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Catching two European birds with one renewable stone: Mitigating climate change and Eurozone crisis by an energy transition

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ABSTRACT

The threat of climate change and other risks for ecosystems and human health require a transition of the energy system from fossil fuels towards renewable energies and higher efficiency. The European geographical periphery, and specifically Southern Europe, has considerable potential for renewable energies. At the same time it is also stricken by high levels of public debt and unemployment, and struggles with austerity policies as consequences of the Eurozone crisis. Modeling studies find a broad optimum when searching for a cost-optimal deployment of renewable energy installations. This allows for the consideration of additional policy objectives. Simultaneously, economists argue for an increase in public expenditure to compensate for the slump in private investments and to provide economic stimulus. This paper combines these two perspectives. We assess the potential for renewable energies in the European periphery, and highlight relevant costs and barriers for a large-scale transition to a renewable energy system. We find that a European energy transition with a high-level of renewable energy installations in the periphery could act as an economic stimulus, decrease trade deficits, and possibly have positive employment effects. Our analysis also suggests that country-specific conditions and policy frameworks require member state policies to play a leading role in fostering an energy transition. This notwithstanding, a stronger European-wide coordination of regulatory frameworks and supportive funding schemes would leverage country-specific action. Renewed solidarity could be the most valuable outcome of a commonly designed and implemented European energy transition.

Contents

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1. Introduction

Avoiding anthropogenic climate change and risks for ecosystems and human health call for a thorough transformation of the global energy system from fossil fuels towards a more sustainable pathway [1–5].[1] Sustainability criteria translate into multiple policy targets for the energy sector, such as climate change mitigation, reduction of local environmental damages, energy security, phase-out of nuclear power plants, "green" economic growth associated with green jobs and poverty reduction, as well as maintaining or achieving a sufficient food supply. A meaningful policy analysis requires a multiple-objective, multiple-externality framework that explicitly accounts for the dynamic interdependencies [6,7] and that acknowledges potentially considerable uncertainties and the consideration of impacts that are not well quantifiable [8–10].

The European Union's (EU) climate and energy strategy rests on explicit targets for reducing greenhouse gas emission, promoting renewable energy sources and increasing energy efficiency (the so-called 20-20-20 targets). These targets have been underpinned by a variety of EU and Member State policy instruments, most notably the EU Emission Trading Scheme (EU-ETS) in the utility sector and country-specific support schemes for renewable energies. Primary measures to address these policy targets include the massive deployment of renewable energy sources, an increase in energy efficiency, and the associated changes in distribution, storage and usage patterns, shortly also referred to as energy transition [3]. These efforts notwithstanding, the political reality places the long-term challenge of climate change mitigation on the back burner. The Eurozone crisis, which involves a sovereign debt crisis, a banking crisis and a severe and enduring recession, dominates the European discourse [11]. The crisis has affected all EU Member States but particularly those in the geographical periphery. Energy transition modeling suggests that a cost-effective decarbonization of the European electricity production and distribution system can be achieved by transitioning on different pathways in terms of technology choice, spatial distribution of production capacity and the degree of connectivity between different Member States [12–14]. It is the central argument of this paper that this degree of freedom in designing an energy transition offers significant leeway to maximize welfare from co-effects of renewable deployment, thus simultaneously addressing other public policy targets than climate change mitigation. Hence, depending on its design, a European energy transition may also help European economies to recover by fostering economic growth, creating jobs, providing energy security, and building trust.

We argue that European renewable policy should be designed such that the respective co-benefits are realized predominantly in peripheral countries. This argument rests on three rationales. 1) An argument of economic efficiency: a crash of economies in the periphery will also affect those countries that are currently well off. If the use of direct means of economic policy, such as fiscal and monetary instruments, is limited (e.g. for political reasons), the promotion of renewable energy investments in the periphery may be understood as a surrogate for such policy [15,16]. 2) An argument of justice and fairness: a joint European effort to promote renewable energy investments in the periphery may provide a fairer distribution of wealth within Europe. This is especially relevant in a unified European economy where central regions such as the Benelux countries, Germany and Northern Italy profit from agglomeration dynamics and without the periphery the center would not boast such impressive agglomeration dynamics. 3) An argument of political feasibility: co-benefits in terms of economic development or trust building may be a precondition for governments to be willing to support a European energy transition [17].

To date, the questions of how to design a European energy transition and how to help the European periphery overcome the debt crisis have been analyzed in entirely separated strands of literature. The New Economic Geography points out that in a unified economic zone, the geographical core profits at the expense of the geographical periphery due to agglomeration economics [18,19]. On the debt crisis, one strand of literature argues that deep recessions, accompanied with the bursting of property bubbles, require increased government investments to compensate for the saving demands on business [20,21]. Lending and investments into those countries that suffer most from the debt crisis are seen as most promising to elicit growth and employment effects [22]. In a very different strand of literature, the prospective of a European energy transition as driven by climate change mitigation has been explored in a recent special issue [13,23]. The technical and sustainable potential and options had already been comprehensively explored by Graßl et al. [1]. The policy status and further options were also subject to scrutiny in recent analyses [16,24]. Special emphasis has been given to the European ETS [25–28]. In a first, more holistic approach an edited volume studied the German energy transition from a behavioral economic, engineering, legal, philosophical, and political perspectives [29]. Nevertheless, a common denominator of these analyses is that they implicitly consider climate change mitigation as the predominant public policy challenge. This paper, in contrast, contextualizes a European transition of the energy system – driven by climate change mitigation concerns – in the broader framework of European challenges, notably the deep recession and debt crisis in the European periphery and its lack of solidarity. Similar to Leggewie [30], we see an opportunity in fostering renewable energies in the European periphery, an argument that we substantiate with quantitative analysis.

The scope of this paper is restricted to the analysis of electricity generation and distribution as this sector of the energy system

[1] RE: Renewable energies; PV: Photovoltaic; BOS: Balance of system costs; LCOE: Levelized cost of electricity; EMF: Energy Modeling Forum; TFEU: Treaty on the Functioning of the European Union; NREAPs: National Renewable Energy Action Plans; EU ETS: EU Emissions Trading Scheme; ACER: Agency for the Cooperation of Energy Regulators; ENTSO-E: European Network of Transmission System Operators for Electricity