

Dutch sectoral energy intensity developments in international perspective, 1987–2005

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HIGHLIGHTS

- We study energy intensity developments in the Netherlands over the period 1987–2005.
- We compare Dutch performance with that of 18 other OECD countries.
- Aggregate energy intensity in the NL decreased marginally and increased in Services.
- Dutch performance is in general worse than the OECD average.
- Changing sectoral composition is important in explaining aggregate trends.

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ABSTRACT

This paper makes use of a new dataset to investigate energy intensity developments in the Netherlands over the period 1987–2005. The dataset allows for a comparison with 18 other OECD countries. A key feature of our analysis is that we combine a cross-country perspective with a high level of sectoral detail, covering 49 sectors. Particularly innovative is our evaluation of energy intensity developments in a wide range of Service sectors. We find that across sectors, energy intensity levels in the Netherlands on average decreased only marginally, and increased in Services. This performance is in general worse than the OECD average, especially between 1987 and 1995. Changes in the sectoral composition of the economy play an important role in explaining aggregate trends. In the Manufacturing sector, about half of the efficiency improvements were undone by a shift towards a more energy-intensive industry structure. In contrast, in the Service sector efficiency decreased, which was undone for about one third by a shift towards a less energy-intensive sector structure.

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1. Introduction

In the Netherlands, like in most other developed countries, enhancing the efficient use of energy has been the goal of many policy initiatives over the past decades. Also in the next decades, improving energy efficiency continues to be an important strategy to help meeting future energy needs in the context of concerns about greenhouse gas emissions and energy security.

A prerequisite for appropriate future projections and policy design in this area is a careful evaluation of historic and internationally comparative trends as regards the efficient use of energy. A natural starting point for such an evaluation is an analysis of trends in energy intensity, i.e., the ratio of energy use per unit of economic activity.

In general, the aggregate energy intensity level of a country can be explained from (i) characteristics in the underlying sector structure, and (ii) energy productivity performance within individual sectors. The latter is typically thought to be driven by the interplay of energy prices and technological change (e.g., Berndt and Wood, 1975; Jorgenson, 1984; Magnus, 1979; Popp, 2002; Popp et al., 2010). In addition, various authors have recently argued that environmental regulation and energy abundance affect industry location decisions via relative prices, thus affecting the sectoral structure and trade activity in a country or region (Gerlagh and Mathys, 2011; Mulatu et al., 2010; Michielsen, 2011).

Against this background, the Netherlands is an interesting country to study. Notwithstanding the fact that reducing energy

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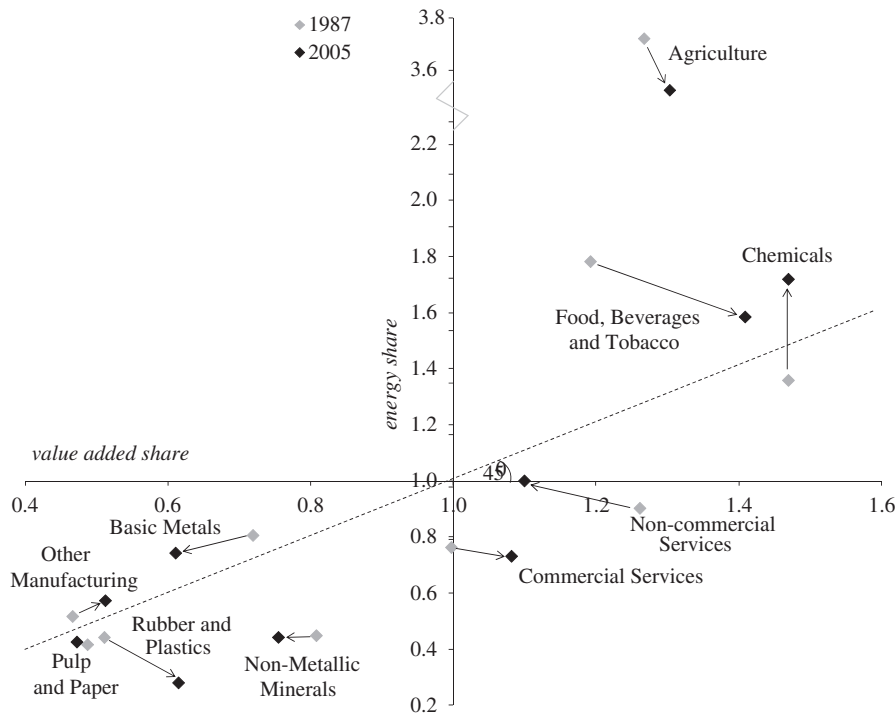
Table 1

The Netherlands in comparison to the OECD average: key indicators, normalized (OECD = 1).

Source: IEA energy balances.

	Energy intensity ^a	Share of energy intensive sectors ^b	Energy price ^c	Energy abundance ^d	Share in total final energy consumption		
					Natural gas	Coal and coal products	Petroleum products
1987	0.85	0.97	0.57	1.30	2.46	0.34	0.73
2005	1.14	1.15	0.65	1.28	1.78	0.49	0.84

Notes:

^a Measured at the aggregate economy level, which is defined as agriculture + manufacturing + services.^b In value added terms. The energy-intensive sectors are chemicals, non-metallic minerals, basic metals, pulp and paper, rubber and plastics.^c Sector-specific constant (1997) energy prices, derived from EU KLEMS data on expenditures on intermediate energy inputs that encompass all energy mining products, oil refining products and electricity and gas products (see Section 2 for more details).^d Total energy production (ktoe) per capita. Sources: IEA Energy Balances (energy production) and Worldbank (population).**Fig. 1.** Sector structure and energy consumption in the Netherlands, relative to the OECD (normalized, OECD=1).

consumption has been an ambition of the Dutch government for many years – the first campaign to increase public awareness of energy use dates from the 1970s – the country is, in comparison with the OECD average, characterized by a high and increasing energy intensity level (see Table 1). Table 1 shows that this development combines with a relatively low energy price, high energy abundance and a high share of energy-intensive sectors in the Dutch economy.

Energy abundance in the Netherlands mainly derives from its natural gas endowment, which not only translates into a high share of natural gas in final energy consumption (Table 1) but also into a relatively energy intensive sector structure. The latter is illustrated by Fig. 1, which shows the internationally exceptional position of the Agro-Food Industry and the Chemical sector in the Netherlands.

The position of the Agro-Food Industry is related to a large energy-intensive advanced Horticulture sector for which – given the Dutch climate – natural gas traditionally has been an indispensable input because of the need to have large-scale greenhouses. The rise of the energy-intensive Chemical sector coincided with the

development of the Groningen natural gas fields in the Netherlands at the beginning of the 1960s.² Abundance of natural gas clearly provided a comparative advantage for both sectors by lowering the domestic price for a key input in the production process. At the same time, there is also evidence that in the 1970s natural gas exports contributed to de-industrialization in the small open economy of the Netherlands via a real exchange rate appreciation that negatively affected competitiveness—a phenomenon that has become known as the Dutch Disease (Ellman, 1981; Kremers, 1986; Corden and Neary, 1982).

The objective of this paper is to further analyze long-term energy intensity trends in the Netherlands in relation to structural transformations of the economy. An underlying reason, of

² This is best illustrated by the history of the company DSM, established in 1902 as a state-owned coal mining company. On behalf of the Dutch Government, DSM was responsible for the exploitation of the Groningen gas fields between 1959 and 2006. After 1965, when the decision was taken to phase out the mining operations, it accelerated its diversification into fertilizers and other chemicals. Currently, the company is also active in the field of food and nutritional products.

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