AARHUS UNIVERSITY

# 15TH **GLOBAL** CONFERENCE ON **ENVIRONMENTAL TAXATION**

## Environmental taxation and emissions trading in an era of climate change

24-26 September 2014, Copenhagen Denmark

## CONFERENCE PROGRAMME

EEA · cost EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY · GreenBudgetEurope European Expert Platform on Environmental Fiscal Reform · KØBENHAVN EUROPAS GRØNNE HOVEDSTAD · Environmental Tax Policy Institute Vermont Law School USA · INOGOV INNOVATIONS IN CLIMATE GOVERNANCE · SAS OFFICIAL AIRLINE

# GCET

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# Data Sheet


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Motive on conference bag: © Ruth Stentoft Gundersen

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# Welcome to GCET15

Welcome to Copenhagen, the capital of Denmark and the official European Green Capital in 2014. Your host is Aarhus University, the second-oldest university in Denmark and the largest with more than 40,000 students and 11,000 staff, present in the greater Copenhagen area with Department of Environmental Science. Copenhagen is also host to the European Environment Agency, a significant data and knowledge-generating body of the European Union founded 20 years ago.

The topic of this year's conference is 'Environmental taxation and emissions trading in an era of climate change'. It is timely to gather here under this topic only one month prior to the scheduled finalizing in Copenhagen October 31st of the synthesis summary to policy-makers from the IPCC on basis of the 5th Assessment Report. While the natural science basis for climate policies has been consolidated, important questions remain over the design and choice of policy instruments to curb global warming, including environmental taxes and other market-based instruments. GCET is addressing many of the associated economic, legal and policy questions, by providing a truly global forum for presentations of research, findings and recent developments in an open exchange among professionals from all parts of the world – in an exceptional parallel diplomacy to the convoluted climate negotiations of the nation-states.

More than 100 presentations have been accepted for GCET15 which sets a new record with 28 parallel sessions, so many that some are referred to under the Danish letters Ø and Å. We will have important plenary contributions, including a plenary panel on fiscal consolidation and environmental taxation, and distinguished keynote speakers. We have planned the sessions to have time for questions and debate and encourage all participants, whether presenting or not, to react and engage in a spirit of openness, dialogue and mutual understanding.

We are delighted to host the conference for the first time in Scandinavia and in a location at Asiatisk Plads with traditions for international travel and exchange for more than 250 years. We appreciate this significant opportunity to join forces among the faculties of Business and Social Sciences and of Science and Technology at Aarhus University with the European Environment Agency represented in the organizing committee. We hope you will have some great and memorable days in Copenhagen, with many old and new acquaintances, delivering and gaining exciting insights and having some fun too.

Mikael Skou Andersen,
*Dept of Environmental Science, Aarhus University*

Birgitte Egelund Olsen,
*Dept of Law, Aarhus University*


Stefan Speck,
*European Environment Agency*

Co-chairs of the international programme committee for GCET15.

# Venue: Eigtveds Pakhus

EIGTVEDS PAKHUS SAL III
Address: Asiatisk Plads 2 G
1448 København K
Phone: +45 33921601
http://um.dk/da/om-os/kontakt/eigtveds-pakhus/

## Getting to the venue

**Walking:** 5-7 min walk from Hotel Copenhagen Strand – and 8-10 min. walk from Kongens Nytorv in city centre.

**Metro:** (http://intl.m.dk/#!/) Direct line from Copenhagen Airport (Terminal 3) to metro stop Christianshavn.. Approx. 5 min walk from the metro station to Eigtveds Pakhus (crossing the small canal). Ticket machine can be found in the airport's luggage arrival hall; the trip covers 3 zones.

**Bus:** (http://www.rejseplanen.dk/): 2A, 9A, 40 and 350S stop at Knippelsbro Bridge. 2 min. walk. Bus 2A (Lergravsparken) and 9A (Opera) leave from exit of CPH Central Station (Hovedbanegården) facing Tivoli.

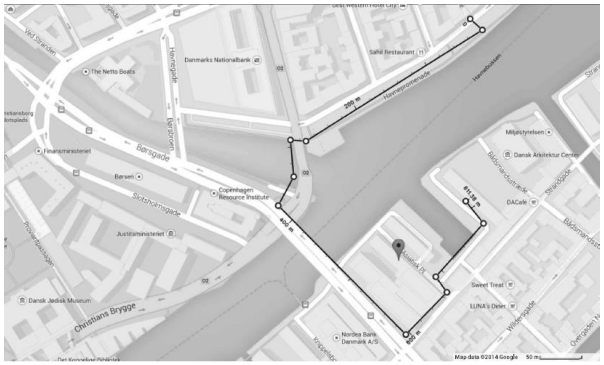
**Water bus:** (http://www.rejseplanen.dk/): 991 (southbound) or 992 (northbound) call below Knippelsbro bridge. Tip: 991 at 08.20 from the Nyhavn stop in hotel area sails directly to venue (Knippelsbro). (http://www.moviatrafik.dk/dinrejse/trafikinfo/Documents/Havnebus_helt_kort_23102011.pdf).

**Ticketing:** in ticket machines, in buses or online at http://www.1415.dk/?lang=en.

**Parking:** Unfortunately Eigtveds Pakhus does not have parking facilities.

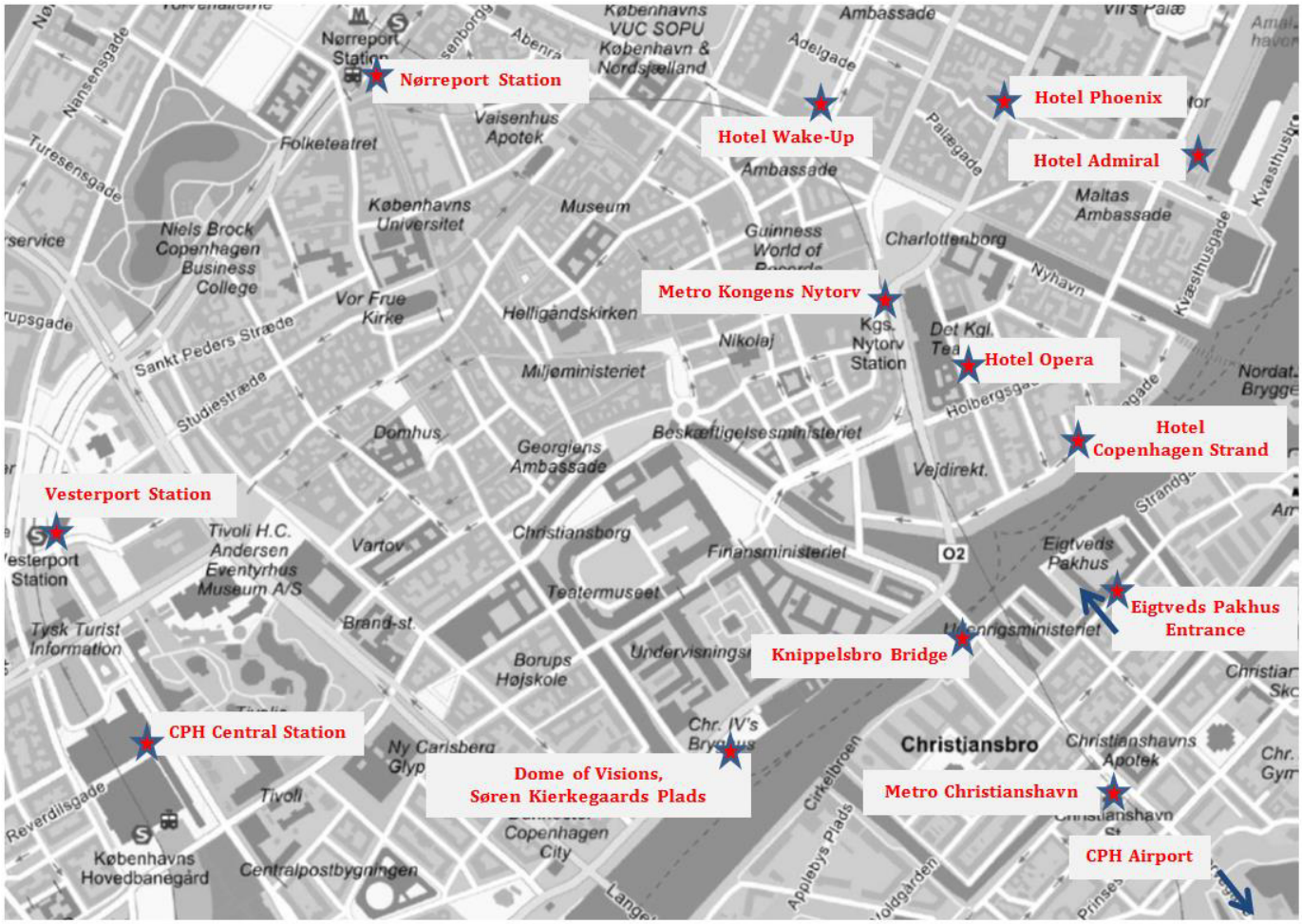
**Taxi:** From Copenhagen Airport to Eigtveds Pakhus is approx. 15-20 min., costs about 200 DKK. Amager-Øbro taxi tel: (+45) 32515151 – from this company you may request a carbon-neutral taxi.

**Tip:** For public transport you can buy a 2 zone multi-ride ticket with 10 trips at DKK150. Valid in metro, buses etc. including the water bus. Stamp twice for trip to airport. Read all about ticketing in public transport here; http://www.moviatrafik.dk/dinrejse/Tourist/English-tourist/Pages/Principal-fares.aspx




*Mini-map: walking route to venue.*

# Copenhagen Inner City Map




## Understand Copenhagen in 30 seconds

The Inner City is the historical heart of Copenhagen. The names Nørreport (northern gate), Vesterport (western gate) and Østerport (eastern gate), now associated with the rail stations carrying the same names, are actually the locations of the old gates leading through the fortifications, and into the city. The heart of the district is the medieval city. South of the medieval district is Slotsholmen - with the parliament housed in Christiansborg palace. Eigtveds Pakhus is located across the harbor in the Christianshavn quartier, built as part of the southern fortification in the early 17 th century. Protected by water its buildings escaped the devastating fires that raged other parts of Copenhagen in the 18th century.
http://wikitravel.org/en/Copenhagen/Indre_By

# Registration and Information

**The registration desk will be open as follows:**
Thursday 8.15-10 and 14-15.
Friday 8.45-10 and 14-15.

**Badges**
The name badge is given to you when you register and ensures your admission to the conference. Please make sure you wear it at all times!

**Programme changes and message board**
General announcements, changes and updates to the program will be displayed in front of Sal III.

**WIFI and internet café**
Wireless network connection name: Eigtved - Password: 33921601
There is a small internet café on top floor of Eigtveds Pakhus.

**Catering**
Coffee breaks and the Thursday lunch sandwiches are served on the floor below Sal III.
The buffet lunch Friday is served in salon C and D in the ground floor.

**Reception**
If you need assistance for calling a taxi or for sending a fax please go to the reception of Eigtveds Pakhus, located near the entrance.

**Important telephone numbers:**

- Emergency call **112**
- Medical assistance **1813**
- Police **114**

**Metro** Traffic schedules website: http://intl.m.dk/#!/

**Copenhagen Airport** website: http://www.cph.dk/en/ and http://www.cph.dk/en/china/

**News in English from Denmark's Radio** website: http://www.dr.dk/Nyheder/Andre_sprog/English/

**May I show you Copenhagen ?** website: http://www.welcome-to-my-copenhagen.com/

# Social Programme

**Welcome Reception on 24 September 19.00**

DOME OF VISIONS
Søren Kierkegaards Plads

Most Copenhageners and Danes know 'The Black Diamond' (the Royal Library). DOME OF VISIONS at Søren Kierkegaards Plads opens the site's future as a new cultural venue in Copenhagen. The dome is transparent. Inside is a two-storey house, shielded from wind and rain, surrounded by fragrant trees and plants.

**Harbor Boat transfer 25. September**

Departs 18.15 from Gammel Dok (turn right when exiting Eigtveds Pakhus, and then right again along the quai – follow old rail tracks about 100 meters). Boat will pass several sights including the Marble Church, the Royal Palace and the Opera and terminates near Little Mermaid, from where a bus connects to conference dinner at JOSTY.

**Conference dinner 25. September**

Conference dinner will take place at restaurant JOSTY situated at the edge of Frederiksberg gardens – near the palace atop Frederiksberg hill.
Address: Pile Allé 14a, Frederiksberg.
Tel: +45 3886 9090
Bus departure 19.00 from Hotel Copenhagen Strand, Havnegade 37 for participants not with the harbor boat. Busses will return participants to hotel area around 22.30.

# Presenters' instructions

**Presentation Technology**
Computer and projector will be available in each room for presentations. Please use either PowerPoint (.ppt) or Portable Document Format (.pdf) as presentation formats. Presenters are requested to bring their presentations on a USB stick under all circumstances. Connecting personal laptops is discouraged to avoid excessive loss of time.

**Duration**
The time available for each presentation, including discussant's comments and general discussion, is 26 minutes. As a general rule, this could be divided into 18 minutes of presentation, 3 minutes of comments from the discussant and 5 minutes general discussion.

**Presenters**
Presenters are invited to come to the room 10 minutes prior to the start of the session to upload their presentation and check functionality. We recommend avoiding file names such as GCET15 or PRESENTATION. If you need technical assistance and cannot spot an assistant, kindly call the reception at telephone (+45)33921601 and request it indicating your room number. Please be aware of your duties as discussant and, possibly, session moderator.

**Discussant**
Discussants are expected to provide a brief discussion (3 minutes). We encourage a few focused questions and comments on the preceding paper, encouraging and leaving time for the general discussion. The discussant is the presenter of the following paper in the session, except for the last paper in the session. Here the first presenter will act as discussant.

**Session moderator**
Session moderators are invited to come to the room 10 minutes prior to the start of the session. Their responsibilities include introducing the session and the speakers, ensuring that the time is equally divided across all presentations, and guiding the general discussion. In case the scheduled session moderator fails to arrive on time, the presenter of the third paper is expected to assume the role as moderator.

# GCET15 at a Glance

## Environmental taxation and emissions trading in an era of climate change

EIGTVEDS PAKHUS, Copenhagen – Denmark

| 25th Sept. - THURSDAY | 26th Sept. - FRIDAY |
|---|---|
| 8.45-9.10<br>Welcome | 8.45-10.30<br>Parallel sessions III |
| 9.10-9.50<br>Keynote lecture: HANS BRUYNINCKX | |
| 9.50-10.30<br>Keynote lecture: MICHAEL GRUBB | |
| 10.30-11.00<br>Coffee break | 10.30-11.00<br>Coffee break |
| 11.00-12.45<br>Parallel sessions I | 11.00-11.45<br>Keynote lecture: LUDIVINE TAMIOTTI |
| | 11.45-12.15<br>Kreiser Award ceremony |
| 12.45-13.45<br>Sandwich Lunch | 12.15-13.30<br>Buffet Lunch in Salon C and D |
| 13.45-15.30<br>Parallel sessions II | 13.30-15.15<br>Parallel sessions IV |
| 15.30-16.00<br>Coffee break | 15.15-15.45<br>Coffee break |
| 16.00-16.20<br>Keynote: CLAUDIA DIAS SOARES | 15.45-16.25<br>Keynote lecture: THOMAS STERNER |
| 16.20-16.40<br>Keynote: CHRIS BOYD | 16.25-17.00<br>Keynote lecture: ANDY JORDAN |
| 16.40-17.50<br>Panel Debate: FISCAL CONSOLIDATION AND ENVIRONMENTAL TAXATION<br>Chair: PAUL EKINS<br>Panelists: IAN PARRY; FABRIZIA LAPECORELLA; CLAUDIA DIAS SOARES; CHRIS BOYD | 17.00-17.20<br>Next year's conference: GCET16 HOST |
| | 17.20-17.30<br>Closing remarks: LARRY KREISER |
| 19.30 – 22.30<br>CONFERENCE DINNER<br>Restaurant JOSTY,<br>Pile Allé 14a, Frederiksberg | |

