Energy Policy 48 (2012) 611–617

Contents lists available at SciVerse ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

The world at a crossroads: Financial scenarios for sustainability

Jofre Carnicer [a,b,*], Josep Peñuelas [b,c,**]

[a] CEES, Centre for Ecological and Evolutionary Studies, University of Groningen, Nijenborgh 7 9747 AG, Groningen, The Netherlands
[b] CREAF, Cerdanyola del Valles, Barcelona 08193, Catalonia, Spain
[c] CSIC, Global Ecology Unit CREAF-CEAB-CSIC-UAB, Cerdanyola del Valles, Barcelona 08193, Catalonia, Spain

ARTICLE INFO

Article history:
Received 8 May 2012
Accepted 27 May 2012
Available online 22 June 2012

Keywords:
Financial system
Renewable energy
Sustainability

ABSTRACT

The global financial system is a major component of our global society. The available analyses of sustainability, however, have poorly assessed the role of the financial system in scenarios of future global change. Here we contrast current global flows in the financial system with the future economic costs of a worldwide transition to renewable energies under the baseline and 450 ppm scenarios for emissions of greenhouse gases proposed by the IPCC. We show that annual global financial flows are three orders of magnitude greater than the annual economic costs of policies for global sustainability. A small global tax on financial transactions of 0.05% could thus provide the required funds for the deployment of renewable energies. To assess the roles of the financial sector in future policies for sustainability, we identified 14 key international actors and enumerated 16 key policies for sustainability that should be implemented to achieve effective global ecological and financial sustainability. We conclude that the proposed structural reforms to the financial system are essential steps urgently required for financing a global transition to a sustainable economy. Consequently, we suggest that the international scientific community should urgently pursue an academic consensus on policy recommendations for the financial sector.

1. Introduction

The financial sector plays central structural functions in the global economy, providing liquidity, channeling savings to economic agents who require financing, restricting and filtering financial resources to profitable economic activities, and creating risk-coverage instruments (Stiglitz et al., 2010). Although being a major driver of the global economy (its size is roughly equivalent to 70 times the global GDP), the financial sector stands out as anomalous, being largely poorly quantified, unregulated, and untaxed (United Nations, 2009; United Nations Conference on Trade and Development (UNCTAD), 2009). A broad and strong international consensus presently identifies the need to urgently reform and regulate the global financial system to avoid the emergence of repeated financial crises (G-20, 2011). However, despite the urgent need for a transition to an economy based on renewable energy (Hoffert et al., 2002; Paccala and Socolow, 2004; Haines et al., 2007; Peñuelas and Carnicer, 2010), the relationships between the projected reforms in the core financial sector and the needed global inversions in renewable energies remain poorly assessed and discussed.

The world is now at a complex crossroads: a multifaceted global crisis is occurring. The global crisis has humanitarian, energetic, ecological, and financial aspects. Half of the world's human population presently suffers some form of malnourishment, and famine is projected to increase in the coming decades due to a mix of water scarcity, increased energy costs, effects of land degradation, and impacts of climate change (Schade and Pimentel, 2010). In addition, the world is currently experiencing increased emissions of CO_2, increased global temperatures, widespread changes in land use, and loss of biodiversity and ecosystemic services (Intergovernmental Panel on Climate Change (IPCC) 2007a; Intergovernmental Panel on Climate Change (IPCC) 2007b). The energetic and material aspects of the global crisis are also challenging. Indeed, during the coming decades, several inputs of basic resources to the global economy will become more expensive and/or restricted, including oil (Peñuelas and Carnicer, 2010), water (Schade and Pimentel, 2010), coal (Mohr and Evans, 2009), irrigable and cultivable land (Schade and Pimentel, 2010), various raw materials (European Commission, 2010), and phosphorus (Cordell and White, 2011).

Due to the ongoing global situation, some countries have already strategically started an incipient transition to an economy based on renewable energy that will require sustained and

* Corresponding author at: CEES, Centre for Ecological and Evolutionary Studies, University of Groningen, Nijenborgh 7 9747 AG, Groningen, The Netherlands.
** Corresponding author.
E-mail addresses: jofre.carnicer@creaf.uab.es (J. Carnicer), josep.penulas@uab.es (J. Peñuelas).

0301-4215/$ - see front matter © 2012 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.enpol.2012.05.065

Table 1
Global annual financial flows and financial costs of the deployment of renewable energies in the IPCC baseline and 450 ppm scenarios. (A) A quantification of major components of the global economic system. The annual turnover in the global foreign-exchange market illustrates the relative size of the financial sector relative to global GDP, Global Gross External Debt, and foreign exchange reserves. (B) Sustainability costs. Estimated costs are provided for the UN Millennium Developmental Goals in 2015. We also list the economic costs of policies for the deployment of renewable energy in the IPCC SRREN baseline and 450 ppm scenarios (IPCC, 2012). Global costs of subsidies for the consumption of fossil fuels are also reported. (C) Expected revenues of a 0.05% global tax on financial transactions are reported and compared to other financial sources. Maximum revenue values assume no reduction in the traded volumes. Minimum revenue values illustrate a 75% reduction in traded volumes (Stiglitz et al., 2010). The calculation of the Global Gross External Debt in section A includes the following countries: Argentina, Armenia, Australia, Austria, Belarus, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Georgia, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Kyrgyz Republic, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mexico, Moldova, Morocco, Netherlands, Norway, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Tunisia, Turkey, Ukraine, United Kingdom, United States and Uruguay.

	Variable	Economic value (US$ trillions, 10^{12}S)	Reference
A	Global GDP 2011	70.01	International Monetary Fund (IMF) (2011a)
	Global Gross External Debt	61.50	Joint External Debt Hub (Bank for International Settlemments- OECD- World Bank and IMF) (2011)
	Gross External Debt Euro Area	15.45	
	Gross External Debt USA	14.96	
	Gross External Debt People's Republic of China	0.94	
	Foreign-exchange reserves People's Republic of China Dec 2011	3.18	Central Intelligence Agency (CIA) (2011); International Monetary Fund (IMF) (2011b)
	Foreign-exchange reserves USA Feb 2012	0.149	
	Foreign-exchange reserves Euro Area Jan 2012	0.925	
	Annual global foreign exchange market turnover	1020	Bank for International Settlemments (BIS) (2010)
B	UN Millennium Development Goals Annual Cost	0.19	United Nations Millennium Project (2005)
	IPCC SRREN Baseline Scenario		
	Annual mean investment in deploying renewable energies	0.14	International Panel on Climate Change (IPCC) (2012)
	Cumulative renewable energy investments (2011–2030)	2.85	
	IPCC SRREN 450 ppm Stabilization Scenario		
	Annual mean investment in deploying renewable energies	0.61	International Panel on Climate Change (IPCC) (2012)
	Cumulative renewable energy investments 2011–2030	12.28	
	Global annual cost of fossil-fuel consumption subsidies	0.31	International Energy Agency (IEA) (2010); International Energy Agency (IEA) (2009)
C	Annual revenue from a Global Financial Transaction Tax (0.05%)	0.64–1.83	Stiglitz et al., (2010)
	Annual revenue from a tax on foreign exchange (0.001%)	0.007	UN, (2010)
	Increased emission of IMF Special Drawing Rights	0.1–0.3	UN, (2009)
	Carbon tax (1US $/ton) in the OECD countries	0.001	UN, (2010)