Journal of Cleaner Production 200 (2018) 533–541

Contents lists available at ScienceDirect

Journal of Cleaner Production

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

Resource control by a sustainability based currency equivalent

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ARTICLE INFO

Article history:
Received 14 November 2017
Received in revised form
31 May 2018
Accepted 29 July 2018
Available online 1 August 2018

Keywords:
CO_2 mitigation
Resource shares
Trade-off
Decarbonization
Equity
Ecopoints

ABSTRACT

Mitigation of CO_2 emissions is the greatest task of this century. It requires the abandonment of fossil fuels and the complete restructuring of industrial processes. Earlier concepts for CO_2 mitigation focused exclusively on emission control. Here, a system of resource control is proposed that limits the extraction of fossil fuels and abiotic resources, as well as the use of land. Efforts in the reduction of resource consumption are often accompanied by switching to other resources as the replacement of fossil fuels by biofuels shows. For preventing this shift, a global system of resource control is desirable. For this purpose, resource shares are generated and distributed to the world's population for purchasing products made by virgin resources. These shares are handed from merchants via manufacturers to resource producers, who return them to an administrative body as an extraction fee. Trading between individuals allows persons with low resource consumption to achieve an additional income, while high resource consumption results in higher expenditures. A specified inflation rate on resource prices reduces consumption over the years to a sustainable limit. This proposal focuses particularly on fossil fuel extraction, which represents about 75% of all resources covered by this scheme.

1. Introduction

When the delegates from all over the world met in Paris for the United Nations Climate Change Conference (COP 21) in December 2015; they agreed on limiting global warming to below 2 °C, also pursuing efforts to limit the increase to 1.5 °C. After the extension of the Kyoto protocol failed, the new motto is voluntary action. The Nationally Determined Contributions (NDCs) announced by participating parties could maintain a global warming of about 2.7 °C above the pre-industrial level if put into practice by the parties (Falkner, 2016; Morgan, 2016). The hope of this bottom-up approach is to trigger announcements that are more ambitious if willing parties are going ahead. Another obstacle is the expected financial aid of US$ 474 billion required for mitigation and adaptation measures in developing countries until 2030 (Zhang and Pan, 2016), which is still far from being granted (Aglietta et al., 2015). Developing countries will suffer more from the effects of climate change (Burke et al., 2015; Lemoine and Kapnick, 2016) and the poor, who have already been disconnected from the economic success of their countries (Sumner, 2016), will bear the heaviest burden.

Industrialized countries fear the competition from developing countries and developing countries do not want to pay for CO_2 emission mitigation efforts, since they claim no responsibility for global CO_2 emissions. This leads directly into the 'climate first – development first' dilemma (Hourcade and Shukla, 2015), describing the battle between ecology and economy. However, this is the result of a misunderstanding, implying that investments into CO_2 emitting technologies can sustain development in a world striving for decarbonization. Developing countries could be set back by another 20 or 30 years, if they stay behind in the effort of reorientation of economy and society for more sustainability. Moreover, the conflict regarding a just distribution of mitigation and adaption costs between developing and developed countries makes it even more difficult to find doable concepts. A bottom-up approach, which focuses on the individual consumption instead of the emissions of a whole nation, might reduce the cause of conflict.

Consumers feel the wish to contribute to environmental issues with their purchase decisions. However, purchase behavior does not always reflect their beliefs (Maxwell-Smith et al., 2016; Vezich et al., 2017). The diversity of products, production technologies and locations makes it difficult to find the product with the lowest environmental burden without a deep insight into the market structure (Gjerris et al., 2016). The large number of choices, the tendency to stick with the familiar habit, and low willingness to take risks among other reasons let consumers make bad or at least

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https://doi.org/10.1016/j.jclepro.2018.07.297
0959-6526/

non-optimal decisions (Frederiks et al., 2015), although, consumers exercise tremendous economic power by their purchase decisions.

The measures that are discussed currently are constrained to carbon taxes and emission markets as described in the clean development mechanism (CDM) (Goulder and Schein, 2013; Gray, 2011). As an example, the currently largest carbon market was implemented in 2005 by the European Union (EU-ETS) including about 11,000 industrial facilities located in 31 countries, 28 EU members, Iceland, Liechtenstein, and Norway (Welfens et al., 2017). The EU-ETS is compulsory for facilities of a defined size belonging to one of about a dozen industrial sectors, including chemical industry, energy, steel, and cement production. Some other sectors and smaller units are excluded from the mechanism. Although, the EU-ETS manages about 2 billion tons of CO_2-emissions per year, half of the CO_2 emitted in the participating countries is released uncontrolled.