# GCET15 - General Programme

| WEDNESDAY 24th SEPTEMBER | | *see page* |
|---|---|---|
| 19.00-21.00 | Welcome reception at DOME OF VISIONS, Søren Kierkegaards Plads | 9 |
| **THURSDAY 25th SEPTEMBER** | | ***see page*** |
| 8.45-9.10 | Welcome | 5 |
| 9.10-9.50 | Keynote lecture:<br>Prof. Hans Bruyninckx, Executive Director of EEA (European Environment Agency)<br>*Environmental taxation and the transition to a green economy* | 14 |
| 9.50-10.30 | Keynote lecture:<br>Prof. Michael Grubb, University College London<br>*Time to take stock – changing the role and narrative of environmental taxation* | 15 |
| 10.30-11.00 | Tea & coffee break | |
| 11.00-12.45 | Parallel sessions I<br>SAL I: Environmentally harmful subsidies<br>Salon F: Acceptability and communication<br>Room 4: Green innovation<br>Room 5: Tax expenditures and incentives<br>Room 6: Renewables<br>Room 9: Energy transition<br>Room 10: Emissions trading | 24-26 |
| 12.45-13.45 | Lunch (sandwich) | |
| 13.45-15.30 | Parallel sessions II<br>SAL I: Environmental fiscal reform<br>Salon F: Managing fossil fuels<br>Room 4: Costing transitions<br>Room 5: Border-tax adjustments and trade law<br>Room 6: Water management and offsets<br>Room 9: Carbon taxes ex-post<br>Room 10: Maritime and aviation emissions | 26-28 |
| 15.30-16.00 | Tea & coffee break | |
| 16.00-16.20 | Keynote: Prof. Claudia Dias Soares, Portugal's Green Tax Commission<br>*A green tax proposal to address fiscal and environmental issues* | 20 |
| 16.20-16.40 | Keynote: Chris Boyd, European Commission<br>*Environmental fiscal reform in the EU* | 21 |
| 16.40-17.50 | Panel debate on fiscal consolidation and environmental taxation<br>Chair: Prof. Paul Ekins, University College London<br>Panelists: Fabrizia Lapecorella, Ministry of Economy and Finance (Italian EU Presidency)<br>Ian Parry, IMF (International Monetary Fund)<br>Chris Boyd (European Commission) and Claudia Dias Soares (Portugal's Green Tax Commission) | 19-22 |
| 18.15- | Optional harbor boat tour with transfer via Langelinie/Little Mermaid to JOSTY | 9 |
| 19.00 | Bus departure to JOSTY from Hotel Copenhagen Strand, Havnegade 37 | |
| 19.30-22.30 | Conference dinner, Restaurant JOSTY, Pile Allé 14a, Frederiksberg | 9 |

| FRIDAY 26th SEPTEMBER | | *see page* |
|---|---|---|
| 8.45-10.30 | Parallel sessions III<br>SAL I: Fuel taxation<br>Salon F: Political economy<br>Room 4: Cleaner Technologies<br>Room 5: State aid<br>Room 6: Climate adaptation<br>Room 9: Green tax policy<br>Room 10: Carbon credits | 28-30 |
| 10.30-11.00 | Tea & coffee break | |
| 11.00-11.45 | Keynote lecture:<br>Counsellor Ludivine Tamiotti, WTO (World Trade Organization)<br>*The trade and climate change debate and the topic of border tax adjustments* | 16 |
| 11.45-12.15 | Kreiser Award | |
| 12.15-13.30 | Buffet lunch (salon C and D in ground floor) | |
| 13.30-15.15 | Parallel sessions IV<br>SAL I: Road transport<br>Salon F: Mobilizing actors<br>Room 4: Accounts and modelling<br>Room 5: Consumption taxes<br>Room 6: State vs markets<br>Room 9: Emerging schemes<br>Room 10: Implementation and compliance | 31-33 |
| 15.15-15.45 | Tea & coffee break | |
| 15.45-16.25 | Keynote lecture:<br>Prof. Thomas Sterner, IPCC coordinating lead author and University of Gothenburg<br>*Are carbon taxes the solution? Design of policies to deal with climate change* | 17 |
| 16.25-17.00 | Keynote lecture:<br>Prof. Andy Jordan, Tyndall Centre, University of East Anglia<br>*Policy innovation in a changing climate: sources, patterns and effects (INOGOV)* | 18 |
| 17.00-17.20 | Next year's conference<br>GCET16 Host | |
| 17.20-17.30 | Closing remarks<br>Prof. emeritus Larry Kreiser, Cleveland State University | |

# Keynote Speakers

## EEA Executive Director, Professor Hans Bruyninckx

**BIO:** Hans Bruyninckx is the Executive Director of the European Environment Agency, since 1 June, 2013. Dr Bruyninckx holds a PhD in international environmental politics from Colorado State University. From 2010 until his appointment at the EEA, he was head of the HIVA Research Institute in Leuven, Belgium, a policy-oriented research institute associated with the Katholieke Universiteit Leuven, where he was also head of the Political Science department from 2007 to 2010. Over the last 20 years, he has conducted research in more than a dozen countries, in areas including environmental politics, climate change, and sustainable development. He has taught on global environmental politics and global environmental governance in relation to the European Union (EU), publishing extensively on EU environmental policies and its role as an actor in global environmental governance. Throughout his career Dr Bruyninckx has worked with governmental agencies, civil society and businesses, often in an advisory role.

**KEYNOTE:** Environmental taxation and the transition towards a green economy.

**ABSTRACT:** The 7$^{th}$ Environmental Action Programme of the European Union has a vision to take us beyond the existing 2020 environmental policy targets. It promotes a long-term objective of *'Living well, within the limits of our planet'* based on a 2050 vision centred on ecological limits, a circular economy, and society's resilience. This vision is of a Europe that (i) is low in carbon use; (ii) is a **resource-efficient**, green, and competitive **economy** with resources being efficiently used, preventing and minimising waste; and (iii) ensures ecosystem resilience and the continued flow of ecosystem services to support human well-being. Environmental fiscal reform is a critical driver unifying our short-term goals and long-term visions. A pre-condition of environmental fiscal reform is the reform and phasing-out of environmentally harmful subsidies. By putting a price on environmental externalities, environmental taxes can reduce pollution and increase resource efficiency in the most cost-effective way. They can help to promote behavioural change in consumers and in economic sectors. And when environmental taxes are well-designed they can achieve these objectives, while also promoting employment, economic growth, and social fairness at the same time.

## Professor Michael Grubb, University College London

**BIO:** Michael Grubb is Professor of International Energy and Climate Change Policy at University College London (UCL) – Institute of Sustainable Resources and Senior Advisor to the UK Energy Regulator Ofgem. He is editor-in-chief of the journal Climate Policy and is on the editorial board of Energy Policy, and was recently the Specialist Advisor to a House of Lords European Committee enquiry. 'No Country is an Energy Island: securing investment for the EU's Future' (2013). His former positions include Chair of the international research organization Climate Strategies; Chief Economist at the Carbon Trust; Professor of Climate Change and Energy Policy at Imperial College London; and head of Energy and Environment at Chatham House, and he continues to be associated with these institutions. In 2008 he was appointed to the UK Climate Change Committee. Michael Grubb is author of eight books, fifty journal research articles and numerous other publications. He has held many advisory positions with governments, companies and international studies, including the IPCC. His book Planetary Economics was published in March 2014: it has received widespread accolade as a 'seminal' contribution, 'comprehensive and profoundly important' for its presentation of a new approach to both the theoretical underpinnings and the practical policies for tackling energy and climate change challenges.

**KEYNOTE:** Time to take stock – changing the role and narrative of environmental taxation.

**ABSTRACT:** After more than a quarter of a century of policy recommendations, including active engagement and adoption in some countries, the role of environmental taxation remains marginal in most countries. Indeed even in Europe, the proportion of revenues raised by "environmental taxation" has been static or declined, and the repeal of the Australian carbon tax is a significant reversal. All this is despite apparently strong arguments in favour in principle. This presentation, drawing upon the author's book *Planetary Economics*, will argue that the political obstacles to environmental taxation have not been taken seriously enough, and moreover that addressing the obstacles requires digging deeper into the underlying economics and potential linkages between environmental taxation and other policy instruments. Setting environmental taxation in a wider package of measures, that span the three different domains of economic decision-making and associated policies, may offer a renewed way forward for its practical implementation.

## Counsellor Ludivine Tamiotti, WTO

**BIO:** Counsellor Ludivine Tamiotti (ludivine.tamiotti@wto.org) is leading environmental affairs in the World Trade Organization (WTO) in Geneva. Before joining the WTO in 2001, she worked at the United Nations International Court of Justice in The Hague. She holds advanced law degrees from the Universities of Aix-en-Provence, Geneva and New York. In the WTO's Trade and Environment Division, she is in charge of the regular and negotiating committees on trade and environment and she provides legal advice to dispute settlement panels. She also conducts research on technical barriers to trade and trade and environment issues and has published widely in these and related fields. Among other things, she has been the lead author of the WTO/UNEP Report on Trade and Climate Change.

**KEYNOTE:** The trade and climate change debate and the topic of border tax adjustments.

**ABSTRACT:** The discussion on border tax adjustments has been triggered by a number of factors, including the design by governments of new policy mechanisms to mitigate climate change, the concerns over competitiveness, trade impact and carbon leakage and the related risk of protectionism. The presentation will provide an overview of the range of national climate change mitigation policies, including possible border measures, and relevant WTO rules. Over the past decades, the scope and complexity of national climate policy have increased. It is therefore fundamental to understand better their key features in order to draw a clearer picture of their effect on environmental protection, sustainable development, and trade. Key legal issues relevant to carbon border tax adjustments in particular will be outlined.

## Professor Thomas Sterner, IPCC

**BIO:** Thomas Sterner is professor of environmental economics at University of Gothenburg, Sweden, where he has built up the Unit for Environmental Economics. It is a leading Scandinavian and European center for environmental economics and gives a unique PhD program in climate economics with many graduate students from developing countries. Sterner has published more than a dozen books and 90 articles in refereed journals, mainly on environmental policy instruments with applications to energy and climate, industry, transport economics and resource management in developing countries. In 2012-2013 he was on sabbatical leave from Gothenburg and worked as Chief Economist at the Environmental Defense Fund in New York, where one of his main areas of work was on instrument design for climate policy. Sterner sits on numerous boards and is a past president for the European Association of Environmental and Resource Economists, (EAERE) and an associate editor of the journal Environmental and Resource Economics. Currently Professor Sterner is also a Coordinating Lead Author of IPCC (Intergovernmental Panel on Climate Change) Fifth Assessment Report WGIII on Mitigation of Climate Change.

**KEYNOTE:** Are carbon taxes the solution? Design of policies to deal with climate change.

**ABSTRACT:** The economists prescription seemed easy and clear enough: We need a) A global treaty (since this is a global public good); b) A price on carbon (and other climate forcing agents). Either through a tax or permit trade; c) Maybe a policy for technology to overcome the fact that the patent system is insufficient and there is thus a market failure leading to insufficient private research into clean energy. However, as we all know – it is not quite so simple. Thomas Sterner, CLA of IPCC WGIII chapter 15 on policy instruments will give an overview of IPCC conclusions on the choice of policy instruments and particularly address the potential role of taxation. Carbon taxes have been tried in a few countries although generally restricted to a limited number of sectors in the guise of various proxies such as fuel taxes. In Sweden carbon taxes are remarkably high: how has this affected the Swedish economy? The whole of EU, Japan and some other countries have very high fuel taxes – IPCC mentions that this can reduce sectoral emissions as much as 50%. Still carbon taxes and gasoline taxes are generally thought to be politically impossible because of distributional and political economy aspects. Finally Sterner will discuss some theoretical pros and cons of taxes visavis other instruments such as tradable permits, regulation, technology policy and so forth. The truth is that progress on policy instrument adoption to date, is much too slow for the 2 degree target and currently we are on a path to at least three maybe four degrees. One of the few positive signs for the climate is the progress of renewables – particularly solar energy. This clearly raises the importance of technology policy.

## Professor Andrew Jordan,
## Tyndall Centre for Climate Change Research

**BIO:** Andrew Jordan is particularly interested in the governance of environmental problems in different political contexts, and has recently published Dismantling Public Policy (Oxford University Press, 2012) and the third edition of EU Environmental Policy (Earthscan, 2012, with Camilla Adelle). In the past, Andrew Jordan has taken on leadership roles in many large national and EU-funded projects, and produced work for a number of knowledge users including the OECD, UK Cabinet Office, the UK environment ministry (DEFRA), UK Foresight, the European Commission and the Dutch Environment Ministry. He is currently completing a book on Designing Politically Sustainable Climate Policies and two journal special issues on Climate Policy Innovation (for Global Environmental Change and Environmental Politics respectively). He is the Managing Editor of the international journal Environment and Planning C (Government and Policy) since 2008. In 2010 he was awarded a Major Research Fellowship by the Leverhulme and in 2008 was elected as an Academician of the Academy of Social Sciences (AcSS).

**KEYNOTE:** Policy innovation in a changing climate: sources, patterns and effects.

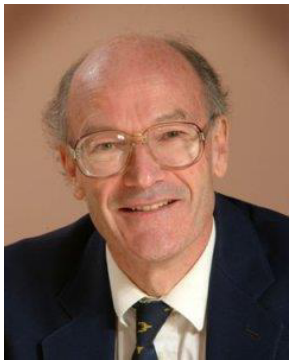
**ABSTRACT:** Many observers now believe that a 'new' climate governance is emerging through transnational and/or local forms of action that will eventually plug the gaps in international governance. Yet states, which remain oddly absent from discussions of the 'new' governance, will remain key players even as governance becomes more polycentric. In this presentation I will explore the ability of states to rise to these interconnected challenges through the analytical prism of policy innovation, which incorporates three vital aspects - the source of new policy elements ('invention'), their entry into use ('diffusion'), and their projected and/or real effects ('evaluation'). I will draw on the findings of two special issues (in *Environmental Politics* and *Global Environmental Change*) to offer new insights into the important roles that states play in relation to all three activities. I will conclude by outlining the funded opportunities to study these three that are arising via a new COST funded network (IS1309, 2014-18), known as INOGOV.

# Plenary Panel on Fiscal Consolidation and Environmental Taxation

Prior to Rio+20 the European Heads of State, gathered in the European Council, stated that *"Promoting a more resource-efficient, greener and more competitive economy is crucial"* while in the same resolution acknowledging the linkages between fiscal policies and performance.

*"Tax policy can contribute to fiscal consolidation and growth. In line with the Council conclusions of 21 February, and recognizing Member States' competences in this area, the European Council invites Member States, where appropriate, to review their tax systems with the aim of making them more effective and efficient, removing unjustified exemptions, broadening the tax base, shifting taxes away from labor, improving the efficiency of tax collection and tackling tax evasion"* European Council, 1/2 March 2012, Conclusions, EU CO 4/1/12.

The GCET15 plenary panel on fiscal consolidation and environmental taxation will review pioneering national experience, introduce the European Semester process of performance oversight, while taking stock of challenges and opportunities for a greening of the economy in Europe and beyond.



## Panel Chair: Professor Paul Ekins, University College London

**BIO:** Paul Ekins has a PhD in economics from the University of London and is professor of Resources and Environmental Policy and Director of the UCL Institute for Sustainable Resources at University College London. He is also a Co-director of the UK energy Research Centre. His academic work focuses on the conditions and policies for achieving an environmentally sustainable economy, and he has conducted extensive research on environmental taxation and other policy instruments, published in a number of books and papers - his most recent books of which he is editor or co-editor are Environmental Tax Reform: a Policy for Green Growth (Oxford University Press, Oxford); and Energy 2050: the Transition to a Secure, Low-Carbon Energy System for the UK (Earthscan, London). In 2011 he was appointed Vice-Chairman of the DG Environment Commissioner's High-Level Economists Expert Group on Resource Efficiency and a member of the European Commission's high-level European Resource Efficiency Platform.

## Professor Claudia Dias Soares, Portugal's Green Tax Commission

**BIO:** Claudia Dias Soares is professor of law at the Portuguese Catholic University and a member of the 2014 Environmental Tax Reform Commission (Ministry of Finances and Ministry of Environment and Energy). Claudia has been a visiting researcher at several North American and European universities, including in Denmark. She has been a fellow of the Portuguese National Academy of Research, Science and Technology, the Deutscher Akademischer Austauschdienst (DAAD), the Portuguese Foundation for Science and Technology, the Calouste Gulbenkian Foundation, the London School of Economics and Political Science (LSE), the University of London, the European Consortium for Political Research (ECPR) and the Swedish Institute. She teaches regularly in several European institutions and is member of the editorial board of law journals in Europe and in South America as well as of the scientific committee of the Portuguese Tax Association. Moreover, she served as expert in the Group ad Hoc on 'Environmentally Harmful Subsidies' created under the terms of reference established by the High Level Group on Competitiveness, Energy and the Environment set-up by the European Commission. Apart from being member from the Environmental Tax Reform Working Group of the Portuguese Council for the Environment and Sustainable Development (independent advisory board to the MOE), she has been involved in several legislative processes, such as the 2014 Framework Environmental Law (Ministry of Agriculture, Sea, Land Planning and Environment) and the 2013 Working Group on Environmental Taxation (Ministry of Agriculture, Sea, Land Planning and Environment).

**KEYNOTE:** A green tax proposal to address fiscal and environmental issues'.

**ABSTRACT:** Portugal initiated in January 2014 a process that might lead to a major overhaul of the country's environmental taxation system. As a European Union member state with high levels of public debt, Portugal is trying to follow the approach strongly encouraged by the European Commission in the European Semester to increase environmental taxation, which is seen as a more competitiveness-friendly alternative to higher taxes on labour. An independent committee was appointed to assess the potential for a green tax shift and its proposals are expected to be included in the 2015 budget proposal. The committee addressed a wide range of areas within a context of fiscal neutrality, namely energy, mobility, water, waste and biodiversity. These proposals have two major aims. On the one hand, they pursue the introduction of a new rationality in the Portuguese economy, by improving resource efficiency and promoting green growth, and, on the other hand, they try to focus the national tax system on consumption taxes coherent with up-to-date development paradigms.

## Christopher Boyd, European Commission, Policy officer – European Semester

**BIO:** Christopher Boyd works on the European Semester, bringing environmental issues into macroeconomic policy, at the European Commission, DG Environment in Brussels. Until 2010 he spent over two years in charge of negotiating and setting up a wind energy joint venture in Italy for Airtricity, the Irish renewable energy business, now part of Scottish and Southern Energy. Before that he was CEO of Lafarge's cement business in Italy for four years until 2007. Previously Chris was in Paris as Senior Vice-President Environment and Public Affairs at Lafarge from 1999 to 2003, in charge of environmental and sustainability issues, including their policy to reduce carbon emissions. While with Lafarge he set up a partnership with WWF that was their first with an industrial company. In a previous stint at the European Commission from 1983 to 1998, Chris worked for three years in the cabinet of President Jacques Delors as his economic advisor. During this part of his career with the EU Commission, he covered a broad range of issues including the creation of the euro, transport, budget, tax and customs and, of course, environment. Chris is an economist who studied in Britain and in Canada.

