. The research reported in this collected volume was part of a larger research programme on stimulating the adoption of energy-efficient technologies, financed by the Netherlands Organization for Scientific Research (abbreviated NWO in Dutch) and SenterNovem, an agency of the Dutch Ministry of Economic Affairs that focuses on the promotion of sustainable development and innovation.

A key aspect of the research programme on stimulating the adoption of energy-efficient technologies was to bring together knowledge, expertise and insights from both the natural and the social sciences. Our research efforts reflect this overall aim of the programme and integrate the available knowledge in economics and the sciences with respect to investment in energy-efficient technology. Through its diverse collection of authors, this volume brings together a mix of theoretical and empirical contributions written on the basis of different disciplinary backgrounds. The volume presents new empirical material and uses innovative methodological approaches, such as spatial econometrics and meta-analysis, to empirically assess actual energy-efficiency trends and investment behaviour. In several chapters, the authors combine and compare economic and physical indicators of energy usage to monitor and analyse trends in energy efficiency while, at the same time, paying ample attention to the detection of empirical regularities in the determinants of energy-saving investment, including uncertainty, energy price volatility and subsidies. This volume also contains several chapters analysing the role of energy modelling in policy design and the potential effect of energy policies on technology diffusion in energy-extensive sectors. We hope that this unique collection of research papers will serve as a useful guide and reference for academics as well as policy-makers, government officials and other professional experts in the area of energy and sustainable development.

We gratefully acknowledge the financial support of the Netherlands Organisation for Scientific Research and SenterNovem, which made it possible for a large multi-institutional research group to focus on energy efficiency from a multidisciplinary perspective during a period of four years. This edited volume is but one of the scientific outputs of this project, which in addition comprises numerous journal articles, book chapters, dissertations and conference presentations. Independent expert reviewers have been used to perform a quality assessment for all chapters of this book in order to ensure and increase the scientific quality of our

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