A rather new measure are personal carbon trading (PCT) schemes (Fan et al., 2016a,b; Raux et al., 2015) for the implementation of carbon markets for the final consumer. All these measures aim to raise costs for emitting CO_2 and relieve the consumer from individually collecting information. Although emission prevention is made more economically feasible, CO_2-costs are too low to make a change (Morgan, 2016). Davis et al. (2011) suggested to impose a certain price on CO_2 emissions along the fossil fuel supply chain giving all parties the chance to participate in the revenues. However, emission control is an 'end-of-pipe' way of thinking, curing the symptoms, not the plague. Mitigation in one part of the world reduces the demand for fossil fuels. Prices decrease with decreasing consumption, making carbon sources more attractive to mitigation-refusing parties (Aldy et al., 2003). It has to be clear that all the fossil fuel extracted from the ground is released as CO_2 into the atmosphere. With this in mind, would it not be more reasonable to control fossil fuel production instead of trying to reduce CO_2 emissions (Buxton, 2016)?

Little suggestions were made how fossil fuel production could be controlled, even though, the control of fossil fuel output has several advantages. It is easier to control a rather small number of producers concentrated in some geographical areas instead of numerous small CO_2 emitters (Davis et al., 2011; Goulder and Schein, 2013). A plethora of regulations is required for the mitigation of emissions (Bernauer, 2013). The number of climate-related regulations and policies doubles every five years (Falkner, 2016), most of which could be omitted if fossil fuel production were the target of control. Setting production limits could lead to the control of CO_2 releases over a long period under the consideration of economic and ecologic aspects. Since fossil fuels are traded according to the market principles, NDCs and CDMs become obsolete. The consequence would be a rise in fuel prices caused by the limited supply, which could be borne by industrialized countries, but probably not by developing countries in their attempt to catch up with the developed ones. Moreover, the selection of producers allocated for fuel production and the persuasion of all actors to comply with such a commitment are open questions. Most fossil fuel exporting countries are highly dependent on the revenues.

It is obvious that developing countries cannot follow the development path of already developed countries under the constraints of resource scarcity (Hallding et al., 2013) and social-economic adjustments are required to support the development and the reduction of global poverty (Hickel, 2016). In this study, a framework for the reduction of resource output under the consideration of equity was developed, targeting the economic development of developing countries without neglecting mitigation goals.

2. Outline of the ecopoint concept

McGlade and Ekins (2015) showed that the largest part of fuel reserves have to be preserved in the ground to limit global warming to below 2 °C. It is, however, very likely that fossil fuel consumption increases for the next decades (EIA, 2017). Such a scenario is eminent for the development of new technologies. However, high volatility of fuel prices endanger investments into alternative technologies (Aghion et al., 2016; van Ruijven and van Vuuren, 2009). Under these circumstances, it appears highly unlikely that fossil fuel production will decrease without intervention.

Covert et al. (2016) identified two market failures – the low price of greenhouse gas emissions and lacking investments into new technologies – in the current economic system. Therefore, resource shares are proposed as a sustainable currency equivalent. While conventional pricing solely follows the economic interests, resource shares provide a useful instrument for the control of resource consumption and reduction of environmental impacts from human activities. Every person is given a defined number of shares, called Ecopoints, which can be used to acquire a certain amount of resources. These resources are not purchased by consumers in their native state, but rather the result of a long production process, including energy and materials from abiotic and organic origin. Consumers use Ecopoints for purchasing resources incorporated in products they buy (Fig. 1). Merchants pass them to the manufacturers, who acquire the resources from resource producers. Producers return Ecopoints to the emitting authority as a fee for resource extraction. Note that the total amount of resource consumption is limited by the number of emitted Ecopoints. For the emission and collection of Ecopoints, a central bank has to be established, as it was suggested for carbon pricing (Doda, 2016). Only resource extraction is charged. Materials incorporated into waste or end-of-life products are not accounted for, making them attractive for recovering and recycling.

The total amount of Ecopoints reflects the resource consumption of a reference year. Each person receives the same share on a monthly basis that is the resource consumption is capped by the monthly-emitted shares. Note that increasing population causes a rise in the number of Ecopoints. For the sake of reducing resource consumption, an annual inflation rate is introduced, rising the number of Ecopoints required for purchasing listed resource, while the personal share remains constant. The inflation rate can be adjusted depending on the economic situation and scientific knowledge, aiming for reducing the resource consumption to a sustainable future level at which the resource prices might be kept constant.

Ecopoints are freely traded between persons and convertible to other currencies, allowing individuals, who do not make use of all of their Ecopoints, to receive additional income. This trading system rewards ecofriendly behavior, while resource squandering is discouraged. However, the role of financial institutions need to be restricted. Resources are essential for the development of industry and economy, and therefore, an unhindered Ecopoint flow from consumers willing to sell to consumers willing to buy through mediation of a bank is the most favorable option. Resource producers, manufacturers, traders, public authorities should not be allowed to sell or buy Ecopoints, since there is a high risk of for unwanted resource financing, i.e. a coal company could buy Ecopoints to maintain mining, while customers are not willing to pay. All actors, except consumers, have to retrieve Ecopoints required for their businesses from their customers. Public authorities may raise Ecopoints required for their services as taxes.

There are some similarities between the new proposal and emission trading schemes, as the EU-ETS. Both the EU-ETS and the Ecopoint proposal achieve their reductions by cap and trade that is