Abstracts

Valuing the Depletion of Oil and Gas Resources in the US: A Comparison of Alternative Approaches

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Abstract

This paper reviews the definitions, meaning and major empirical analyses of the related concepts of dematerialization and intensity of use (IU). Dematerialization refers to the absolute or relative reduction in the quantity of materials used and/or the quantity of waste generated in the production of a unit of economic output. A common indicator is the intensity of material use (IU), which is the quantity of material used per unit of economic output. The discussion is organized around the central areas of research: the environmental Kuznets curve for materials, material use and long wave theory, material decomposition analysis, statistical, input-output, and dynamic models of material use, and analyses of aggregate material use. The discussion then turns to some outstanding issues such as the measurement of aggregate material use and aggregate waste emissions, the testing of underlying hypotheses, the importance of materials embodied in imports, and the forces that countervail dematerialization such as rising affluence and the "rebound effect." Among our conclusions are 1) our knowledge of the extent of and mechanisms behind the patterns of material use are limited largely to individual materials or very specific industries, and most of those examples are metals; 2) the economy is getting "lighter," but the aggregate economic significance of that trend, if any, is unknown; 3) despite claims to the contrary, there is no compelling macroeconomic evidence that the US economy is "decoupled" from material inputs, and 4) we know even less about the net environmental effects of many changes in materials use, except for a few important effects such as the decarbonization of primary energy inputs.