**KEYNOTE:** Environmental Fiscal Reform in the EU.

**ABSTRACT:** The European Semester process is the EU's cycle of macroeconomic governance put in place during the current economic crisis. The main question I will concentrate on is "greening" the European Semester: how the environment can contribute to growth and jobs. The main arguments are: 1) In the medium to long term we have unsustainable resource use – we cannot go on as we are; 2) We are reaching the planetary boundaries of human activity, leading to health and pollution issues; 3) We have a vision of where we want to be – the circular economy. The actions required include: 1) Make the tax system more growth-friendly, for instance by shifting the tax burden away from labour onto tax bases linked to consumption, property, and combatting pollution; 2) Dismantle environmentally harmful subsidies, for example fossil fuels, company cars, or diesel compared to petrol; 3) Promoting resource efficiency by improving waste and water management, recycling and energy efficiency; 4) Encourage the job potential of the greening of the economy. Looking more closely at environmental taxes, we note that they are not preponderant and have tended to shrink over recent years. A study carried out using EEA methodology looks at the potential of environmental fiscal reform in 12 MS (a similar study for the remaining MS will be carried out this year). It shows there is plenty of scope for increased revenues and indicates a range of suggested changes that Member States should consider.

## Panel Discussants

### Director General Fabrizia Lapecorella, Ministry of Economy & Finance (IT)

**BIO:** Fabrizia Lapecorella was appointed Director General of Finance at Ministry of Economy and Finance on June 2008 and she is member of the Bureau of the OECD Committee of Fiscal Affairs since January 2012. She joined the Ministry of Economy and Finance in 2002 as expert of the Tax Advisory and Inspective Service (SECIT) and worked for the Tax Policy Department in the International Relations Office. In 2005 she returned to SECIT and was appointed Director of the Service in January 2006. She left the Ministry for the Italian Supervisory Authority for Public Contracts where she was appointed Director of the Observatory for public procurement in January 2008. Prof. Lapecorella obtained her D. Phil. in Economics from the University of York in 1997. She began her academic career in Italy in 1992 and was appointed full Professor of Public Finance at the University of Bari in 2004. Her academic experience includes a year spent as visiting researcher at the University of Toulouse (FR), and several teaching appointments at the University of York. She has carried out research in the economic analysis of taxation, public finance, public economics, market regulation, and contract theory. The results of her research activity have been presented in conferences and workshops in Italy and abroad.

### Principal Fiscal Environmental Policy Expert Ian Parry, IMF (International Monetary Fund)

**BIO:** Ian Parry is Principal Environmental Fiscal Policy Expert in the Fiscal Affairs Department of the IMF (International Monetary Fund). Prior to joining the IMF in 2010, Parry was at Resources for the Future, where he was first appointee to the Allen V. Kneese Chair in Environmental Economics. He holds a PhD in economics from the University of Chicago. Parry's research focuses on the development of analytical models to quantify the economic impacts and efficient levels of a wide range of environmental, energy, and transportation policies. His work emphasizes the critical role of fiscal instruments to address externalities and raise revenue. Parry has published over 50 papers in professional journals and has written numerous other scholarly articles. His recent (co-authored or co-edited) books include *Fiscal Policy to Mitigate Climate Change: A Guide for Policymakers*; *Issues of the Day: 100 Commentaries on Environmental, Energy, Transportation, and Public Health Policy*; *Getting Energy Prices Right: From Principle to Practice*; and *Implementing a US Carbon Tax: Challenges and Debates*.

# Parallel Sessions Overview

| Room | Parallel Sessions I<br>25th Sept.<br>11.00-12.45 | Parallel Sessions II<br>25th Sept.<br>13.45-15.30 | Parallel Sessions III<br>26th Sept.<br>08.45-10.30 | Parallel Sessions IV<br>26th Sept.<br>13.30-15.15 |
|---|---|---|---|---|
| SAL I | **ENVIRONMENTALLY HARMFUL SUBSIDIES**<br>(A) | **ENVIRONMENTAL FISCAL REFORM**<br>(H) | **FUEL TAXATION**<br>(O) | **ROAD TRANSPORT**<br>(V) |
| Salon F | **ACCEPTABILITY AND COMMUNICATION**<br>(B) | **MANAGING FOSSIL FUELS**<br>(I) | **POLITICAL ECONOMY**<br>(P) | **MOBILISING ACTORS**<br>(W) |
| Room 4 | **GREEN INNOVATION**<br>(C) | **COSTING TRANSITIONS**<br>(J) | **CLEANER TECHNOLOGIES**<br>(Q) | **ACCOUNTS AND MODELLING**<br>(X) |
| Room 5 | **TAX EXPENDITURES AND INCENTIVES**<br>(D) | **BTA AND TRADE LAW**<br>(K) | **STATE AID**<br>(R) | **CONSUMPTION TAXES**<br>(Y) |
| Room 6 | **RENEWABLES**<br>(E) | **WATER MANAGEMENT AND OFFSETS**<br>(L) | **CLIMATE ADAPTATION**<br>(S) | **STATE VS MARKET**<br>(Z) |
| Room 9 | **ENERGY TRANSITION**<br>(F) | **CARBON TAXES EX-POST**<br>(M) | **GREEN TAX POLICY**<br>(T) | **EMERGING SCHEMES**<br>(Ø) |
| Room 10 | **EMISSIONS TRADING**<br>(G) | **MARITIME AND AVIATION EMISSIONS**<br>(N) | **CARBON CREDITS**<br>(U) | **IMPLEMENTATION AND COMPLIANCE**<br>(Å) |

# Detailed Programme
## Thursday 25th September – Parallel Sessions I

### 11.00 – 12.45 (A) ENVIRONMENTALLY HARMFUL SUBSIDIES — Sal I

**Moderator: Patrick Ten Brink*, Institute for European Environmental Policy (BE)**

**The Use of Economic Instruments in Nordic Environmental Policy 2010-2013** (ID: 118) - David Sundén, Copenhagen Economics (SE), Hrafnhildur Bragadóttir, Environice (IS), Carl von Utfall Danielsson, Copenhagen Economics (SE), Roland Magnusson, GreenStream (FI), Sampo Seppänen, GreenStream (FI) & Amanda Stefansdotter, Copenhagen Economics (SE)

**Reforming Fossil Fuels Subsidies. Will it Make a Difference?** (ID: 058) - Manfred Rosenstock & Malgorzata Kicia, European Commission (BE)

**Do You Get What You Pay For With U.S. Climate Change Tax Provisions?** (ID: 119) - Hans Sprohge, Wright State University (US) & Larry Kreiser, Cleveland State University (US)

**Subsidies to Fossil Energy Consumption in Italy: A Quantitative Assessment** (ID: 103) - Michele Governatori & Marianna Antenucci, Italian Association of Energy Wholesalers and Traders (IT)

### 11.00 – 12.45 (B) ACCEPTABILITY AND COMMUNICATION — Salon F

**Moderator: Jacqueline Cottrell, Green Budget Europe (BE)**

**Use of the Delphi Method in Developing Climate Change Law and Policy** (ID: 131) - Evgeny Guglyuvatyy, School of Law and Justice at the Southern Cross University (AU) & Natalie P Stoianoff, University of Technology, Sydney (AU)

**Paying Enough Taxes Already? Testing the Acceptability of Carbon Taxes - with Survey Data** (ID: 033) - Stefano Carattini, University of Applied Sciences of Western Switzerland (CH) and Universitat de Barcelona (ES) & Andrea Baranzini, University of Applied Sciences of Western Switzerland (CH)

**Facing the Dilemma: Who Cares about Environmental Taxes?** (ID: 123) - Yan Xu, Chinese University of Hong Kong (HK)

**An Investigation of Possible Routes to Improving the Communication of Environmental Fiscal Reform to Increase Public Acceptance and Support** (ID: 048) - Jacqueline Cottrell, Green Budget Europe (BE)

### 11.00 – 12.45 (C) GREEN INNOVATION — Room 4

**Moderator: Kazuhiro Ueta, Kyoto University (JP)**

**Can a "Price-Distorting" Tax Help Meeting Climate Change Targets by Speeding Up Substitution in Natural Resources Use?** (ID: 094) - Laura Castellucci, Stefano Gorini & Giacomo Pallante, Università degli Studi di Roma "Tor Vergata" (IT)

**Competitiveness and Innovation Towards Green Growth in Developing Countries: A Case Study of Brazil** (ID: 124) - Camila Gramkow, University of East Anglia (UK)

**On the Existence of a Sectoral Environmental Kuznets Curve for Portugal – A Nonlinear Cointegration Approach for $CO_2$ Emissions** (ID: 042) - Cátia Sousa, Lusófona University (PT), Catarina Roseta-Palma & Luís F. Martins, Instituto Universitário de Lisboa (PT)

**Human Capital and Environmental Taxation** (ID: 023) - Hector Pollitt, Terry Barker, Unnada Chewpreecha, Lee Tae-Yeoun & Sungin Na, Cambridge Econometrics Ltd (UK)

# Detailed Programme

## Thursday 25th September – Parallel Sessions I

### 11.00 – 12.45 (D) TAX EXPENDITURES AND INCENTIVES Room 5

**Moderator: Michael Rodi, University of Greifswald (DE)**

**The Role of R&D Tax Incentives in Encouraging Private Sector Investment in Sustainable Agricultural Innovation: An International Comparative Case Study** (ID: 062) - Victoria J. Roberts, University of New South Wales (AU)

**Tax Expenditures to Promote Environmentally Responsible Investment** (ID: 093) - María Amparo Grau Ruiz, Complutense University of Madrid (ES)

**Responding to Climate Change Impacts: Can Tax and Other Fiscal Measures Advance Adaptation Efforts** (ID: 120) - Mona L. Hymel, University of Arizona College of Law (US)

**Tax and the Environment: An Evaluation Framework for Australian Tax Policy Reform** (ID: 016) - Natalie Stoianoff, University of Technology (AU) & Margaret McKerchar, University of New South Wales (AU)

### 11.00 – 12.45 (E) RENEWABLES Room 6

**Moderator: Marianne Zandersen, Aarhus University (DK)**

**The Effects of Carbon Taxes on Investments in Smart-Grids and Consumer Engagement** (ID: 105) - Elena Claire Ricci, Università degli Studi di Milano (IT)

**Supporting Emission Reductions through a Viable Wind Energy Industry - Lessons for Australia** (ID: 041) - Karen Bubna-Litic, University of South Australia (AU)

**EU Renewable Energy Markets' Governance & Economic Crises. A Taxation "Makeover"? Greece as a Case Study** (ID: 027) - Ioanna Mersinia, Regulatory Authority for Energy (EL) and University of Eastern Finland (FI)

**Subsidies for Electricity from Renewables: How They May Need to Change Not to Make Renewables Die of Their Success** (ID: 133) - Orsola Mautone, Italian Ministry of Environment (IT) and European Commission EASME (BE)

### 11.00 – 12.45 (F) ENERGY TRANSITION Room 9

**Moderator: Constanze Adolf, Green Budget Europe (BE)**

**The Transition to the Low-Carbon Society: What Role for Taxation?** (ID: 107) - Kris Bachus & Frederic Vanswijgenhoven, University of Leuven (BE)

**Implementation of Environmental Taxes in China. Transformation from Environmental Charges to Taxes** (ID: 031) - MAI Ya-zong, LIN Si-yu, MA Zhong & SHI Lei, Renmin University of China (CN)

**Towards a Sustainable Climate and Energy Policy Mix** (ID: 002) - Sven Rudolph, Kyoto University (JP) & Takeshi Kawakatsu, Kyoto Prefectural University (JP)

**Comparative Study of Policy Making Process on ETR/Carbon Tax between Germany and Japan** (ID: 076) - Shinji ONODA, Hosei University (JP) and Freie Universität Berlin (DE) & Kai Schlegelmilch, Green Budget Europe (DE)

# Detailed Programme
## Thursday 25th September – Parallel Sessions I & II

### 11.00 – 12.45 (G) EMISSIONS TRADING Room 10

**Moderator: Ian Parry, International Monetary Fund (US)**

**The EU Emission Trading Scheme: First Evidence on Phase 3** (ID: 100) - Claudia Kettner, Austrian Institute of Economic Research (AT)

**The EU Emissions Trading 'Revolution' in 2008: A Failed Policy Innovation?** (ID: 128) -Jørgen Wettestad, Fridtjof Nansen Institute (NO)

**The Free Allocation of Permits and the Linking of ETSs: A Comparative Analysis of the EU ETS and AUS CPM** (ID: 019) - Elena de Lemos Pinto Aydos, University of Sydney (AU) & Tilburg University (NL)

**Emission Trading Based on Emission Pathways Calculated with Regensburg Formula** (ID: 035) - Manfred Sargl, Universität der Bundeswehr (DE), Andreas Wolfsteiner (DE) & Günter Wittmann (DE)

### Parallel Sessions II:

### 13.45 – 15.30 (H) ENVIRONMENTAL FISCAL REFORM Sal I

**Moderator: Stefan Speck, European Environment Agency (DK)**

**Potential for Environmental Fiscal Reform in 12 Member States – Key Issues** (ID: 083) - Timothy Elliott, Dominic Hogg, EUNOMIA (UK) & Mikael Skou Andersen, Aarhus University (DK)

**Limits to Regional Environmental Taxes (Spanish Experience and Proposals)** (ID: 032) - Álvaro del Blanco García, Instituto de Estudios Fiscales (ES) & Pedro M. Herrera Molina, National Distance Education University (ES)

**A Green Tax Reform in Times of Financial Economic Crisis. The Italian Attempts 2012 and 2014** (ID: 097) - Aldo Ravazzi Douvan, Ministry of Environment, Land & Sea (IT) & Fabrizia Lapecorella, Ministry of Economy and Finance (IT)

**Enhancing the Implementation of Environmental Fiscal Reform at EU and National Level through the European Semester** (ID: 126) - Constanze Adolf, Green Budget Europe (BE)

### 13.45 – 15.30 (I) MANAGING FOSSIL FUELS Salon F

**Moderator: Janet Milne, Vermont Law School (US)**

**Prospects for Regulation of Greenhouse Gases in the Russian Federation** (ID: 017) - Nikolay V. Kichigin, Institute of Legislation and Comparative Law under the Government of the Russian Federation (RU)

**An Analysis on 2011 China' Coal Resource Tax Reform** (ID: 090) - HE Yanmin, Kyoto University (JP)

**Carbon Divestment Policies to Fight Global Climate Change?** (ID: 003) - Florian Habermacher, University of St. Gallen (CH)

**Canadian Oil Sands Extraction: The Linkage between Economic and Environmental Sustainability in Alberta** (ID: 050) - Norma Maccari & Francesco Busato, University of Naples Parthenope (IT)

# Detailed Programme

## Thursday 25th September – Parallel Sessions II

### 13.45 – 15.30 (J) COSTING TRANSITIONS Room 4

**Moderator: Claudia Kettner, WIFO (Austrian Institute of Economic Research)**

**Econometric Analysis of the Impact of Fukushima Nuclear Disaster** (ID: 088) - Kazuhiro Ueta, Kyoto University (JP); Hirotaka Kato, Kyoto University (JP) & Yoshifumi Sako, University of Tokyo (JP)

**Complementarity Modeling of Overlapping Biofuel Policies in the United States: Interaction between Compliance Credit Markets** (ID: 084) - Adam Christensen, Johns Hopkins University (US), Chris Malins, International Council on Clean Transportation (US), Sauleh Siddiqui & Ben Hobbs, Johns Hopkins University (US)

**Carbon Tax Burden: Different Perspectives of Distributional Impacts** (ID: 064) - Miguel Angel Tovar Reanos, Centre for European Economic Research (DE)

**Constraints and Possibilities for Environmental Taxes in Spain** (ID: 081) - Alberto Gago & Xavier Labandeira, University of Vigo (ES)

### 13.45 – 15.30 (K) BTA AND TRADE LAW Room 5

**Moderator: Bill Butcher, University of New South Wales (AU)**

**Environmental Border Tax Adjustments (BTAs): Their Forgotten Legal History** (ID: 011) - Alice Pirlot, Université Catholique de Louvain (BE)

**Recommendations for Developing and Least Developed Countries on Responses to Potential Border Carbon Adjustments Proposed by Developed Countries** (ID 036) - Selina Cheng, University of New South Wales (AU)

**Border Adjustments, WTO Law, and Climate Protection** (ID: 008) - Felix Ekardt, Rostock University (DE)

**Renewable Energy: Subsidies and Taxes as Competition Distortion?** (ID: 018) - Rolf H. Weber, University of Zurich (CH)

### 13.45 – 15.30 (L) WATER MANAGEMENT AND OFFSETS Room 6

**Moderator: Pernille Wegener Jessen, Aarhus University (DK)**

**Payment for Ecosystem Services – Compensatory Mussel Production and the Provision of Ecosystem Services (**ID: 082) – Marianne Zandersen, Berit Hasler, Aarhus University (DK), Hans Frost & Jens Erik Ørum, University of Copenhagen (DK)

**Tax Treatment of the Interaction between Water and Energy** (ID: 069) - Marta Villar, University of San Pablo CEU (ES) & Enrique Fonseca, Self-employed Lawyer (ES)

**Environmental Tax Policy and System Dynamics Modelling for Water Management in the 21ST Century** (ID: 089) - Deborah L. Jarvie, University of Lethbridge (CA)

**Offsets in Environmental Policy** (ID: 054) - Hope Ashiabor, Macquarie University (AU)

# Detailed Programme

## Thursday 25th September – Parallel Sessions II & III

### 13.45 – 15.30 (M) CARBON TAXES EX-POST — Room 9

**Moderator: Thomas Sterner, University of Gothenburg (SE)**

**The Instruments Mix of the Swiss Climate Policy and the Effectiveness of the $CO_2$ Tax on Heating Fuel** (ID 047) - Sandra Daguet, Swiss Federal Finance Administration (CH)

**Energy Efficiency Policy vs Carbon Taxes – A Comparison of the Irish Case** (ID: 073) - Frank Convery, Louise Dunne, University College Dublin (IE) & Lisa Ryan, Consultant environmental economist (IE)

**Decoupling of GHG Emissions from Growth – How Important are the Carbon Dioxide Taxes? A Case Study of Sweden** (ID: 101) - Elisa Abascal-Reyes, Reino Abrahamsson, Sara Almqvist & Per Wollin, Swedish Environmental Protection Agency (SE)

