

Workshop  
**Developments in Energy Economics**

Madrid, 15 February 2018

**Thursday, 15 February**

- 10.00 – 10.10     **Welcome and introduction**  
*Pedro Linares (EfE) and Gonzalo Sáenz de Miera (AEEE)*
- 10.10 - 11.10     **On Pollution Standard Setting and Compliance Issues**  
*Carmen Arguedas (U. Autónoma Madrid)*  
*Discussant: Francisco André (UCM)*
- 11.10 -11.30     Coffee
- 11.30 – 12.30     **Measures to Enhance the Effectiveness of International Climate Agreements: The Case of Border Tax Adjustments**  
*Michael Finus (U. Bath)*  
*Discussant: Santiago Rubio (U. Valencia)*
- 12.30 – 13.30     **Transition Towards a Green Economy in Europe: Innovation and Knowledge Integration in the Renewable Energy Sector**  
*Elena Verdolini (FEEM)*  
*Discussant: Natalia Fabra (UC3M)*
- 13.30 – 13.40     **Closing and presentation of the 2017 supplemental issue of Energy Economics (7th Atlantic Workshop on Energy and Environmental Economics)**  
*Xavier Labandeira (EfE)*

**On Pollution Standard Setting and Compliance Issues | Carmen Arguedas**

Most textbooks consider pollution standards as command-and-control instruments. Polluters are told what they have to do and it is generally assumed that they will. Emissions are not priced, as opposed to carbon taxes. No flexibility is allowed, as opposed to tradable permits markets. Hence, pollution standards are often regarded as inferior, at least to economists' taste. However, compliance issues are often neglected. In practice, firms may decide to exceed the standard. This may occur if firms' expected costs of violating pollution limits are smaller than firms' compliance costs, and regulators must account for this fact when choosing the appropriate level of the standards. The presentation reviews several recent studies on the interaction between pollution standards and compliance issues. Three main research topics have received increasing attention. The first has to do with the appropriate shape of the fines for non-compliance, and whether full compliance should be pursued as a desirable objective. The second is related to the interaction and different information levels of interested parties and several layers of government. The third comprises the analysis of standard setting and related enforcement issues in dynamic contexts, both in flow and stock pollution problems.

**Measures to Enhance the Effectiveness of International Climate Agreements: The Case of Border Tax Adjustments | Michael Finus**

Unilateral or sub-global actions on climate change are not very effective but global action is not stable due to strong free-rider incentives. These incentives arise because of emissions leakage by non-signatories and the loss of competitiveness by treaty signatories due to higher environmental standards. We study a policy instrument which has been recently proposed to tackle free-riding: border tax adjustments (BTAs). We use a simple strategic trade model which captures consumers' taste for variety to analyze the conditions when BTAs are able to level the playing field and lead to large stable environmental treaties. We show they are particularly successful provided treaties remain of the open membership type and do not serve the interests of few countries who may prefer an exclusive membership rule.

**Transition Towards a Green Economy in Europe: Innovation and Knowledge Integration in the Renewable Energy Sector | Elena Verdolini**

A major concern regarding innovation in clean technologies in the EU is that the fragmentation of its innovation system may hinder knowledge flows and, consequently, spillovers across member countries. A low intensity of knowledge flows across EU states can negatively impact their technological base, suppressing opportunities for further innovations and slowing the movement towards the technological frontier. This paper investigates the fragmentation of the EU innovation system in the field of renewable energy sources (RES) by estimating the intensity and direction of knowledge spillovers over the years 1985-2010. We modify the original double exponential knowledge diffusion model proposed by Caballero and Jaffe (1993) to provide information on the degree of integration of EU countries' innovation efforts and to assess how citation patterns changed over time. We show that EU RES inventors have increasingly built "on the shoulders of the other EU giants", intensifying their citations to other member countries and decreasing those to domestic inventors. Furthermore, the EU strengthened its position as source of RES knowledge for the US. Finally, we show that this pattern is peculiar to RES, with other traditional (i.e. fossil-based) energy technologies and other radically new technologies behaving differently.

**Carmen Arguedas**

Carmen Arguedas is a microeconomist interested in environmental issues. Her research mainly focuses on incentives and information problems related to the design and implementation of environmental policies and voluntary practices. Carmen holds a PhD in Economics from Carlos III University (1999). She is currently an Associate Professor in the Department of Economic Analysis: Economic Theory and Economic History, at the Autonomous University of Madrid. Since March 2017, she also serves as Head of the Department. She has been a Visiting Scholar at Duke University, State University of New York, Tilburg University, The Catholic University of Leuven, and Innsbruck University. She has published the main results of her research in leading journals, such as *Journal of Environmental Economics and Management*, *Resource and Energy Economics*, or *Environmental and Resource Economics*, among others. Carmen has been the research leader in several projects funded by the Spanish Ministry of Economics, and she has presented her work in more than hundred seminars, workshops and conferences around the world.

**Michael Finus**

Michael holds a Chair in Environmental Economics at the University of Bath, UK. He works in the field of environmental economics and public goods, in particular on international environmental agreements. He has published widely in journals such as the *Journal of Public Economics*, *Journal of Public Economic Theory*, *Social Choice and Welfare*, *Public Choice*, and *Environmental and Resource Economics*. He is Co-Editor of *Environmental and Resource Economics* and has been guest editor of various special issues in this journal, the *Journal of Environmental Economics and Management* and *Oxford Economic Papers*. He was President-elect of the German Association of Environmental Economists (2008-2010) and Past President-elect 2010-2012, and was a Lead Author of the 5th Assessment Report of the International Panel on Climate Change (IPCC), Working Group III, which was released in 2014.

**Elena Verdolini**

Verdolini holds a degree in Political Science from the University of Pavia, a Master of Public Administration and a Master of Arts in International Studies from the University of Washington, Seattle and a PhD from Università Cattolica del Sacro Cuore, Milan. She focuses on applied analysis, with an interest in the dynamics of innovation, technology transfer, green growth, and the economic impacts of environmental and energy policies. She has been involved in several internationally funded research projects, most recently the H2020 project INNOPATHS, a major effort to characterise the EU energy transition, highlighting systemic barriers and enabling factors. She has published in several peer-reviewed journals, including the *Journal of International Economics*, the *Journal of Environmental Economics and Management*, the *Review of Environmental Economics and Policy* and *Risk Analysis*. She was one of the authors of the Deep Decarbonisation Pathways Project for Italy.

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