MONITORING GERMANY'S AGGREGATE ELECTRICITY EXPENDITURES

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Overview

The energy transition in Germany -the "Energiewende"- marks a major shift in energy policy and sets ambitious targets. The concept of "Energiewende" aspires an energy system which is almost exclusively based on renewable energies by 2050. In order to oversee this mammoth policy project, the German government has set up a monitoring which aims to continuously review the progress of the Energiewende along its three major objectives: an environmentally friendly, secure and affordable energy supply by 2050. Each of the three dimensions is monitored by several indicators. The dimension "affordable energy supply" is obviously fuzzy and in current discussions most attention in is paid to sectoral electricity prices and distributional aspects induced by the Energiewende or related policies rather than aggregate expenditure information. For example, there has been a heavy debate about the redistributive effects resulting from exemptions granted to power-intensive manufacturing under the German renewable electricity support scheme. However, having the aggregate expenditures in view, the granted exemptions are irrelevant as they unburden one sector at the expense of other sectors but no additional expenditures are induced. Likewise the monitoring reports of the German government consist of a multitude of price indices (e.g. industries prices, household price etc.), but economy-wide expenditure information are scant. The importance of distributional aspects and sector-specific price indicators is beyond controversy- especially with respect to public acceptance of the Energiewende. We argue, however, that distributional aspects of the German energy transition and aggregate expenditure developments are two distinct issues that should be analysed individually. For those reasons we propose an indicator that monitors aggregate electricity expenditures and thereby allowing undistorted analyses of its main components and underlying drivers. Parts of the ideas and results presented here have been developed in the framework of our activities in the German Governmental Expert Commission to Monitor the Energy Transformation (Löschel, Erdmann, Staiß a. Ziesing 2014).

Methods

Electricity expenditures in this paper refer to the aggregate amount of money spent by consumers, industry, and others in Germany to purchase electricity. In order to conceptualize the various components of electricity expenditures we propose to distinguish between three sub-categories:

(1) **State-induced elements** encompass components such as eco taxes, concession levies and the apportionments for the support of renewable as well as cogeneration electricity.

(2) State regulated elements refer to the regulation of the electricity grid as natural monopoly and consist of the sum of annual transmission and distribution fees.

(3) Market driven elements predominantly refer to prices of electricity on wholesale markets.

In order to quantify the proposed indicator, several statistical and other sources have to be combined to a consistent view. Starting point for the estimating of the aggregate electricity expenditures are the statistics on electricity sales and revenues of utilities provided by the German Federal Statistical Office. This statistic is based on a complete census covering the entire domestic sales volumes to final customers and corresponding revenues. The reported revenues are gross values that encompass all price components such eco taxes, grid charges, renewable and other levies. Value added taxes, however, are not considered. Furthermore the aggregate revenues are reduced by the amount of eco-taxes which are refundable. As the various components are not reported individually, quantitative information on the respective components have been collected from other sources. Finally, the data do not cover by definition auto production of electricity for own use (e.g., CHP in industry). Auto production accounts for roughly 10 percent of final electricity consumption in Germany.

Results

Table 1 summarizes the results of the assessment for the years 2010 through 2013. The overall expenditures rose from 61 billion euros in 2010 to 70 billion euros in 2013 at slightly declining electricity sales volumes. It is conspicuous that both state-induced and state-regulated elements rose considerably. Market driven elements, on the other hand, declined drastically. The lion share of the state induced expenditures can be attributed to renewable electricity support (EEG levy). These payments represent additional costs, i.e. they are composed of the difference between feed-in tariffs and the market value of renewable electricity. Market driven elements are determined by wholesale electricity prices and as such depend on primary energy prices, CO_2 prices, electricity demand (i.e., load) and the structure of supply capacities. Furthermore the merit-order effect of renewable electricity also plays a significant role. As can be seen, the absolute market revenue of renewable electricity rose from 3.5 bn EUR in 2010 to 4.2 bn EUR in 2013, which is driven by increasing sales volumes rather increasing market values of renewable electricity. In fact, in the same period renewable electric generation grew from 82 TWh to 125 TWh and, hence, the average market value of renewable electricity declined.

		2010	2011	2012	2013	2010-2013 %Change
Total Sales Volume	**TWh**	**479**	**467**	**462**	**462**	**-3.4**
Total Expenditures	**bn EUR**	**60.9**	**63.6**	**64.3**	**70.4**	**15.6**
State-induced elements	bn EUR	**17.2**	**23.0**	**23.3**	**30.0**	**74.5**
Eco-tax		6.4	7.2	7.0	7.0	10.0
Concession levy		2.1	2.2	2.1	2.1	0.8
EEG levy		8.3	13.4	14.0	19.8	137.4
CHP a. other levies		0.4	0.2	0.3	1.1	182.1
State regulated elements	bn EUR	**16.9**	**17.6**	**19.0**	**21.2**	**25.1**
Transmission charges		2.2	2.2	2.6	3.0	36.8
Distribution charges		14.7	15.4	16.4	18.2	23.4
Market driven elements	bn EUR	**26.8**	**23.1**	**22.0**	**19.2**	**-28.2**
Market revenue REN		3.5	4.4	4.8	4.2	22.2
Conventional generation a. sales		23.3	18.6	17.2	15.0	-35.7

Table 1: Electricity sales volume and expenditures in Germany in the years 2010 to 2013

In contrast revenues for conventional generation and sales collapsed by 36% from 23.3 bn EUR in 2010 to 15.0 bn EUR in 2013. This is a combined effect of decreasing wholesale market prices and simultaneously declining sales volumes due to higher shares of renewable electricity. The declining revenues provide empirical facts for the ongoing debate about the missing money problem.

Conclusions

The Energiewende is a lung run community endeavor with major economy wide impacts. Monitoring the aggregate energy expenditures, here exemplified by the electricity sector, is indispensable in order to analyze and control the overall financial impacts. Aggregate numbers which are not diluted by distributional aspects give important insights into the respective developments and underlying drivers. Furthermore, the indicator reveals the mutual dependence of the respective elements and therefore exemplifies that only the aggregate, i.e. the sum of them, can be used for putting the developments in a consistent perspective. For example, the discusion about the Energiewende and the associated financial burden heavily focus on the amount of the EEG levy. The EEG levy, in turn, is inversely linked to market prices. The higher the market prices, the lower the levy and vice versa. From a narrow view on the levy only, we may interpret a decreasing levy as result of increasing market prices as a cost relief. From an aggregate expenditure view, however, this apparent relief may turn into the opposite as overall expenditures will increase.

References

Löschel, A.; Erdmann, G.; Staiß, F.; Ziesing, H.-J. (2014): Statement on the second monitoring report by the German government for 2012. Berlin, Mannheim, Stuttgart, 2014