**Determinants to Decreasing $CO_2$ Emissions in the Swedish Residential Sector** (ID: 115) - Alexandra Kenne, Disa Thornquist, Stockholm School of Economics (SE) & Per Strömberg, Swedish Environmental Protection Agency (SE)

### 13.45 – 15.30 (N) MARITIME AND AVIATION EMISSIONS — Room 10

**Moderator: Anselm Görres, Green Budget Europe (DE)**

**Taxing Emissions from Maritime Fuels Unilaterally** (ID: 106) - Dirk Heine, University of Hamburg (DE), Giacomo Luchetta, CEPS - Centre for European Policy Studies (BE) & Susanne Gäde, Common Future Think Tank (DE)

**Putting a Price on International Aviation's Greenhouse Gas Emissions. Regime Interaction between the Climate Regime and ICAO** (ID: 112) - Beatriz Martínez Romera, University of Copenhagen (DK)

**Will the EU ETS Affect the Competitiveness between EU and Non-EU Airlines** (ID: 096) - Xuebing Wang & Antony Evans, University College London (UK)

## PARALLEL SESSIONS III: FRIDAY 26th SEPTEMBER

### 08.45 – 10.30 (O) FUEL TAXATION — Sal I

**Moderator: Nils-Axel Braathen, OECD (FR)**

**Long Term Climate Mitigation and Energy Use in Austria – The Impacts of Carbon and Energy Prices** (ID: 071) - Kurt Kratena, Ina Meyer & Mark Sommer, Austrian Institute of Economic Research (AT)

**How Should Different Countries Tax Fuels to Correct Environmental Externalities?** (ID: 006) - Ian Parry, International Monetary Fund (US), Dirk Heine, University of Hamburg (DE), Shanjun Li, Cornell University (US) & Eliza Lis, European Central Bank (DE)

**Overreaction to Excise Taxes: the Case of Gasoline** (ID: 007) - Silvia Tiezzi, University of Siena (IT) & Stefano F. Verde, European University Institute (IT)

**Environmental Tax: A Potential Policy Tool on VOCs Control in China** (ID: 052) - GE Chazhong, REN Yajuan & LI Xiaoqiong, Chinese Academy for Environmental Planning (CN)

# Detailed Programme
## Friday 26th September – Parallel Sessions III

### 08.45 – 10.30 (P) POLITICAL ECONOMY — Salon F

**Moderator: Paul Ekins*, University College London (UK)**

**What Does Make Carbon Taxes Acceptable? A Literature Review and Qualitative Assessment** (ID: 037) - Andrea Baranzini, University of Applied Sciences of Western Switzerland (CH), Metin Caliskan, University of Geneva (CH) and Stefano Carattini, University of Applied Sciences of Western Switzerland (CH) & Universitat de Barcelona (ES)

**Opportunities and Obstacles to Carbon Taxation: A Comparison of France and Ireland** (ID: 025) - Kathryn Harrison & Pascal Doray-Demers, University of British Columbia (CA)

**Carbon Tax and Equity Issues in the European Union: Old Debate, New Insights** (ID: 079) - Lucas Chancel, Sciences Po (FR)

**From Decentralized to Integrated Carbon Taxes: Lessons from Tax Policy in the Canadian Federal System** (ID: 087) - Tracy Snoddon, Wilfrid Laurier University & the Balsillie School of International Affairs (CA)

### 08.45 – 10.30 (Q) CLEANER TECHNOLOGIES — Room 4

**Moderator: Laura Castellucci, Università di Roma (IT)**

**Technology Adoption Incentives under Endogenous Uncertainty: The Role of Carbon and Energy Policies** (ID: 091) - Federico Boffa, Università degli Studi di Macerata (IT), Stefano Clò, Università degli Studi di Milano (IT) & Alessio D'Amato Università di Roma "Tor Vergata" (IT).

**Taxation and Innovation in Eco-Industry** (ID: 110) - Oliwia Kurtyka, University of Grenoble Alpes (FR)

**Emissions Trading Enhances the Social Desirability of Environmental Improvement** (ID: 092) - Ayumi ONUMA; Keio University (JP) & Eiji SAWADA, Waseda Research Institute for Science and Engineering (JP)

**The Recent Development of Diverse Energy Taxation Bills in Taiwan: A "Comparative" Study?** (ID: 022) - Anton Ming-Zhi GAO, National Tsing Hua University (TW)

### 08.45 – 10.30 (R) STATE AID — Room 5

**Moderator: David Duff, University of British Columbia (CA)**

**EU Energy Tax Directive, Promotion of Renewable Energy and State Aid Law** (ID: 063) - Álvaro Antón Antón, University of San Pablo CEU (ES)

**Harmonizing Support Schemes for Renewables: Do Feed-In-Systems Constitute State Aid? - A Critical Analysis of the New EU Guidelines on State Aid for Environmental Protection and Energy** (ID: 061) - Pernille Wegener Jessen & Birgitte Egelund Olsen, Aarhus University (DK)

**The New EU Environment and Energy State Aid Guidelines – Help or Hindrance to Cost-Effective Design of Environmental Taxes** (ID: 024) - Susanne Åkerfeldt, Swedish Ministry of Finance (SE)

**Reform of Energy Taxes in Line with Climate Policies** (ID: 057) - Michael Rodi, University of Greifswald (DE)

# Detailed Programme
## Friday 26th September – Parallel Sessions III

### 08.45 – 10.30 (S) CLIMATE ADAPTATION — Room 6

**Moderator: Claudia Dias Soares, Catholic University of Portugal (PT)**

**Economic Loss versus Economic Cost of Climate Change: The Case of Winter of 2013/2014** (ID: 034) - Rahmat Tavallali, Walsh University (US)

**Storms Ahead: Climate Change Adaption Calls for Resilient Funding** (ID: 040) - Janet E. Milne, Vermont Law School (US)

**Bringing together climate change mitigation and adaptation strategies within the German "Energiewende". Is there a need for government interventions and legal obligations?** (ID: 028) - Markus Groth & Jörg Cortekar, Helmholtz-Zentrum Geesthacht - Climate Service Center 2.0 (DE)

**Climate Policy Integration – Evidence on Coherence in EU Policies** (ID: 044) - Claudia Kettner, Daniela Kletzan-Slamanig & Angela Köppl, Austrian Institute of Economic Research (AT)

### 08.45 – 10.30 (T) GREEN TAX POLICY — Room 9

**Moderator: Manfred Rosenstock, European Commission (BE)**

**Environmental Fiscal Reform in Germany – Making Progress in Times of Complacency** (ID: 127) - Eike Meyer & Damian Ludewig, Green Budget Germany (BE)

**"A Template for the World": British Columbia's Carbon Tax** (ID: 072) - Thomas F. Pedersen, University of Victoria (CA) & Stewart Elgie, University of Ottawa (CA)

**Taxes and Fees as Climate Policy Instruments** (ID: 122) - Thomas Færgeman, Klaudia Gram, Susanne Krawack, Marianne Tjørning, Michael Appel, Jørgen Henningsen, Fie Junkuhn & Jørgen Birk Mortensen, CONCITO – Denmark's green think tank (DK)

**An Overview of the Environmental Taxation in France** (ID: 125) - Jeremy El Beze, & Christian De Perthuis, Chaire Economie de Climat (FR)

### 08.45 – 10.30 (U) CARBON CREDITS — Room 10

**Moderator: Nathalie Chalifour, Ottawa University (CA)**

**Taxation Treatment of Emissions Trading Permits** (ID: 102) - Keith Kendall, La Trobe University (AU)

**The Comparison Studies on ETS in China and South Korea** (ID: 055) - Yiyuan (William) Su, Hokkaido University (JP)

**Brazilian Taxation of 'Carbon Credits'** (ID: 116) - Denise Lucena Cavalcante, Luiz Dias Martins Filho, Federal University of Ceará (BR), Júlia Mattei, Federal University of Ceará (BR) & University of Cologne (DE) & Saulo Carvalho, Federal University of Ceará (BR)

**International Taxation of ETS** (ID: 051) - Juan Ignacio Gorospe Oviedo, Universidad CEU San Pablo (ES)

# Detailed Programme
## Friday 26th September – Parallel Sessions IV

### 13.30 – 15.15 (V) ROAD TRANSPORT — Sal I

**Moderator: Mikael Skou Andersen, Aarhus University (DK)**

**The Cost of Air Pollution: Health Impacts of Road Transport** (ID: 012) - Nils Axel Braathen, OECD (FR)

**Congestion Tax in Sweden – Economic and Environmental Effects** (ID: 104) - Mats-Olof Hansson, Ministry of Finance (SE)

**Urban Road Pricing: A Comparative Study on the Experiences of London, Stockholm and Milan** (ID: 053) - Edoardo Croci, IEFE-Boccony University (IT) & Aldo Ravazzi Douvan, Ministry of Environment, Land & Sea (IT)

**Assessment of the Impact of Motor-Fuel Taxation on Transport Behaviour in the Czech Republic using an Estimated Microsimulation Model** (ID: 085) - Jan Bruha, Hana Bruhova-Foltynova & Vitezslav Pisa, Kolin Institute of Technology (CZ)

### 13.30 – 15.15 (W) MOBILISING ACTORS — Salon F

**Moderator: Aldo Ravazzi, Ministry of Environment, Land and Sea (IT)**

**Motivating Progress on Environmental Tax Reform through Coalitions of Like-Minded Countries** (ID: 075) - Sirini Withana & Patrick ten Brink, Institute for European Environmental Policy (BE)

**A Reconsideration of WTO Priorities: From Open Trade Champion to Active Environmentalist** (ID: 010) - Bill Butcher, University of New South Wales (AU)

**The Policy and Politics of Implementing Environmental Fiscal Reform in Europe between 1990 and 2012** (ID: 078) - Paul Ekins, University College London (UK) & Chris Hewett, Finance Innovation Lab (UK)

**Developments and Opportunities for an Ecological Tax Reform in Spain** (ID: 114) - Ignasi Puig Ventosa, Fundaciò, ENT (ES) & Eike Meyer, Green Budget Europe (DE)

### 13.30 – 15.15 (X) ACCOUNTS AND MODELLING — Room 4

**Moderator: Hector Pollitt, Cambridge Econometrics (UK)**

**Environmentally Related Taxes and Subsidies Linked to Climate Policy** (ID: 113) - Viveka Palm, KTH Royal Institute of Technology and Statistics Swedish (SE), Maja Cederlund, Sebastian Constantino, & Nancy Steinbach, Statistics Sweden (SE)

**Understanding the impact of Environmental Tax on the Competitiveness of Enterprises: A Case Study from China** (ID: 080) - WU Jian, MAO Yujiao, GUO Xingjie & PANG Jun, Renmin University of China (CN)

**Outward Foreign Direct Investments Patterns of Italian Firms in the EU-ETS** (ID: 099) - Simone Borghesi, University of Siena (IT), Chiara Franco, Catholic University of the Sacred Heart (IT) & Giovanni Marin, National Research Council of Italy (IT)

**Taxes and Other Determinants to Emissions from Road Freight Transport in Sweden** (ID: 109) - Anastasia Papagiannopoulou & Per Strömberg, Swedish Environmental Protection Agency (SE)

# Detailed Programme
## Friday 26th September – Parallel Sessions IV

### 13.30 – 15.15 (Y) CONSUMPTION TAXES — Room 5

**Moderator: Susanne Åkerfeldt, Ministry of Finance (SE)**

**Reforming the VAT System to Support the Transition to a Low-Carbon and Resource Efficient Economy** (ID: 066) - Bettina Bahn-Walkowiak & Henning Wilts, Wuppertal Institute for Climate, Environment and Energy (DE)

**Designing a VAT-Inspired Destination-Based Carbon Tax** (ID: 121) David G. Duff, University of British Columbia (CA)

**Including Consumption in the EU ETS - A Chance for the European Union to Overcome Carbon Leakage Constraints** (ID: 045) - Roland Ismer & Manuel Haussner, Friedrich-Alexander-University Erlangen-Nuremberg (DE)

**Putting a Charge on Carbon: A Proposition for a Multilateral Carbon Tax Treaty** (ID: 049) - Tatiana Falcão, International Bureau of Fiscal Documentation (NL)

### 13.30 – 15.15 (Z) STATE VS MARKET — Room 6

**Moderator: Kris Bachus, University of Leuven (BE)**

**Putting a Price on Carbon: The Metaphor** (ID: 001) - David M. Driesen, Syracuse University (US)

**The Paradox of the Markets' Power** (ID: 095) Anselm Görres, Green Budget Europe (DE)

**International Tax Reform and the Global Environment** (ID: 005) - Roberta F. Mann, University of Oregon (US)

**Environmental Taxes – The European Way** (ID: 129) - Chas Roy-Chowdhury, Association of Chartered Certified Accountants (UK)

### 13.30 – 15.15 (Ø) EMERGING SCHEMES — Room 9

**Moderator: Hope Ashiabor, Macquarie University (AU)**

**Carbon Taxation Schemes – An Overview of Design Schemes throughout the World** (ID: 046) - Stefan Speck, European Environment Agency (DK)

**Carbon Energy Tax in Mexico: A Perspective From the South** (ID: 132) - Juan Manuel Ortega Maldonado & Humberto Serrano Guevara, Morelos Autonomous State University (MX)

**Environmental Taxation and Energy Policies: An Overview of the Brazilian Situation and its Sustainability's Perspectives** (ID: 117) - Denise Lucena Cavalcante, Federal University of Ceará (BR), Júlia Mattei, Federal University of Ceará (BR) & University of Cologne (DE) & Saulo Carvalho, Federal University of Ceará (BR)

**China's Carbon Tax Legislation** (ID: 130) - QIAO Shiming, Minzu University of China (CN)

# Detailed Programme
## Friday 26th September – Parallel Sessions IV

**13.30 – 15.15 (Å) IMPLEMENTATION AND COMPLIANCE** **Room 10**

**Moderator: Birgitte Egelund Olsen, Aarhus University (DK)**

**The EU Emissions Trading System: Is EU Law Biasing the Rules of the Game?** (ID: 060) - Sébastien Wolff, Catholic University of Louvain (BE)

**Fault Lines between Fees and Taxes – Learnings for US and EU Climate Change Policy** (ID: 086) - Stefan Weishaar, Groningen University (NL)

**Compliance of Carbon Pricing Mechanisms – A Comparison of the British Colombia Carbon Tax and the Québec Emissions Trading Market** (ID: 070) - Nathalie Chalifour, Université d'Ottawa (CA) & Jacques Papy, Université du Québec à Montréal (CA)

**Taxation or Allocation: Legislative Lessons in Australia and EU ETS** (ID: 067) - Mau-Ting Nee, Dong-Hai University and National Chung Hsin University (TW) & Yiyuan (William) Su, Hokkaido University (JP)

*Note: moderators that are indicated with * are to be confirmed. Due to constraints in the availability of certain parallel session presenters, some presentations have been appended to the topical sessions - thank you for your understanding.*

# Abstracts

ID: 001

## Putting a Price on Carbon: The Metaphor

David M. Driesen,
Syracuse University (US)

This Essay analyzes the characterization of both pollution taxes and so-called cap-and-trade programs addressing greenhouse gas emissions as policies that "put a price on carbon," a characterization that has come to dominate both policy discussion and much modern scholarship on environmental instrument choice. It shows that the rationale for characterizing cap-and-trade-quantitative rather than a pricing mechanism - as putting a price on carbon suggests that analysts should likewise treat traditional regulation as a mechanism putting a price on carbon. On the other hand, it would be perfectly sensible to treat pollution taxes as putting a price on carbon, and to regard quantitative mechanisms, like cap-and-trade programs, as not doing that. Treating "market-based mechanisms" as uniquely putting a price on carbon reflects and perpetuates a tendency to see markets and government as antonyms, with markets operating through price and governments operating through coercion, even though markets and governments are intimately intertwined and use a variety of tools. This Essay shows that an informed third generation debate about instrument design and instrument choice should focus on understanding prices' limits as a coordinating tool, including appreciation of potential conflicts among the values price is thought to serve.

ID: 002

## Towards a Sustainable Climate and Energy Policy Mix

Sven Rudolph, Kyoto University (JP)
& Takeshi Kawakatsu, Kyoto Prefectural University (JP)

Global Warming and the Fukushima disaster point to the necessity of rethinking our energy system. While energy policy aims at an environmentally sound, secure and low cost energy supply, climate policy focuses on limiting greenhouse gas emissions with carbon dioxide from energy conversion being the major pollutant. Hence, both policy areas are closely related and, due to the diverse set of targets, a policy mix is inevitable. Still, the use of multiple instruments such as cap-and-trade, carbon taxes, and feed-in tariffs has been heavily criticized e.g. for creating double burdens. But how to design a climate and energy policy mix that fulfills criteria of both economic efficiency and environmental effectiveness? Also, recently a public debate on the social justice of the energy system transformation process has evolved. Hence, besides economic and environmental criteria, e.g. questions of inter- and intragenerational justice have to be taken into account. In practice, Japan is still discussing major parts of its future climate and energy strategy including the use of nuclear energy, climate policy targets, and the use of market-based instruments, while the German "Energiewende" is steadily being implemented. Hence, a comparative analysis makes an interesting trial case study for testing the above mentioned preliminary theoretical insights, and it provides a good guide for future research. Against this background, this paper, being fully aware of the challenges of such an approach and explicitly aiming at preparing an in-depth future research program, first, evaluates the existing literature on a climate and energy policy mix (Bennear/Stavins 2007, OECD 2007, Oikonomou/Jepma 2008). Secondly, it summarizes thinking on sustainability criteria for policy instrument evaluation and tries to link it with policy mix questions (Lerch 2011, Rudolph et al. 2012). Third, as a first step for further empirical research, the paper describes the differences in the current energy and climate policy mix between Japan (EECJ 2012) and Germany (BMU 2011, BMWi 2014) and comparatively evaluates them based on the preliminary sustainability criteria for a climate and energy policy mix. Thus, the paper gives a first indication of policy mix design options and their compliance with ambitious sustainability criteria, while also identifying questions for future research.

