Lehrstuhl für Wirtschaftliche Staatswissenschaften, insbesondere Energiewirtschaftslehre

Staatswissenschaftliches Seminar
Mikroökonomik, Institutionen und Märkte

Master Thesis on the Topic

Final Energy Consumption and Human Well-Being

A Breakdown of Final Energy Requirements with a Focus on Electricity and Thermal Energy

As global energy use has been rising throughout history, its connection to human well-being has been a great subject of research. In recent decades various researchers found that the social returns on energy consumption per capita are becoming increasingly marginal. The large discrepancy between social outcomes and energy consumption of some countries[1] has furthermore incentivized many researchers to theorize about the energy requirements of well-being. Among others, Rao et al. (2019) formulates a framework that aims to model the energy requirements of human well-being through the proposition of basic material needs and the analysis of the amount of final energy necessary to produce them. In a follow-up study, Millward-Hopkins et al. (2020) build upon the toolbox of Rao et al. (2019) and finds that the *theoretical*[2] final energy requirements for *decent* living standards of the global population could be 60% lower than energy consumption today. Their bottom-up approach revolves around the calculation of the ecological impact that the provision of a specific consumption inventory that includes all essentials for human well-being would imply. While exhibiting some modelling advantages against a top-down approach, some caveats of their study inherently stem from specific assumptions considering the diffusion of new technologies as well as conservative estimates of the evolution of demand side management. As current levels of energy consumption exceed sustainable levels by far, a more

[1] This discrepancy is particularly pronounced when comparing highly industrialized countries with less developed countries.
[2] *Theoretical* here refers to the fact that Millward-Hopkins et al. (2020) do not consider the diffusion of new technologies with regards to economic feasibility, but focus on what is possible from a pure engineering view.

rigorous discussion on the use of energy for economic development and especially human well-being becomes more and more important.

Building upon Millward-Hopkins et al. (2020), this Master thesis aims to extend their modelling technique to enable detailed accounting considering the demand of electricity and thermal energy. As a first step, the thesis may focus on the *Decent Living Standard (DLS)* - scenarios established in the paper, as several assumptions have been made to calculate the respective energy requirements. After a discussion on the effects of these assumptions with respect to the direction of the results, specific improvements may be discussed with a focus on the breakdown of final energy into electricity and thermal energy. Subsequently, the extended empirical framework should be estimated. The thesis may conclude with a discussion on the results and possible policy advise.

Literature

Millward-Hopkins, J., Steinberger, J. K., Rao, N. D., & Oswald, Y. (2020). Providing decent living with minimum energy: A global scenario. Global Environmental Change, 65, 102168.

Rao, N. D., Min, J., & Mastrucci, A. (2019). Energy requirements for decent living in India, Brazil and South Africa. *Nature Energy*, *4*(12), 1025-1032.

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