Accepted Manuscript

Decoupling global environmental pressure and economic growth: scenarios for energy use, materials use and carbon emissions

Heinz Schandl, Steve Hatfield-Dodds, Thomas Wiedmann, Arne Geschke, Yiyong Cai, Jim West, David Newth, Tim Baynes, Manfred Lenzen, Anne Owen

PII: S0959-6526(15)00833-1

DOI: 10.1016/j.jclepro.2015.06.100

Reference: JCLP 5759

To appear in: Journal of Cleaner Production

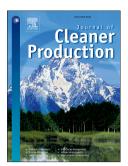
Received Date: 28 July 2014

Revised Date: 29 March 2015

Accepted Date: 22 June 2015

Please cite this article as: Schandl H, Hatfield-Dodds S, Wiedmann T, Geschke A, Cai Y, West J, Newth D, Baynes T, Lenzen M, Owen A, Decoupling global environmental pressure and economic growth: scenarios for energy use, materials use and carbon emissions, *Journal of Cleaner Production* (2015), doi: 10.1016/j.jclepro.2015.06.100.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Decoupling global environmental pressure and economic growth: scenarios for energy use, materials use and carbon emissions

Heinz Schandl^{a,b,*}, Steve Hatfield-Dodds^a, Thomas Wiedmann^{c,d}, Arne Geschke^d, Yiyong Cai^e, Jim West^a, David Newth^e, Tim Baynes^a, Manfred Lenzen^d, Anne Owen^f,

Author affiliations: ^aCSIRO Land and Water, Canberra, ACT 2601, Australia, ^bAustralian National University, School of Sociology, Canberra, ACT 2601, Australia, ^cUNSW Australia, School of Civil

and Environmental Engineering, Sydney Australia, ^dThe University of Sydney, Integrated Sustainability Analysis, School of Physics, NSW 2006, Australia, ^eCSIRO Oceans and Atmosphere, Canberra, ACT 2601, Australia, ^fUniversity of Leeds, School of Earth and Environment, Leeds, LS2 9JT, UK.

*) Corresponding author: Heinz Schandl heinz.schandl@csiro.au

Submission to a Special Volume of the Journal of Cleaner Production 'Achieving absolute reductions in material throughput and energy use'

Keywords: Dematerialization, decarbonization, decoupling, economic development, material use, energy use, carbon emissions, footprint, integrated economic-environment-climate modelling

Abstract: In recent decades economic growth and increased human wellbeing around the globe have come at the cost of fast growing natural resource use (including materials and energy) and carbon emissions, leading to converging pressures of declining resource security, rising and increasingly volatile natural resource prices, and climate change. We ask whether well-designed policies can reduce global material and energy use, and carbon emissions, with only minimal impacts on improvements in living standards. We use a novel approach of combined economic and environmental modelling to assess the potential for decoupling for 13 world regions and globally. We apply a production (territorial) and consumption approach to discuss regional differences in natural resource use and carbon emissions across three stylized policy outlooks: a reference case with no significant changes to environment and climate policies; a 'high efficiency' outlook involving a global carbon price rising from \$50 to \$236 (constant price) per tonne of CO₂ between 2010 and 2050 and improvements in resource efficiency (rising from 1.5% historically to between 3.5%-4.5% in the scenarios); and a 'medium efficiency' outlook midway between the 'no change' and 'high' outlooks. We find that global energy use will continue to grow rapidly under all three scenarios from 17 billion tonnes of oil equivalent (toe) in 2010 to between 30 and 36 billion toe. Carbon emissions would be considerably lower with a global carbon price, less than half the level of the reference case (29 to 37 billion tonnes of CO₂ instead of 74 billion tonnes) and also material use would grow much more slowly under a carbon price and significant investment to increase resource efficiency (95 instead of 180 billion tonnes of materials). We find that OECD economies have significant potential to reduce their material throughput and carbon emissions with little impact on economic growth, and that developing economies such as China could expand their economies at much lower environmental cost. Globally, the effects of very strong abatement and resource efficiency policies on economic growth and employment until 2050 are negligible. Our study suggests that decarbonization and

Download English Version:

https://daneshyari.com/en/article/8101440

Download Persian Version:

https://daneshyari.com/article/8101440

Daneshyari.com