ID: 003

## Carbon Divestment Policies to Fight Global Climate Change?

Florian Habermacher,
University of St. Gallen (CH)

This asks whether regional or global carbon divestment taxes (or equivalent individual actions) can be fruitful in mitigating climate change. The growing fossil fuel divestment campaign, supported by the recent announcement of the world's largest sovereign wealth fund – Norway's oil fund – to consider selling its global oil, gas and coal assets, has an intuitive basis for its moral call to abandon investments into climate threatening assets: First, the carbon content of the fuel reserves contributing to the financial value of their owners listed on stock exchanges is large enough to warm the climate by many degrees, with likely disastrous consequences for mankind. Second, the significant financial value of these reserves is difficult to explain unless there are prospects for their future use. Derived claims that public investors should abstain from investments in these resources, and that policies should discourage them (notably through taxes on investments in environmentally dangerous fuel assets), are met by opponents with the answer that reduced investment by a few would be offset by increased investment by others, leaving the balance of fuels ready to be burned unchanged. This analysis shows that the question is more complex. First, the present value of listed carbon assets represents an average of resource rents from different possible futures. Climate change may either be contained, due to future political mitigation strategies such as carbon taxes, or due to technological developments such as carbon capture and storage, or it may continue unabated due to lack of stringent political or technological developments in the medium-term future. The dynamic probabilistic asset valuation model shows that present carbon asset values can be explained even in a world with restricted future climate change. Second, in a simple world, an environmental investment tax, supporting emission reductions through an incentive to divest from carbon assets, may be more cost-effective than appreciated by opponents of divestment. Not only climate *benefits* of institutions' divestments from the assets, but also financial *costs* to the institutions can be of low magnitude. This leaves scope for positive cost-benefit balances for divestment policies even if only few institutions divest. Nevertheless, as a third observation, we find that in a geopolitically divided world, where present leaders in climate mitigation try to convince climate mitigation laggards to join future climate agreements, regional divestment policies can aggravate climate change. They shift carbon assets to the laggard regions, disincentivizing them to join climate agreements.

ID: 005

## International Tax Reform and the Global Environment

Roberta F. Mann,
University of Oregon (US)

Nearly everyone agrees that the United States' system of taxing multinational corporations is broken. While nominal U.S. corporate tax rates rank near the top among developed countries, the taxes actually paid by U.S. corporations are the lowest among those countries. Debates over corporate reform are intensifying. The U.S. asserts its taxing authority over all the income earned by its citizens and residents. This type of taxing system is called a "worldwide" system. The foreign income of foreign corporations and residents is not taxed unless it is repatriated to the United States, for example, by means of a dividend paid to the U.S. corporate parent by a foreign subsidiary. U.S. corporations and residents are allowed to reduce their U.S. tax liability by foreign tax credits for taxes paid to foreign governments. By holding foreign income overseas, U.S. multinationals avoid U.S. tax. Other countries use a "territorial" system of taxation. Those countries tax only the income attributable to activities within their borders. Some countries have used their tax systems to attract business by low tax rates. Reformers assert that the U.S. should adopt a territorial tax system to improve global competitiveness of U.S. multinational corporations. A seldom-asked question is whether a worldwide or territorial system is best for the world's environment? This paper will attempt to answer that question. Focusing on manufacturing activities, I will compare environmental rules in the United States with those in major manufacturing economies such as China and Germany. I will compare the tax rules applicable to manufacturing concerns in those countries. I will also consider whether examining international tax reform through an environmental lens could have other beneficial side effects, such as slowing harmful tax competition and improving compliance with trading norms. Ultimately, the question is whether economic competition and capitalism can be good for the environment. Perhaps international tax reform can move the world in a sustainable direction.

ID: 006

## How Should Different Countries Tax Fuels to Correct Environmental Externalities?

Ian Parry, International Monetary Fund (US),
Dirk Heine, University of Hamburg (DE),
Shanjun Li, Cornell University (US),
& Eliza Lis, European Central Bank (DE)

The principle that fiscal instruments (environmental taxes or tax-like instruments) must be center-stage in addressing the major environmental side effects of energy use is well-established. This paper discusses a recent IMF report that aims to help put this principle into practice by setting out a practicable methodology and associated tools for estimating the efficient set of charges on fossil fuel products, for developed and developing countries, to reflect carbon emissions, local air pollution, and (for motor fuels) road congestion/accidents. Carbon damages are taken from the literature. Air pollution damages are assessed by matching data on the location of emissions sources in different countries to population by grid cell, using evidence on how (observed) mortality rates for pollution-related illness respond to pollution exposure, and studies of how people in different countries value money/risk trade-offs. Congestion costs at the country level are extrapolated from a city-level database on travel delays and accident costs from traffic fatality data. The main policy messages include: Coal use is pervasively undercharged, not only for carbon but also the health costs of local air pollution, though appropriate charges for the latter differ across countries with population exposure, the value of mortality risk, and emissions factors. Crediting for capture of local air emissions during fuel combustion (or instead levying charges on emissions), provides strong incentives for the adoption of such control technologies with large health benefits. Heavy taxes on motor fuels - at least US$0.40 per liter and often much higher - are warranted in most developed and developing countries, but more to reflect the costs of traffic congestion and accidents rather than carbon emissions and local pollution. Over the longer term however, countries should partially shift away from fuel taxes to kilometer-based charging to more effectively reduce congestion. Air pollution damages for natural gas are small relative to those from coal, but significant charges are still needed to reflect carbon emissions. Tax reforms can yield large revenue gains (enabling significant reductions in other taxes), substantial reductions in $CO_2$, and dramatic reductions in pollution-related deaths. In short, getting energy prices right involves a straightforward extension of (widely accepted and easily administered) motor fuel taxes—better aligning their rates with environmental damages and extending similar charges to other fossil fuels. The findings suggest large and pervasive disparities between efficient fuel taxes and current practice across developed and developing countries, with much at stake in terms of fiscal, environmental, and health outcomes.

ID: 007

## Overreaction to Excise Taxes: the Case of Gasoline

Silvia Tiezzi, University of Siena (IT)
& Stefano F. Verde, European University Institute (IT)

In this paper we contribute new results on the different consumers' reaction to tax or price changes. We separately compute the compensated gasoline retail price elasticity and the gasoline tax elasticity and show that consumers overreact to taxes as compared to price variations. We estimate a complete system of demand for the U.S. population of households using quarterly data from the Consumer Expenditure Survey from 2007 to 2009. Relying on a complete system of demands rather than on single equations avoids imposing an implausible separability restriction, thus allowing estimation of accurate compensated elasticities that take behavioral responses into account, i.e. that account for the way in which consumers reallocate their expenditure on a bundle of goods after a price/tax change in one of the goods. Our analysis shows that the reaction to a gasoline tax change is, on average, about 20% stronger than the reaction to a corresponding price change. We discuss the implications of our findings for the design of energy policies.

ID: 008

## Border Adjustments, WTO Law, and Climate Protection

Felix Ekardt, Rostock University (DE)

An interesting solution for carbon leakage in case of a stronger EU climate policy could be an ambitious EU energy tax or an extended EU ETS combined with border cost adjustment. For a border adjustment, a tax or the overall costs of climate policy instruments are at least partly refunded when goods are exported, while imported goods are subject to an energy levy. This could prevent competitive disadvantages of European companies caused by lesser efforts to protect the climate in e.g. the USA or the newly industrialised countries such as Brazil, India or China and at the same time enable an effective climate policy, providing these countries with an important example of combining climate protection and economic welfare. If the EU introduced ambitious eco-taxes or ETS reforms (better more ambitious than the existing proposals) combined with border adjustments, it could also demonstrate to countries such as China that climate protection and economic development are not mutually-exclusive. Despite some politicians and companies frequently claiming otherwise, this approach would be compatible with world trade law, as I will show in this contribution. Especially, they are compatible with Art. II, III and XX GATT. Maybe border adjustments can even be justified by the goal of avoiding irregular subsidies in Art. XVI GATT, because the adjustments help to avoid an externalization of costs. Border adjustments do not discriminate against anybody in global free trade, but on the contrary ensure equal treatment and fair competition. Nonetheless, the cost adjustment has to be carefully designed to avoid discrimination. The greatest problem for the justification of adjustments is likely to be that the EU would have to indicate the energy intensity and climate relevance of the products concerned (and the quality of the political measures against climate change of other countries) with some precision in order to secure equal treatment. According to the WTO jurisprudence it could be sufficient if the EU carries out plausible approximations which would be treated as valid as long as the importing countries do not unambiguously prove their inaccuracy. Nonetheless, differentiations will for instance be necessary between different countries (the US, China, India etc.), as the necessary border adjustment will vary according to state of export. Furthermore, the implications of border adjustments for multilateralism have to be discussed.

ID: 010

## A Reconsideration of WTO Priorities: From Open Trade Champion to Active Environmentalist

Bill Butcher, University of New South Wales (AU)

The World Trade Organisation has consistently asserted the importance of environmental protection and sustainable development and the commitment of its members to these objectives. This ethos is enshrined in the preamble to its foundational document, the 1995 Marrakesh Agreement Establishing the World Trade Organization which states that WTO members recognise that "their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living…while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment…" and has been reaffirmed in numerous announcements including the Doha Ministerial Declaration which launched the current round of trade negotiations. A number of WTO dispute resolution rulings have given environmentalists cause for concern that the WTO's rules, as applied, raise doubts about the depth of this commitment. There has been a consistent thread, even from the earlier General Agreement on Tariffs and Trade (GATT) cases that predate the establishment of the WTO in 1995, that the pursuit of open trade will not be subjugated to environmental concerns. This paper contends that the opposite should apply – that even the WTO should give precedence to environmental protection over open trade. Despite appearances and assumptions, trade liberalisation is not the preeminent raison d'etre of the WTO. It is but one of a series of objectives, which include raising living standards and ensuring full employment, all to be sought through sustainable development. Subverting the environment to an overarching goal of open trade runs counter to the balance of priorities the WTO says it espouses. The WTO should go beyond merely neutralising its impact on environmental protection policies. It should actively *incentivise* them. The paper proposes that the WTO do this by sanctioning a degree of trade protection, whether in the form of import or export tariffs or otherwise, as long as that protection is a core component of an effective environmental protection policy. This would do more than the use of border tax adjustments and other such measures which seek to negate the concerns of a loss of global competitiveness that have discouraged national governments from introducing environmental protection measures: it would positively promote such measures by conferring on them benefits founded not only on positive environmental outcomes but also on immediate economic self-interest.

ID: 011

## Environmental Border Tax Adjustments (BTAs): Their Forgotten Legal History

Alice Pirlot,
Université Catholique de Louvain (BE)

Environmental border tax adjustments (BTAs) – and in particular border carbon adjustments (BCAs) – are regularly discussed as one possible solution in mitigating global environmental challenges, including climate change. The legal scholarship on environmental BTAs usually focuses on the compatibility of these measures with the provisions of the General Agreement on Tariffs and Trade (GATT). This paper takes a different approach: the objective is to analyse environmental BTAs in light of the "traditional concept" of non-environmentally specific BTAs. The assumption of this paper is that the legal analysis of environmental BTAs should better take into consideration the history of traditional BTAs and the legal principles on which this concept relies. First, this paper comes back on the history of traditional BTAs and points out that the literature has often forgotten to consider one of the first reports devoted to the topic of BTAs, namely the 1968 OECD Report on "Tax Adjustments Applied to Exports and Imports in OECD Member Countries". The analysis of this report sheds light on the roots of the concept of BTAs and offers new perspectives to examine environmentally specific BTAs. Second, the paper highlights the main differences between the 1968 OECD Report and the 1970 GATT Working Party Report, which is usually referred to as the first report on BTAs in the literature. The paper explains the extent to which these differences may be relevant for the legal analysis of environmental BTAs. The 1968 OECD Report also serves as a basis to compare traditional BTAs with environmentally-related BTAs. Points of comparison include: the rationale of these measures, their definition, their legal grounds, etc. In conclusion, by emphasising the peculiarities of environmentally specific BTAs, this paper draws the attention to the main legal challenges related to the development of these "green" BTAs.

ID: 012

## The Cost of Air Pollution: Health Impacts of Road Transport

Nils Axel Braathen,
OECD (FR)

When designing taxes on motor vehicle fuels and on other energy products that can contribute to local air pollution, policy-makers should ideally take into account the magnitude of the environmental externalities caused by the use of these products. Recent studies by the World Health Organization have documented that outdoor air pollution is causing much more premature deaths than previously thought – in the order of 3.7 million persons globally in 2012. OECD has combined this information with country-specific value of statistical life estimates, based on the method coming out of the 2012 publication *Mortality Risk Valuation in Environment, Health and Transport Policies* and presents the findings in the recent book *The Cost of Air Pollution: Health Impacts of Road Transport*. The book shows that the costs to society of outdoor air pollution are *very* high – running into *trillions* of USD annualy. This presentation will describe the main findings of the new book, and the approach used to elaborate the estimates. It will also discuss implications of the findings for the design of taxes on motor fuels and vehicles, and for policy assessment approaches more broadly.

ID: 016

## Tax and the Environment: An Evaluation Framework for Australian Tax Policy Reform

Natalie Stoianoff, University of Technology (AU)
& Margaret McKerchar, University of New South Wales (AU)

Australia has had more than 30 years of environmentally-related tax measures which need to be evaluated. Tax measures, such as deductions and incentives are part of the tax expenditure system utilised by governments to intervene in the market and influence the behaviour of certain classes of taxpayers or industries. Accordingly, it is not unreasonable to expect that such measures be evaluated in terms of their efficiency and effectiveness in achieving their underlying policy objective if the revenue expended in favour of a particular industry and/or class of taxpayers, which may otherwise appear to be inequitable, is to be justified. The purpose of this paper is to develop a rigorous framework that may be appropriate for such an evaluation and has the potential to enable greater transparency and accountability in terms of the effectiveness of environmental tax measures and could impact on both the form and quality of future environmental tax policies. The paper is primarily focused on how such an evaluative framework might apply to environmental tax measures in respect of mine site rehabilitation. A range of performance indicators derived from the literature are considered for their relevance in the context of tax measures driven by environmental goals. From this discussion a set of key indicators are drawn as the basis of the proposed evaluation framework. Then the mine site rehabilitation deduction is evaluated on the basis of the proposed framework and the appropriateness of the framework itself is critiqued. Finally, conclusions are drawn as to the implications of the proposed evaluative framework for tax policy, and consideration is given to the extent to which the framework could apply to other environmental tax measures.

ID: 017

## Prospects for Regulation of Greenhouse Gases in the Russian Federation

Nikolay V. Kichigin,
Institute of Legislation and Comparative Law under the Government of the Russian Federation (RU)

Currently, comprehensive regulation of greenhouse gas emissions in the Russian Federation does not exist. However, recently the government is taking steps to reduce greenhouse gas emissions. It is fixed in the Climate Doctrine of the Russian Federation (2009), that the choice of economic instruments that could help reduce level of greenhouse gas emissions (including the possible use of market mechanisms, including emissions trading) would be determined by their effectiveness in the use of public and private funding. In the context of difficulties in achieving international consensus on the implementation of agreed measures to limit emissions become important efforts of individual countries and intergovernmental organizations to limit greenhouse gas emissions. The EU has committed to reduce greenhouse gas emissions by 20% up to 2020. In 2013 in the Presidential Decree of 30.09.2013 № 752 was made a commitment to the reduction of greenhouse gas emissions by 25% of these emissions to 2020 compared with 1990. Pursuant to the Presidential Decree in April 2014 by the Government of the Russian Federation is approved a Plan of measures to reduce greenhouse gas emissions. Specific mechanisms in the Presidential Decree and in the Plan of measures are not determined. In the Plan of measures was made a task for analyzing the current situation in the sphere of greenhouse gas emissions and for the preparation of proposals for the development of specific mechanisms of state regulation. However, it is possible to predict the future regulatory arrangements to reduce greenhouse gases. It can be assumed that it will be applied most likely a complex of measures: the enforcement of emission reductions of greenhouse gases and the mechanism of payment for emissions in excess of the limit. S. Smith points out that trade mechanisms in the environmental field are used when the relevant tax arrangements cannot be applied cause of political issues. The Russian Federation has quasi tax payment system for negative impact on the environment, which can be applied to greenhouse gases, although they are not pollutants. Thus, there is no need probably to develop mechanisms for trading domestically. The trading approach can be implemented by the accession of the Russian Federation to the international system of emissions trading.

ID: 018

## Renewable Energy: Subsidies and Taxes as Competition Distortion?

Rolf H. Weber,
University of Zurich (CH)

Governmental financial support or fiscal incentives which are designed to increase the competitiveness of environmentally preferable products could lead to the risk of falling into the scope of subsidies. International trade law (WTO Law) distinguishes between prohibited, actionable and permissible fiscal incentives under the Subsidies and Countervailing Measures (SCM) Agreement. At the time of the conclusion of the SCM Agreement in 1994, environmental subsidies promoting the adoption of existing facilities to new environmental requirements were exempted from potential legal challenges. This exemption, however, expired in 1999. As a consequence, countries now have only limited tools to sufficiently encourage industries for adopting greener technologies or to promote environmentally preferable products. So far, the practice of the Dispute Settlement Bodies (DSB, Panels and Appellate Body) of the WTO has been quite inflexible in respect of environmental subsidies by referring to the competitive disadvantages caused by financial contributions. In particular, the justification reasons as of Art. XX GATT (conservation of exhaustible resources or protection of human and animal health) are applied in a restrictive way. In the context of renewable energies (having gained importance after the nuclear power disaster in Japan) the recent case of the DSB in the matter of "Canada – Certain Measures Affecting the Renewable Energy Generation Sector" assessing the treatment of subsidies merits attention. In this case, the Appellate Body ruled in May 2013 that the wholesale energy market was an irrelevant market for comparing the feed-in-tariff scheme for renewable energy resources. Even if the regulatory measure in the given situation has not been considered as being in compliance with WTO-Law the conclusion can be drawn from the decision, provided a detailed analysis is executed, that along the chosen approach it seems to be possible that environmental subsidies could be (partly) allowed again. As a consequence, the most recent court practice appears as a positive sign towards an improved conservation of environmental sustainability. However, a precise delineation of the relevant market (similarly as in the antitrust law context) is necessary, based on the characteristics under the given circumstances. Thereafter, the WTO-Law disciplines (most favoured nation principle and national treatment principle) need to be assessed and finally the mentioned justification reasons can be evaluated.

