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Increasing the use of national statistics data for monitoring energy efficiency in The Netherlands

Joost Gerdes, TNO, The Netherlands, joost.gerdes@tno.nl
Sebastiaan Mantel, CBS, The Netherlands

EXTENDED ABSTRACT

This paper describes the setup and results of the Dutch Energy Efficiency Monitor that conforms to both the energy balance definition as used for the EED and the sector definitions as used by the Dutch government for energy and climate policy.[1] The main underlying developments are analysed by constructing indices, mainly on sub-sectoral level, comparing energy consumption to measures of activity. Special attention is paid to the availability of data from national statistics and to consistency with other energy efficiency monitoring efforts.

Introduction

Lately, interest of the Dutch government has grown in monitoring energy efficiency and energy consumption, among other things because of the revised Energy Efficiency Directive (EED). Detailed monitoring of final energy efficiency developments at the national level is already being done by the Odyssee-Mure project and by the IEA.[2,3] Detailed monitoring of energy conversion efficiencies, that would allow an overview of efficiency developments of primary energy consumption, is not covered however. Also, for some activities, Odyssee-Mure and IEA make use of lower quality data because official data from Statistics Netherlands (CBS) are lacking. This concerns mostly data on physical production and activities, but also some detailed energy consumption data.

One of the goals of the energy efficiency monitor we developed and describe here (an annual publication) is to improve data availability by involving CBS. Another reason to involve CBS is that for historical energy consumption, determining energy consumption on the (sub)sector level in accordance with article 4 of the EED and with the sector definitions as used by the Dutch government can only be done properly by CBS. A third important goal of the monitor is to give insight in the main developments underlying the primary and final energy consumption levels. A final aim of the project is to set definitions for energy efficiency indicators that can be used within the national and possibly international context.

Methodology

We will describe the methodology by addressing the sector classification, the way we give insight in the main primary and final energy consumption trends and the compatibility with the national and international context.

For the sector classification, we aligned with the sectors as defined for the Dutch Climate Agreement, which is convenient for decisionmakers in the Netherlands.[4] The sector Industry encompasses industrial activities

[1] Gerdes, J., Mantel, S. and Jonker, S. (TNO, 2025) https://energy.nl/publications/monitor-energiebesparing/
[2] https://www.odyssee-mure.eu/
[3] https://www.iea.org/data-and-statistics/data-product/energy-efficiency-indicators
[4] Ministry of Economic Affairs (2019) https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-the-netherlands

in the energy sector like refineries, production of oil and gas and coke ovens. Conversion losses of electricity and heat production by autoproducers are allotted to the applicable end use sectors; energy use by mobile machinery in all sectors is allotted to the transport sector. The monitor was set up with data from CBS as much as possible. In practice, we still made use of some data series on activities collected by TNO from other sources for Odyssee-Mure. This approach allowed for a first analysis of gaps in the data and opportunities for improved data collection by CBS. This involves making datasets more detailed and/or addressing methodological breaks in time series.

Giving insight in the main developments underlying the primary and final energy consumption levels was done by setting up indices based on energy consumption divided by levels of dominant activities. The base year used is 2015, resulting in analysis over a long enough time, and giving more insight in relatively recent developments than using an earlier base year.

We chose indicators on the sector level for sectors that are relatively homogeneous, like the power sector, households, services and agriculture (the energy consumption of which in the Netherlands is dominated by horticulture). The industry sector is not completely but largely covered with separate indices for the large consumers refineries, the chemical industry and the steel industry. Transport is covered by indices for cars, trucks, light vehicles and air traffic.

In the current first version, no sector level indices were constructed for the industry and transport sectors as a whole, nor were primary and final indices on the national level. The approach used is less detailed than that of Odyssee-Mure and IEA, as it does not take structural effects into account. For households for example, the total energy consumption of fuels and electricity is simply divided by the number of households, without taking changes in heating systems or the ownership rate of electrical appliances into account. This is deliberate, as we do not aim to replicate the level of detail in Odyssee-Mure. This also means the savings indicator in the Energy Efficiency Monitor will result in less efficiency gains than in Odyssee-Mure if consumption-increasing structural effects have occurred.

We aligned the definition of the indicators to match the national, and, if possible, the international context. The most important example is the allotment of CHP input energy to either electricity or heat in the power sector. The allotment method used for CHP in power plants is a direct variant on the standard Dutch calculation of CO_2 emissions from electricity generation[5]. The method first calculates the energy saved by comparing combined generation of heat and power to the case of separate generation. In the latter case, electricity would be generated with the average efficiency of Dutch power plants and heat with an estimated boiler efficiency of 90%. Subsequently, to calculate the electrical and heat efficiencies for the case with CHP, half of the energy saved is subtracted from the reference input for electricity generation and half of it is subtracted form the reference input for heat generation. The allotment method has direct implications for the resulting energy efficiency of the electricity sector. By taking this approach, indicators stay consistent between different reports in the Dutch energy transition discourse.

Results

Only a few sectors show a convincing trend towards higher efficiency compared to the index value of 100 in the base year 2015, namely the power and the services sectors, with efficiency indices for 2022 of 85 and 83 respectively. Refineries have a primary index for 2022 of 93, the chemical industry a feedstock-input based index of 108, the steel industry a final index of 109, the residential sector a final index of 88, cars 95, trucks 106, light vehicles 102, passenger air traffic 88 and agriculture 89. The relatively low index values for residential and agriculture are outliers though, related to the high energy prices in 2022. A secondary result of the project is that it has raised awareness of the additional data necessary for energy efficiency monitoring that are not (yet) directly available at CBS.

[5] https://www.cbs.nl/nl-nl/achtergrond/2012/39/berekening-van-de-co2-emissies-het-primair-fossiel-energiegebruik-en-het-rendement-van-elektriciteit-in-nederland

Conclusion & discussion

An important feature of the Dutch Energy Efficiency Monitor is that it provides insight in the main trends underlying energy consumption and efficiency developments that match the nationally determined sector definitions. With this, it can help shape sectoral policies to reach the article 4 targets of the EED. The importance of having data available at CBS as much as possible is that it would improve consistency between different databases and monitoring methodologies (by IEA, Odyssee-Mure and the annual Dutch Climate and Energy Outlook, where unofficial data are sometimes used when official data are missing). Awareness of missing time series necessary for the evaluation of energy efficiency is the first step towards getting activity data higher on the agenda of national statistics offices and decision makers. Still, the national Energy Efficiency Monitor may choose different activity data from Odyssee and IEA if these would seem better fit for purpose, like it has done by choosing non-energetic consumption as the physical production quantity in the chemical industry. Improvements to the monitor may include averaging over multiple years to smoothen statistical noise, constructing efficiency indices on the sector level for all sectors, and primary and final efficiency indices on the national level.