ID: 019

## The Free Allocation of Permits and the Linking of ETSs: A Comparative Analysis of the EU ETS and AUS CPM

Elena de Lemos Pinto Aydos,
University of Sydney (AU)

The paper analyses the free-of-cost allocation of emissions permits to emissions-intensive trade-exposed (EITE) industries under the European Union Emissions Trading System (EU ETS), the New Zealand Emissions Trading Scheme (NZ ETS) and Australia's Carbon Pricing Mechanism (AUS CPM). In the absence of a comprehensive binding international agreement on global emissions reduction, the free-of-cost allocation of permits has been a political condition for the acceptance of these schemes. As a result, individual schemes are adopting distinct criteria and levels of assistance to protect domestic industry. The paper enquires whether the discrepancies in EITE assistance under the EU ETS, NZ ETS and AUS CPM could be problematic to the linking of the ETSs by distorting competitiveness between industries located in these countries. Furthermore, the interaction between the free allocation of permits and WTO rules relating to subsidies is analysed.

ID: 022

## The Recent Development of Diverse Energy Taxation Bills in Taiwan: A "Comparative" Study?

Anton Ming-Zhi GAO,
National Tsing Hua University (TW)

In order to mitigate the effects of climate change or the environmental effects from energy utilization, each country has been very keen at developing measures to deal with such a problematic energy sector. Energy taxation is very often being used as a key tool. Its role is gaining more important, particularly facing the low carbon price in the emission trading market around the globe. Energy or Carbon taxation could contribute to the further emission reduction or improving environment quality. The main purpose of this article is to compare and analyze the 8 versions of Energy Taxation Bill in Taiwan's history since 2006 until now. For this purpose, this article will provide an overview of the "existing" taxation regime applying to energy sector first. Then this article will try to provide an in-depth and systematic comparison of eight versions of Carbon Tax-related Energy Tax Bills. For instance, the analysis will be based on the tax principles, tax approach, tax adjustment approach, the associated measures to reduce the side effects of such tax, etc. Finally, this article will provide the comment and conclude this article.

ID: 023

## Human Capital and Environmental Taxation

Hector Pollitt, Terry Barker, Unnada Chewpreecha, Lee Tae-Yeoun & Sungin Na,
Cambridge Econometrics Ltd (UK)

Environmental Tax Reform (ETR) has been explored extensively with macroeconomic models. Using a scenario-based approach, the models have been used to show the net economic impacts of a shift in taxation, including the existence of possible 'double dividend' effects. Many studies have shown that the way in which the revenues from environmental taxes are used are very important in determining the overall macroeconomic outcomes of fiscal reform. The 'recycling' of revenues back into the economy can take many different forms, for example offsetting other taxes (e.g. on labour or incomes) or through higher rates of government expenditure. Several modelling studies have considered uses of revenues to boost rates of physical investment; however, very few have assessed the possibility of increasing spending on education to boost human capital. This paper assesses such a possibility by combining the economic framework provided by the E3ME macro-econometric model with recent advances in measuring the returns to education. We define a scenario in which we introduce a new environmental tax and use the revenues from it to increase funding for various types of education. The results from the scenario are compared to a business as usual baseline case and a more traditional form of ETR. We assess whether the possibility exists to create a 'triple dividend' of better environmental outcomes, a more educated workforce (with social benefits) and higher economic production. We assess whether education-led green growth is a sensible strategy across a range of different countries.

ID: 024

## The New EU Environment and Energy State Aid Guidelines – Help or Hindrance to Cost-Effective Design of Environmental Taxes

Susanne Åkerfeldt,
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The EU has set climate and energy targets for 2020 and discussions are on-going about the road towards 2030 and 2050. It is essential to have well-functioning tools at hand to meet set targets. Environmental taxes have a key role to play. The 2003 Energy Taxation Directive gives a framework for taxation of fuels and electricity, within which Member States retain a considerable freedom to design taxes to promote a high level of environmental protection. Other union objectives do however limit this freedom. An ill-designed tax differentiation can distort competition on the internal market. Therefore, the Treaty of the Functioning of the European Union in principle prohibits state aid "*favouring certain undertakings or the production of certain goods*". However, under certain conditions the Treaty allows for the European Commission to consider state aid compatible. Exemptions or reductions in environmental taxes often fall within the scope of state aid. The state aid rules are thus of paramount importance for Member States when considering their tax design. The Commission issues guidelines announcing in advance which measures it will consider compatible and has recently adopted new environmental and energy guidelines (EEAG). Sweden currently has 18 approved environmental aid schemes. 11 of those relate to differentiated energy and $CO_2$ taxes. I will explain the principles of Swedish environmental tax design and why it results in us being the second largest granter of environmental state aid per capita in the EU. Our system has served us well in terms of good environmental effects during a number of years, but will the EEAG make it possible for us and other Member States to continue along this path? The commendable objective of the EEAG is to stimulate cost-effective solutions fostering growth. The challenge for the EEAG is to strike a balance between necessary flexibility for Member States to examine different ways and instruments to meet environmental objectives and the desire to create a level playing field at the internal market. At a stage when many countries are introducing and developing environmental taxes, the EEAG is heavily focused on aid in the form direct grants rather than environmental taxes. My presentation will deal with my concerns that the EEAG rather risk to hinder than stimulate cost-effective tax measures and possible ways to avoid this.

ID: 025

## Opportunities and Obstacles to Carbon Taxation: A Comparison of France and Ireland

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Although the European Union has committed to emissions trading for large industrial sources, smaller sources, including motor vehicles, household and building heating, and agriculture, constitute a significant fraction of national and EU emissions, and thus demand additional policy responses. This paper will contrast the successful adoption and survival of a carbon tax in Ireland with the failure of a similar proposal in France. The analysis will compare the impact of policymakers' (and their parties') ideological commitments, public and interest group pressures, and political institutions. Our analysis draws on secondary accounts as well as original interviews with policymakers, public servants, and interest group spokespersons in each country. The paper is part of a broader book project, by the presenting author (Kathryn Harrison), on the comparative politics of carbon taxes.

ID: 027

## EU Renewable Energy Markets' Governance & Economic Crises. A Taxation "Makeover"? Greece as a Case Study

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With the background of climate change urgently calling for a shift to green energy, it is up to the strategic planning to be adopted to allow alternative energy sources to pave the way for a new industrial revolution based on sustainability. The increased regulatory activity for the establishment of an internal European energy market may contribute to the implementation of a coherent energy strategy. However, the measures adopted by Member States on a national level have often been proved inadequate when responding to the common challenges set by EU energy policy, indicating the need for interpretation of public policies and adjustment to the energy status quo of each Member State. The focus of this paper is set on the recently adopted Renewable Energy Sources (RES) regulation in Greece enacted at times of a profound economic crisis as well as within the context of putting effort to reach the aftermath of recession. Main angle of this research is the assessment of the day ahead after the implementation of a framework including retroactive taxation measures, suspension of new Photovoltaic projects, a so called "special solidarity levy" as an emergency tax imposed on the turnover of RES producers, a drastic reduction of Feed-In-Tariffs, as well as an unilateral non negotiated change of the contractual terms for operational RES projects. The Greek case study concentrates on the oxymoron arising from the wide challenges set by climate change and the contradiction between the measures adopted by the Greek Government imposing severe retroactive taxation measures on RES, instead of promoting alternative energy sources via investment incentivisation. The Greek case study concludes with an evaluation of the legal procedures launched during the last two years causing significant instability in the taxation framework for RES aiming to raise incompatibility issues of the framework with European Law and Energy Policy, which incentivizes RES and opposes any obstacles set to the large scale penetration of RES to the energy mix of each country.

ID: 028

## Bringing together climate change mitigation and adaptation strategies within the German "Energiewende". Is there a need for government interventions and legal obligations?

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The option of adapting to climate change is becoming more important in climate change policy. Hence, responding to climate change now involves both mitigation to address the cause and adaptation as a response to already ongoing changes. These changes are expected to have relevance for the energy sector in Germany. Its direct influence varies by the different steps of the value-added chain. Indirect impacts include increased demand – e.g. during heat waves – on transmission infrastructures. In a first step we summarize the current knowledge regarding the possible influences of climate change on the German energy sector along its value-added chain. We point out, that the possible influences of a changing climate are in general relatively easy to handle. This is particularly true when the expected impacts are already taken into account in the upcoming infrastructure projects in the course of the German "Energiewende". The main question is, whether existing adaptation options will be implemented voluntarily by energy suppliers or not. This will be the case, when the measure is considered a private good *and* is economically beneficial (i.e. benefits outweigh costs). If, on the contrary, the measure is considered a public good, additional 'incentives' are needed. This will also be discussed in the first main part of the paper. Additional incentives could either be legal obligations or other governmental interventions like subsidies. Thereby it needs to be considered that the energy sector is one critical infrastructure in the European Union that needs to be protected – like also pointed out by the Council Directive 2008/114/EC. Based on a review of current regulations, the second main part of the paper discusses whether especially in Germany actors in the energy sector should be confronted with increasing legal obligations regarding their efforts to adapt to climate change. Furthermore, the necessity of government intervention will be discussed, especially regarding the private sector needs of policy certainty and the role of policy makers on different governance levels in the process of bringing together mitigation and adaptation. One already implemented example to be discussed as a possible role model will for instance be the UK Climate Change Act 2008 which includes obligations for the energy sector to prepare reports on how actors assess and deal with the risks and opportunities from a changing climate.

ID: 031

## Implementation of Environmental Taxes in China. Transformation from Environmental Charges to Taxes

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The Chinese government has put the levy of environmental taxes on the public policy agenda, and the preliminary design scheme has been submitted to the State Council in 2013. China has announced an intention to make an increased use of economic instruments in environmental policy, and the implementation of environmental taxes and charges is the representative one of them. As the uppermost environmental economic policy in China, the pollution charge system has been implemented for 35 years; however, it did not reach the target of environmental protection and instead the pollution problem is increasingly severe, which indicates serious problems existed in the current pollution charge system. According to the current Chinese tax reform plan, the transformation from pollution charges to environmental taxes would be carried out. However, it should be place emphasis that environmental taxes cannot just be simply transformed from pollution charges; otherwise it is doomed to repeat the same mistakes. Therefore, this paper first analyzes the problems of the current pollution charge system in China and then summarizes the experiences and lessons in order to avoid such problems to happen again in the levy of environmental taxes. After that the paper describes the relationship and similarity between pollution charge system and environmental taxes from the perspective of theory, objective, function, levy and supervision, discusses the advantages of environmental taxes compared with pollution charges, and analyzes the feasibility of the levy of environmental taxes in China. Furthermore, this paper states the objective of setting up environmental taxes and puts forward basic principles which should be followed by the reform: polluter pays principle, non-degradation of environment and sustainable development. The setting of the tax rate should be based on these principles and it should make sure enterprises only have two choices: one is to pay taxes but no pollution treatment, which means enterprises purchase services of pollution treatment by paying taxes; the other one is to control pollution and no pay taxes, which encourage enterprises to make more efficient use of environmental resources and to introduce new, less environmentally intensive products and processes, and to pursue technical innovation on their own initiative.

ID: 032

## Limits to Regional Environmental Taxes (Spanish Experience and Proposals)

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Introduction: Spanish regions (Autonomous Communities) are competent for introducing environmental taxes. They must respect the European and Constitutional legal framework. As a matter of fact, in the last fifteen years they have set up a large number of small taxes on water sewage, $CO_2$ emissions, other atmospheric emissions, landfill taxes, energy taxes, taxes on tourism, commercial undertakings with a large surface area and so on. Some of them are fake environmental taxes with the only aim to collect revenue. Others are actual green taxes, but they are not well co-ordinated with each other. Several taxes have been challenged before the constitutional court and some of them have been declared unconstitutional for causing double taxation. Moreover, the European Commission has initiated several infringement procedures based on possible infractions of European freedoms or State aid rules (although none of them has succeeded so far). In our paper we intend to analyse the current legal status and to propose reforms to improve the coordination and effectiveness of regional environmental taxes. European limits: Main limits are the European freedoms and State aid rules. Furthermore the European tax harmonization directives pose certain restrictions to regional taxing powers on environmental matters. According to the Constitutional Law on Regional Finances the Central State can withdraw regional competencies on taxation when the regional tax infringes European law. Constitutional limits. Current situation: So far the main restriction to regional environmental taxes is the prohibition of double taxation (concurrence with central or local taxes is forbidden). However our Constitutional Court interprets this prohibition in a very lax way. Reform proposals: Some self-proclaimed regional environmental taxes impose a burden on renewable sources of energy and are incoherent with central energy policies. Other regional taxes are correctly designed to protect the environment but each region has followed different patterns so that the global result is not coherent and efficient. Therefore we propose a reform of the Constitutional Law on Regional Finances to exclude false environmental taxes and to promote certain degree of tax harmonization, respecting certain level of regional autonomy. Conclusions: Spain is undergoing a relevant reform of regional finances. Therefore it is now the right moment to analyse the *status quæstionis* and to propose reforms. Only in this way regional taxes will be a suitable instrument to protect the environment.

ID: 033

## Paying Enough Taxes Already? Testing the Acceptability of Carbon Taxes - with Survey Data

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& Andrea Baranzini, University of Applied Sciences of Western Switzerland (CH)

International negotiations aim at stabilizing greenhouse gas concentrations and prevent dangerous interferences with the climate. However, current efforts seem far from sufficient. This is not surprising, since instruments such as carbon taxes are barely implemented. We focus on the political economy of carbon taxes and conduct a survey on over 300 individuals in Geneva, Switzerland, to determine which policy features impact acceptability as well as the effect of private costs and benefits, environmental attitudes, norms, perceived tax effectiveness, preferences for income distribution and labeling (using wording "carbon tax" and "climate contribution"). Broad reasons justify the focus on Switzerland. Switzerland lobbies besides the European Union urging for ambitious post-Kyoto agreements. However, Swiss climate policy can be continuously challenged through semi-direct democracy so that the gap between government's targets and feasible policies may be particularly large. Following the rejection of three energy-tax proposals in 2000, Switzerland switched to voluntary agreements and only recently introduced a carbon tax, limited to heating fuels. As a result, Switzerland had to recur to foreign offsets to reach its Kyoto pledge. This casts serious doubts on the ability to meet new targets without taxing all fuels. Furthermore, Switzerland plans to exit nuclear energy following Fukushima. 40% of electricity is nuclear, implying relatively low carbon emissions and little room to replace this source without increasing emissions. Substantial reductions in consumption are thus likely to be necessary. Higher energy prices are then expected from tighter climate policy and reforms in the electricity market. Consequences on poor and rural households represent a public concern and may call for social cushioning. Carbon taxes and relative revenues may look as an attractive, but political resistance against this instrument needs to be overcome. Our econometric results suggest that carbon taxes may find substantial support in ballots, provided that the design is appropriate. Albeit the political discourse mainly focuses on competitiveness and distributional effects, our data indicate that the former are almost completely neglected by respondents, whereas the latter represent a concern but with limited impact on acceptability. Instead, individuals seem concerned with environmental effects, expressing strong preferences for earmarking through environmental purposes. This claim for environmental effectiveness may be addressed also by communicating better both primary and ancillary benefits, whose awareness is positively associated with acceptability, or applying a label such as "climate contribution".

ID: 034

## Economic Loss versus Economic Cost of Climate Change: The Case of Winter of 2013/2014

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The United States has just witnessed one of the worst winters in decades. These severe weather conditions, which may be linked to climate change, did result in a significant economic loss to the country. Some examples of economic loss in the winter of 2013/2014 include:

- Airlines cancelled more than 78,000 flights in the United States due to severe weather conditions.
- Beef prices hit an all-time high in February 2014 due to drought conditions in the southwest part of the United States.
- Sustained cold weather during the winter increased demand for natural gas and heating fuel in the United States with a resulting significant increase in fuel prices.
- Ongoing drought in California is likely to have a major impact on the State's agricultural production in 2014.

There is no doubt that addressing the issue of climate change comes with a major economic cost to the United States and to every country in the world but the cost of failing to act on climate change may have a much bigger economic cost to the world. According to the Natural Resources Defense Council, if present climate change trends continue, the total economic loss to the United States resulting from climate change may be as high as 3.6 percent of gross domestic product. This paper will analyze the economic costs of addressing climate change versus the potential economic loss if no action is taken on climate change. Included in the discussion will be an analysis of the benefits of an informed national policy on environmental taxation.

# Emission Trading Based on Emission Pathways Calculated with Regensburg Formula

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Definitions
*(C)E*$_t$:(certified) emissions in year t
*TA:* emissions in target year (target amount)
$T_t$: emission trading in year t
$P_t$: population in year t
BY:base year
TY:target year

Why deal with emissions pathways?
The IPCC has made statements concerning $CO_2$ budgets, which will meet the 2°C target with certain probabilities. Therefore, it is crucial that we confront global emissions pathways complying with the 2°C target and break down into national emission pathways (top-down approach).

Determining consistent national emissions pathways from a global emission pathway
As a first step, annual rate of changes are derived from any global emission pathway:

$$CR_t = \frac{E_{t+1} - E_t}{E_t - TA}$$

where $CR_t$ = -100% if $E_t = TA$
In a second step, the target amount values of all countries are specified so as that their sum equals the global target amount:
$\sum TA^i = TA$.
In a third step, the emissions of a country *i* in year *t* are calculated according to the following recurrence relation (Regensburg Formula):

$$E_t^i = E_{t-1}^i + CR_{t-1} * (E_{t-1}^i - TA^i)$$

where $E^i_{BY}$ are the agreed emissions in base year.
For countries whose emissions in year *t-1* are below their target amount the difference ($E^i_{t-1}$ - $TA^i$) is negative. If $CR_{t-1}$ is also negative – standard case of decreasing global emissions – these countries will receive an upgrading assessment of their emissions viz. emission rights until $E^i_t = TA^i$.

Gradual Climate Justice
As one opportunity we propose to implement climate justice on a step-by-step basis, which means national emission pathways will gradually converge towards an equal universal per-capita emission right. Therefore, the target amount of country *i* in target year is calculated as follows:

$$TA^i = \frac{TA}{P_{TY}} * P^i_{TY}$$

We consider gradual climate justice as an option for a compromise for climate negotiations.

Emission trading between countries
We suggest using the emission pathways as a basis for allocating certified emission rights to a country. Therefore, emission trading is also grounded on gradual climate justice if the national emission pathways are based on this criterion. This is an important difference to other proposed trading systems between countries.
$CE^i_t$ and $TA^i_t$ then result from the following formulae:

$$CE_t^i = CE_{t-1}^i + T_t^i + CR_{t-1} * (CE_{t-1}^i - TA_{t-1}^i)$$
$$TA_t^i = TA_{t-1}^i + T_t^i.$$

Regensburg Model
The Regensburg Formula is embedded in the tool „Regensburg Model“ offering among others the possibility to determine global pathways according to political criteria (download: www.save-the-climate.info).

ID 036

## Recommendations for Developing and Least Developed Countries on Responses to Potential Border Carbon Adjustments Proposed by Developed Countries

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According to the current literature, without the participation of developing and (some) least developing countries, emissions abatement by developed countries alone will have limited or no effect on global climate change: China, India, and other developing countries will represent up to two-thirds of global carbon dioxide emissions over the course of this century, vastly exceeding the OECD's expected contribution of roughly one-quarter of global emissions. In this regard, Border Carbon Adjustments (BCAs) have been increasingly discussed and proposed by developed countries, such as the U.S. and EU, not only to protect the competitiveness of their domestic industries but also to ensure the participation of developing countries and least developed countries in the global climate change mitigation regime. This paper firstly introduces the concept of BCAs, their historical background and the uncertainties over their conformity with WTO rules. This paper then discusses the political and economical rationales of developed countries behind their proposals of BCAs and analyses the potential impact of these trade measures on the economic development of developing and least developed countries. Based on these discussions and analysis, the paper concludes with recommendations for developing and least developed countries on dealing with the potential BCAs.

ID: 037

## What Does Make Carbon Taxes Acceptable? A Literature Review and Qualitative Assessment

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& Stefano Carattini, University of Applied Sciences of Western Switzerland (CH) & Universitat de Barcelona (ES)

Climate change is one of the most pressing issues of this century. International negotiations aim at stabilizing emissions at a level preventing severe changes in the climate system. However, they have generally failed to provide consistent and ambitious agreements. Unilateral initiatives have emerged in most developed countries, but often lacking to implement powerful instruments able to dramatically curb emissions, such as carbon taxes. In this paper, we review the political economy of carbon taxes looking in particular at drivers of and obstacles to public acceptability. We provide a qualitative assessment of carbon taxes acceptability based on a preliminary classroom focus group and subsequent semi-direct interviews with a heterogeneous sample of Geneva's population, Switzerland. Our literature survey emphasizes a series of factors affecting carbon tax acceptability. Of course, the expected individual private costs and benefits of a carbon tax have an impact on acceptability and may vary depending on personal characteristics such as age, location, income and carbon footprint. However, other non-monetary factors also play a role. In particular, moral and social norms can imply that individuals get a self-image benefit by contributing to a public good such as climate change mitigation. As a result, awareness of climate change and of the benefits of mitigation, as well as trust in the efforts of other people, tend to lead to higher acceptance of climate policy. That is, perceived effectiveness (including ancillary benefits) seems to be an important determinant of acceptability, since the benefits of carbon taxes are not very salient. The environmental effectiveness of carbon taxes may actually be harshly challenged by the public and mistrust in the government leads pigouvian taxes to be often confused with Ramsey taxes. As a consequence, the way carbon taxes revenues are earmarked represents an important factor determining acceptability. In this respect, we observe a trade-off between competitiveness, distributional and environmental effects, with important implications for acceptability. The qualitative evidence from the semi-direct interviews supports several theoretical predictions. We observe a general resistance to public intervention with, if deemed necessary, a preference for pull (e.g. subsidies to public transportation) over push (e.g. the carbon tax) measures. In particular, presumed ineffectiveness, distrust in the government's intentions and unfair distribution of costs, seem the main obstacles to carbon taxes acceptability. Yet when it comes to elicit preference for revenue recycling, earmarking for environmental purposes comes clearly first. Social cushioning is also considered as important, but it seems that the way of financing it should make abstraction of carbon tax revenues. Actually, respondents are generally disconcerted about the possibility of using the revenues of an environmental tax for something unrelated to the environment. They would also like to pay fewer income taxes, but they are skeptical about the government renouncing to new revenues.

ID: 040

## Storms Ahead: Climate Change Adaption Calls for Resilient Funding

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The IPCC's recent report, *Climate Change 2014: Impacts, Adaptation, and Vulnerability*, reinforces the need to engage in adaptation planning but also suggests a substantial gap between adaptation needs and the funds available to address those needs. The World Bank has estimated that annual global adaptation costs could range from $70 billion to over $100 billion by 2050, but even these are low in the eyes of the IPCC. As governments estimate costs and plan for adaptation, they face difficult questions about who should bear the costs and how to fund the costs that fall on the public sector. This paper examines the role of environmental tax policy in addressing climate change adaptation, using the United States as a case study. To provide a concrete setting, it focuses on the challenges of adapting to extreme weather events. It draws in particular on the adaptation implications of Hurricane Sandy, which devastated the eastern United States in October 2012, flooded New York City's subways and airports, left 8.5 million people without power, and prompted the United States Congress to appropriate $50 billion in disaster funding. Whether or not the storm was linked directly to climate change, it illustrates the tremendous costs of extreme weather, the need to invest in resilience, and the challenges of financing efforts that will restore communities and protect them from future damage. The paper argues that governments should consider how environmentally related taxes might help fill the gap between the costs of adaptation in the face of extreme weather events and available resources, and it highlights the need to earmark revenue for adaptation to ensure that adequate funds are available for short-term responses and long-term investments. Although countries with developed economies may be in a stronger position to find resources to build resilience than those with emerging economies, this case study underscores the fiscal challenge that faces even developed economies and the potential role of environmentally related taxes in meeting that challenge.

ID: 041

## Supporting Emission Reductions through a Viable Wind Energy Industry - Lessons for Australia

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Since the introduction of the mandatory renewable energy target (MRET) in Australia in 2001, a wind energy industry has been developing in Australia. This target of 2% was reached well in advance of the proposed date of 2010 and has increased to a target of 20% by 2020. Currently there is concern that the Federal government's proposed review of the MRET will resulted in uncertainty for the wind energy industry resulting in a withdrawal of investment. Both Denmark and the UK have successful wind energy industries. Denmark has linked wind power development to industry development, heavily involving local communities and employing a range of financial incentives as well as planning law reform. In 1985, it was agreed that the power companies would install 100MW wind power by 1990. Their intention to do this through large scale wind farms stirred up local objections and there were delays getting planning approval. This target was not reached until two years later, creating uncertainty in the political climate. Due to various financial incentives and the streamlining of the planning process to include restrictions on noise, manufacturers developed less noisy and more visually appealing wind turbines. This eventually improved the conditions for mass production of these turbines, giving certainty to the industry and installed capacity improved from 1994 with farmers investing heavily in those turbines. Denmark's use of financial incentives mutually reinforcing energy/environmental objectives and industrial development objectives has resulted in innovation and the establishment of niche markets, both domestically and internationally. The UK has achieved political consensus in the recognition that it must become a global leader in achieving ambitious mitigation targets. It has had a market based green certificate scheme since 2002 and legislated reduction targets pursuant to the *Clean Energy Act* 2008 and other policy instruments. In 2011 it released the Electricity Market Reform white paper which has led to the passing of the *Energy Act* 2013. One of the objectives of this legislative reform is to decarbonise energy generation and attract £100 billion in new energy infrastructure investment. This project examines what policies and laws can best support a sustainable wind energy industry in Australia. It will examine the existing framework in Australia and what lessons can be learnt from Denmark and the UK focusing on planning law reform and grid connection reinforced by industry policy and community engagement.

ID: 042

## On the Existence of a Sectoral Environmental Kuznets Curve for Portugal – A Nonlinear Cointegration Approach for $CO_2$ Emissions

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The increase of carbon dioxide ($CO_2$) emissions in Portugal, between 1990 and 2011, was caused mainly by the economic growth, which in turn led to higher electricity demand and an increase in the number of vehicles on the road and distances driven. This phenomenon was also boosted by the sustained development of road infrastructures and a rapid growth in private car ownership. In order to reduce $CO_2$ emissions, Portugal needs to implement policies that focus on the two main emission sources – power generation and road transport sector – without compromising economic growth. In this context, this paper wishes to be a contribution to the validation of the Environmental Kuznets Curve (EKC) theory debate, for $CO_2$ emissions, and to what extent can this theory be a tool, for climate change policy design, in Portugal. Most of the EKC modelling, up to date, neglect the econometric implications of GDP and its integer powers as regressors, which can lead to misleading results. To obtain reliable EKC outcomes nonlinear cointegration methodologies should be considered. We perform a sectoral empirical analysis – electricity generation and road transport – for $CO_2$ emissions for Portugal, using data between 1960 and 2010. We use standard *Engle and Granger* cointegration tests and nonlinear cointegration methodology. The preliminary results of the Engle *Granger* procedure suggest that the EKC does not hold for both sectors, and the shape of the relation between GDP and $CO_2$ emissions is different for each sector. These results suggest that a sectorial analysis of the 'income - $CO_2$ emissions' relationship may be relevant. EKC empirical validation cannot be nationwide. We need an EKC analysis, capable of describing this sectorial relationship. Only in this manner will we be able to formulate a regulatory framework that allows for $CO_2$ emission savings, according to the characteristics of each sector, without putting economic growth into question. A nonlinear cointegration analysis is required to validate these results in order to contribute for effective climate change policies design. Whether of adaptation, or of mitigation, climate change policies must be specific, not only for each region, but also for each sector. Apart from that, it is relevant bring to the debate, the relation between the evolution of GHG emissions, in both sectors, and the progress of economic activity. If not, the implementation of these policies may hinder economic development.

ID: 044

## Climate Policy Integration – Evidence on Coherence in EU Policies

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In order to successfully tackle the challenge of limiting climate change climate policy has to be understood as a cross-sectoral issue and needs to be firmly integrated in general and sector-specific policy areas that frame economic activity and societal development. Experience, however, shows that there is a trade-off between the need of a cross-sectoral climate policy and policy decisions driven by pressing short term issues (e.g. an economic crisis). The paper presented focuses on the issue of horizontal climate policy integration at the EU level taking into account general strategic policy papers (Lisbon Treaty, EU 2020), energy and cohesion policies as well as the EU's Multi-annual Financial Framework. The evidence on climate policy integration into specific EU policies analysed in this paper is not clear cut: While recent energy policy documents generally refer to climate change as a central motivation, the EU budget does not mention climate change as a budgetary priority. On the strategic level, the relationship of energy and climate policy is partly synergetic (e.g. the objective of a sustainable energy system) and partly conflicting (e.g. the emphasis on fossil fuels in order to ensure energy security). However, specific energy policy documents (e.g. renewable and energy efficiency directives) reinforce climate policy targets. In contrast, climate policy integration is not reflected in the EU budget: No explicit resources are dedicated to climate change issues in the Multi-annual Financial Framework; in cohesion funding – to which a significant part of the EU budget is dedicated – climate-friendliness of the proposed projects is also no funding criterion. Quite the contrary, a large portion of cohesion funding is allocated to transport projects with a focus on investment in road transport entailing adverse effects for climate policy. Our qualitative evaluation confirms that while there is a high level of general commitment to climate change action, climate policy in many cases is subordinate to other policy areas. Much awareness raising and implementation work is still required to depart from climate policy as add-on or "nice to have" policy area towards a comprehensive integration especially in terms of earmarked financing.

ID: 045

## Including Consumption in the EU ETS - A Chance for the European Union to Overcome Carbon Leakage Constraints

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Various approaches have been suggested to deal with carbon leakage: The European Union has granted free allowances to sectors exposed to the risk of carbon leakage. Such rules, however, lead to an over-allocation of allowances and allow producers to make windfall profits. They moreover impede the cost pass-through on the consumption price so that consumption efficiency is not achieved. Border carbon adjustments, which have been proposed by scholars given the drawbacks of free allocation, have not yet been implemented. Others have spoken out in favour of sectoral approaches. This contribution suggests a novel approach to such carbon leakage concerns, which both avoids over-allocation of allowances and reflects carbon costs in the consumption price: Free allocation could be based on output when consumers of high-carbon products are included in the EU ETS by means of a parafiscal charge. The charge would be imposed on the consumed product at the time of release for consumption within the EU. It would be calculated in accordance with the carbon footprint of a product and the carbon price at the auction platforms. The raised amount would be assigned to national trust funds, which would use it for the purpose of acquiring and retiring allowances at the auction platforms. Designed as a market-based approach, the scheme could be based on Art. 192 para 1 TFEU and would thus not require unanimity. The consumption-based nature of the mechanism ensures compatibility with world trade law and the Principle of Common but Differentiated Responsibilities established by the UNFCCC. The following paper first gives an overview of leakage concerns and possible counter-measures discussed in the literature. It then elaborates the novel approach of combining output-based allocation, which ensures production efficiency, with the inclusion of consumption in the EU ETS, which would guarantee consumption efficiency. It demonstrates the compatibility of the proposed approach with European and international law. Finally, more details are provided regarding institutional implementation.

ID: 046

## Carbon Taxation Schemes – An Overview of Design Schemes throughout the World

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During the last two decades many countries realised the significance of implementing policies for controlling greenhouse gas emissions. Among these policies the concept of carbon pricing became a preferred option as a means of combining market-based approaches with regulatory policy measures. It is worthwhile to discuss how carbon pricing policies have been implemented during this time period. In the early 1990s the Nordic European countries started to implement carbon taxation schemes. Already then the design of the carbon taxation schemes differed between countries. During the last years countries outside Europe, such as Australia, India, Japan, South Africa and provinces in Canada, i.e. British Columbia and Alberta, are increasingly discussing the application of or implementing carbon taxes. It is important to note that carbon taxes are not only implemented in developed countries but also developing countries are in the process of introducing them. The focus of this paper lies on an assessment of how carbon taxation schemes, i.e. price-based mechanisms as compared to quantity-based policies like emission trading schemes, have been developed over time and whether their design follows the underlying rationale for their application which is derived from theoretical criteria based on economic theory, such as static and dynamic efficiency. Another topic deserving attention is their link with other economic instruments. Carbon taxes are working in parallel to already existing energy/excise taxes and / or emission trading schemes in the countries of the European Union. Therefore it is not too surprising that their design differ between EU Member States and also between countries which are making solely use of carbon taxes for achieving climate policy goals.

ID 047

## The Instruments Mix of the Swiss Climate Policy and the Effectiveness of the $CO_2$ Tax on Heating Fuel

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1 The Swiss Climate Policy: Following the Kyoto agreement, Switzerland adopted a law on the reduction of $CO_2$ emissions, which includes an objective in term of $CO_2$ reduction (Reduction of 10% in 2010 compared with 1990 and of 20% in 2020 compared with 1990) and the instruments to reach the target. The range of instruments described in the law is very large: standards, subsidies, taxes, emissions trading system and voluntary approaches. Among them, a $CO_2$ tax on heating fuel has been introduced in 2008. The tax rate depends on the achievement of $CO_2$ reduction (currently 49€ per ton of $CO_2$). The tax revenues are partly redistributed as a lump-sum to the population and firms and partly earmarked to the support of energy-saving renovation of buildings and investment in renewable energy. 2 Institutional Analysis: The first purpose of this paper is to show the differences between theoretical models and implemented instruments. This section will analyze how theoretical instruments, such as a Pigouvian tax, is turned into a practical instrument and adapted to political reality. We specially address the following issues: the mix of instruments, the coherence regarding the targets, the rate setting and the use of revenues. Our analysis emphasizes the role of institutions, which contribute to explain the gap between a coherent design, as prescribed by the economic theory, and the effective implementation. In particular, the role of the lobbies is underlined. For instance, it is showed how powerful lobbies succeeded in avoiding the $CO_2$ tax on motor fuel. 3 The Effectiveness of the $CO_2$ Tax on Heating Fuel: The second purpose of this paper consists in the assessment of the effectiveness of the Swiss climate policy. Here, we focus on the achievement of the announced targets and try to disentangle the effect of the $CO_2$ tax on heating fuel among the different instruments. 4. Perspective: In the future, the Swiss climate policy will be closely linked to the energy policy and the announced shutdown of the nuclear power plants. The economic instruments should allow to reach not only climate but also energy targets. This last section briefly explains the forthcoming challenges that the environmental economic instruments will have to face.

ID: 048

## An Investigation of Possible Routes to Improving the Communication of Environmental Fiscal Reform to Increase Public Acceptance and Support

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This paper examines some recent research findings from behavioural economics and looks at how these might be used to improve the way in which Environmental Fiscal Reform (EFR) in general, and environmental taxation in particular, can be improved. The paper looks at the root causes of opposition to EFR and environmental taxation and suggests ways in which this opposition can be mitigated. As a large body of research has already suggested that the slow rate of implementation of EFR is linked to the unpopularity of EFR measures, and many have suggested that policy communication is critical to overcome at least some of the barriers to EFR. Thus, the paper focuses on the notion that improving the chances of EFR being implemented in many EU countries is "basically a matter of how the policy is framed and communicated to the public" (Jagers and Hammar 2009: 224) and suggests some ways in which this can be done. First, the paper introduces current attitudes and responses to EFR. It then goes on to look at a range of research projects in behavioural economics and ecological economics which have investigated the acceptance of taxation and EFR measures. Finally, the paper makes a series of recommendations for communications efforts in the future.

ID: 049

## Putting a Charge on Carbon: A Proposition for a Multilateral Carbon Tax Treaty

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I intend to present my doctoral research project, which is being finalized this coming October. The thesis proposes an environmental tax, more specifically, a carbon tax in order to address the environmental problems brought about by climate change. I provide a construct to qualify environmental taxes under the following terms: 'A tax imposed for environmental reasons, whose tax base is a physical unit (or a proxy of it) that has a proven specific negative impact on the environment. The term "environmental tax" is to be exclusively employed towards those excises capable of conferring a reduction in corresponding pollution release into the environment. They are thus regarded to have environmental purpose and effectiveness.'. The thesis goes on to explain why a carbon tax would be preferable over other forms of environmental taxation. I thus propose a multilateral carbon tax treaty approach to forward carbon taxation. The treaty should live by four basic aims, which are referred throughout the thesis as the four prong test, namely: (1) reduce carbon related pollution; (2) change consumer behaviour; (3) raise revenues (to allow countries to be able to invest in the development of new technologies); and (4) allow a country applying the carbon tax not to lose its competitive position in the international market (due to the increased price of the final product, as a result of having applied the carbon tax). All these aims are to be perceived by the new carbon tax system concomitantly, meaning, one objective does not guard precedence over the other. The carbon tax base, taxpayer, tax rate and the point of taxation are all explored having in mind the four prong test. The final point addressed in the thesis is the issue of carbon leakage and carbon border adjustments, a mechanism which is proposed to be adopted amongst treaty partners only, as a form of incentive for other countries to join the proposed multilateral scheme. The objective is to draft tax policy, which would be readily acceptable by business partners as well as by governments. The focus is thus on ease of assessment and collection, and on a tax rate that is acceptable by the energy industry. Since this is the last time I will be presenting the thesis, I hope to be able to accumulate as much feedback as possible from those present in the conference, in order to address any final issues that might have gone astray.

ID: 050

## Canadian Oil Sands Extraction: The Linkage between Economic and Environmental Sustainability in Alberta

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This paper investigates the relationship between environmental degradation, income and regulation for the Alberta province of Canada. This issue assumes a value added since Alberta is the third-largest oil reserve in the world after Saudi-Arabia and Venezuela. The province is interested by large extractions of unconventional oil from bituminous sands, which produces large greenhouse gas emissions ($CO_2$, $CH_4$, $N_2O$ and HFC). Our attention is focused on the environmental overexploitation, specifically air quality depletion, related to the open-pit and mining oil sands extraction processes. Even though data available are few and scarce, we find a positive and strong relationship between economic growth and environmental degradation for the Alberta region during the last decade. Moreover, we assess the energy intensity indicator of Alberta's economy, which is higher relatively to Canada as whole. This relationship becomes relevant for the possible regulation issues in the framework of International Panel for Climate Change (IPCC) guidelines. Regulation matter because Canada is a high-level GHG emitters and is the only country that, because its expected higher emissions, withdrew the Kyoto protocol on 2011.

ID: 051

## International Taxation of ETS

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1. How to approach a cross-border problem: Pollution and climate change know no borders as environment is a global asset. Therefore unilateral national measures will not work properly to tackle greenhouse effects. A multilateral approach is needed in the form of an international agreement. The Kyoto Protocol moves along these lines but is not comprehensive enough. There is therefore a situation of carbon leakages. 2. Lack of co-ordination among different coexisting instruments: There are four main instruments to combat climate change:
a) Environmental taxes on emissions of greenhouse gases (Pigouvian taxes).
b) Emission trading systems.
c) Mixed mechanisms.
c) Direct regulation.
According to the three first choices (so-called economic instruments) the polluter must pay (meaning that there will be an internalization of environmental impacts). Direct regulations (prohibitions, standards) are imperative but less flexible. They could work as an addition to economic instruments. Nowadays within the European Union emission trading is the main instrument to tackle climate change. However it involves complicate questions regarding international taxation. Our paper will try and solve these questions. 3. Sources of income: domestic law and double taxation conventions: Trading with emission permits can give rise to different kinds of income taking into account national tax rules and the network of double taxation conventions: business profits, royalties, capital gains. We shall pay special attention to the position of Spanish legislation, case-law and administrative rulings. 4. Transfer pricing rules: Transfer pricing rules also play an important role regarding emission trading's taxation. It must be discussed whether such rules could interfere with the environmental goals of ETS. 5. Conclusion: To sum up this paper will analyse the tax regimes of ETS at international level and will assess whether such regimens are or not compatible with the main environmental goals of the Emission Trading Systems.

ID: 052

## Environmental Tax: A Potential Policy Tool on VOCs Control in China

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China has taken dramatically efforts to control air pollution, triggered by frequently massive gray haze in 2013 which brought about great attention and caused great public health impact. VOCs, Volatile Organic Compounds, have contributed to the formation of gray haze and been one of the priority tasks on the list of the national act plan for air pollution control. This paper will examine the potential of environmental tax in controlling VOCs in China. In order to achieve the goal, sources and gross amount of VOCs are indentified, Command and control instruments, and economic instruments such as charge, tax for VOCs control are studies under metric analysis and SWOT analysis, option for VOCs tax are proposed. The paper will contribute to the policy formation for VOCs control in China.

ID: 053

## Urban Road Pricing:
## A Comparative Study on the Experiences of London, Stockholm and Milan

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Urban road pricing schemes have been designed in order to reduce externalities generated by traffic. Main impacts regard: time loss due to congestion, local pollution, noise; contribution to climate change caused by emissions of GHGs, pavement costs and road damages, increase in accidents risks, extra-fuel consumption, decrease in quality of life. Moreover road pricing schemes generate public revenues. The paper performs a comparative evaluation of the three main experiences of urban road pricing in Europe: London (in operations since 2003), Stockholm (in operations since 2007, after a period of trial) and Milan (in operations since 2008, with a shift from pollution to congestion charge in 2012). Since their launch, the schemes have been adjusted in terms of amount of charge, area of application and other features. The schemes have been able to reduce negative externalities generated by traffic, such as accidents, congestion and emissions, up to different levels. A comparative analysis of the relevance of categories of externalities and of damage reduction in the three cities is provided. Determinants of differences in the effectiveness of the schemes are evaluated with a particular focus on elasticity of use of private vehicles to amount of charge. The results can be useful to design well targeted congestion charge schemes and to assess their efficacy.

ID: 054

## Offsets in Environmental Policy

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Offsets are measures that compensate for the residual impacts of an action on the environment, after avoidance and mitigation measures are taken. In some cases, they are considered during the assessment phase of an environmental impact assessment. Some of the questions that this paper proposes to address include:

- The effectiveness of environmental offsets as a complement to environmental mitigation measures; and
- The extent to which carbon offsets in the climate change context helps to counteract greenhouse gas emissions.

These questions would be examined within the wider context of the experience with selected offset markets and standards. In setting the context for the analysis of the issues, the paper will briefly address their history, and the principles that underpin their use in environmental policy.

ID: 055

## The Comparison Studies on ETS in China and South Korea

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China is the biggest greenhouse gas (GHG) emitter in the world and also suffering severe haze within major cities. Under the pressures from UNFCCC Parties, China government is learning new emission trading scheme (ETS) to reduce domestic GHG emissions. It ordered seven provinces and cities as task forces to establish domestic ETS, including cities of Tian-Jin, Beijing, Shanghai, Chong-Qing, Shen-Zen and Provinces of Hu-Bei and Quang-Dong. These task forces cities are doing trading without cap and starting from January of 2013. The China government not only implements domestic ETS but also creates bilateral agreements with Australia and EU on collaboration of future carbon trading schemes. In 2015, the governments agreed to link the three emission trading markets together and the transaction records could be tracked within different registration systems. South Korea also passed its new "Enforcement Decree of the Act on the Allocation and Trading of Greenhouse Gas Emissions Allowances" and plans to start trading from the year of 2015. It is the first and only country in East Asia to adopt cap-and-trade measure to reduce domestic GHG emissions. As an OECD member, South Korea follows the Kyoto Protocol decisions and learns lessons from EU ETS to design this new Act. The new emission trading act is more well-organized and legally guided than China has so far. This paper uses the UNFCCC regulations and decisions as standards to review the legal structures of these two emission trading regulations. We found the regulations in China's task force cities/provinces are not very established and remains fragment. Some cities or provinces announced their administration orders but only guidelines or instructions, the others remain empty yet. All these announced orders do not limit the maximum emission amount (cap) on the polluters and they all allow the polluters to trade their assigned allowances, which is free allocated and assigned by the governments in current early phase. Comparing those seven administrative orders, these local bureaus does not use "grandfathering" emission record to separate the controlled polluters but using a specific emission amount. Besides, the number of the amount is also various from cities to cities. It is hard to image that China could establish a unified domestic ETS within limited time and be linked with other emission trading schemes. This comparison study could not only provide legal suggestion to China on establishing its emission trading regulations but also encourage the two systems to find more details and differences between two different systems. It would benefit the possible linkage between two systems and enlarge the carbon market size in Asia.

ID: 057

## Reform of Energy Taxes in Line with Climate Policies

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Energy taxes have been part of general consumption tax schemes for a long time, making a considerable contribution to the state budget and to road infrastructure in particular. General energy taxes could and should be part of the climate change instrument toolbox. At the moment energy taxes are – as a rule – not aligned with climate change instruments, even contradicting them at times. In 2011 the European Commission issued a proposal for a fundamental restructuring of the Community framework for the taxation of energy products and electricity. It provides a scheme combining minimum tax rates on energy content and tax rates on $CO_2$, as well as an adapted taxation framework for renewable energies. Unfortunately, this interesting piece of legislation has few chances of being adopted due to the unanimity requirement in European taxation and the diverse approaches Member States take in the field of energy policy. At the same time, more and more countries in Europe have implemented or are planning to implement carbon taxes, like Denmark, Finland, France, Ireland, Netherlands, Sweden, and the UK. In Germany, the Institute of Climate Protection, Energy and Mobility (IKEM) is conducting a study for the Federal Government on the alignment possibilities of energy taxes with climate policy instruments. Basic considerations are (1) how to link the tax scheme to the ETS scheme, (2) how to tax (or exempt) renewable energies, (3) how to deal with the problem of carbon leakage (exemptions for industry), and (4) how to mainstream different areas of energy use like production, heating and cooling, traffic and transport? The paper for GCET 2014 will follow this approach. It will draw its conclusions from experiences made so far in different existing energy tax schemes. Primary European Union law, as well as the ongoing discussion on an internal market for renewable energies are also considered in the design of the different alignment possibilities. The Commission's proposal for a restructured energy tax scheme will provide a background as a blueprint. Finally, the role of energy taxes in a consistent climate policy toolbox will be recognized and addressed.

ID: 058

## Reforming Fossil Fuels Subsidies. Will it Make a Difference?

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Fossil fuel subsidies (FFS) take different forms: direct budgetary grants, tax reductions or exemptions or indirect support by for example financing infrastructure or reducing liability. They lead to a double damage: environmental and economic. They induce inefficient production and consumption choices resulting in higher levels of emissions, waste, resource extraction or use, or to negative impacts on biodiversity. FFS are of a significant scale – they are estimated to be worth worldwide USD 409 billion in 2010. The EU 27 MS budgetary support and tax expenditures to fossil fuel only, was EUR 26.6 billion in 2011 as the OECD and Commission research shows and this figure reflects a rather restrictive definition of subsidies. The 7th EAP calls for establishing the right conditions to ensure that environmental externalities are adequately addressed. This involves applying the polluter-pays principle more systematically, in particular through phasing out environmentally harmful subsidies at Union and Member State level. The Commission was given the task to provide guidance to Member States in reforming subsidies harmful to environment via, inter alia, the European Semester. This exercise is particularly difficult as there is no definition or reporting mechanism on subsidies to energy in the EU in spite of continuous declarations made in the last several years. Ten years ago the EEA in its report on subsidies to energy, pointed out that it is "an obstacle to reaching more definite conclusions on the appropriateness of the amounts and structures of subsidies for the different fuels across the EU 15" and advocated for a harmonised energy subsidy reporting framework on the basis of an agreed definition. After 10 years we still don't have a harmonised definition and even so far the most comprehensive OECD inventory reflects it – while in some member states excise duty exemption for household heating fuel is seen as a subsidy, in others it is not. Without solid data on the level of subsidies, any action in this respect will risk to be a failure. The final paper will present conclusions from various recent research projects led by the Commission services. The projects were looking at the impact of removing fossil fuel subsidies on carbon emissions, employment and budgetary revenues. The paper will also discuss different methodological approaches towards definitions of a subsidy and will show how they influence data collection and final figures. Furthermore, it will discuss how the revised rules on state aid in the EU address the issue of fossil-fuel subsidies and environmentally-harmful subsidies in general.

ID: 060

## The EU Emissions Trading System: Is EU Law Biasing the Rules of the Game?

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In the continuity of the signature of the Kyoto Protocol, the European Parliament and the Council created in 2003 a European Emissions Trading Scheme (“EU ETS”) by adopting Directive 2003/87/EC. Effectively launched in 2005, the EU ETS is now in its third phase, running until 2020. The financial crisis of 2008 has however shown the limits of the current design of the Trading System since the demand and the price for allowances abruptly dropped. A structural revision has therefore been proposed in order to address the surplus of allowances and strengthen the efficiency of the System. This paper makes use of a multidisciplinary approach – based on both juridical and economic instruments - in order to analyse the relationship between enterprises’ decision process and the regulation of the EU ETS. It brings to light the most decisive factors influencing the effective compliance of industries with the main goals of EU’s energy policy, including energy transition. The first part of this paper studies enterprises’ decision making process through the game theory (economic perspective). Participation in the EU ETS is viewed as a simultaneous stage game where the players (the enterprises) are acting semi-informed. Indeed, enterprises know or are able to get information with the accurate number of allowances granted to other enterprises, but they are not able to predict competitors’ behaviour or a fundamental change of rules. In this context, the players face three alternative but recursive strategies: (1) reducing the energy consumption and limiting the need in second marketed allowances or selling the surplus; (2) maintaining the actual level of emissions and consequently acquiring the exceeding allowances required; or (3) adopting a defiance strategy by disregarding the requirements related to CO2 emissions and declaring less energy consumption to the authorities. Strategic factors of choices on the energy market are identified and studied, i.e. energy prices, allowance rate on exchange market, and harshness of the sanction for offenders. In the second part, the paper analyses the adequacy of the legal rules surrounding the EU ETS with the microeconomic reality (legal perspective). Through a EU-wide exchange market as well as the reformed auctioning and back-loading systems, the competition in energy efficiency between producers seems enhanced. Furthermore, the allowances appear to be equitably priced. However those are not the only effects of the introduction of a primary pricing system, and some market distortions are likely to occur.

ID: 061

## Harmonizing Support Schemes for Renewables: Do Feed-In-Systems Constitute State Aid? - A Critical Analysis of the New EU Guidelines on State Aid for Environmental Protection and Energy

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To promote renewable electricity generation (RES-E), feed-in systems are the most commonly used support scheme in Europe. This support instrument has proven to be effective and efficient in supporting RES-E in many European countries. Basically, two options are available; the feed-in tariff, which guarantees a fixed price per kWh electricity, or the feed-in premium, which is paid on top of the market price for electricity. The new EU guidelines on state aid for environmental protection and energy, 2014-2020 (State Aid Guidelines) introduces a shift in the diversity in financial support schemes for the promotion of renewable energy sources. Accordingly, to be considered compatible with the State Aid Guidelines after 2016 operating aid to energy from renewable sources will have to be granted through feed-in premiums, which preserve market signals, and not feed-in tariffs. Although a trend towards feed-in premiums can be observed, feed-in tariffs are still widely used in the EU Member States. The objective of this paper is to analyse whether the feed-in premium model is in fact within the scope of EU State aid law at all, and if not, whether the State Aid Guidelines are in fact used as a legal instrument to promote indirect harmonization of EU Member States' design of support schemes? The analysis of whether feed-in premiums should be considered State Aid in the sense of Article 107(1) TFEU will take a starting point in the legal design of the Danish model for feed-in premiums for RES-E from wind energy. Furthermore, it will be assessed whether potential adjustments will have to be made to the Danish feed - in premium model to make sure that it is in compliance with the new EU State Aid Guidelines.

ID: 062

## The Role of R&D Tax Incentives in Encouraging Private Sector Investment in Sustainable Agricultural Innovation – An International Comparative Case Study

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Worldwide the agricultural industry is under pressure to increase yields and improve efficiency to meet market demand while simultaneously reduce carbon emissions and minimise other environmental pollutants. In an attempt to reconcile this multi-faceted challenge with innovative policies and solutions this paper draws on best design elements of the Research and Development (R&D) tax incentive from Japan, South Africa, Australia and the United States of America, to propose a model R&D tax incentive capable of universal application. Attracting private sector investment dollars to research and development in agriculture is difficult, equally difficult is relying on public sector spending given the competing priorities for limited government funds. Yet in the absence of government intervention, there is the likelihood private firms will under-invest in research that has public good characteristics. Therefore it is imperative to look beyond what currently is, and explore alternate financially viable options, which governments can to some extent influence. These fiscal incentives can be found within the tax system. It is proposed that a socio-legal reform orientated R&D tax incentive, could be a means to generate sustainable agricultural innovation. Weaving best practice learned from case studies analysing the R&D tax incentive in Australia, Japan, South Africa and the United States of America, a model R&D tax incentive capable of encouraging greater private sector investment in agricultural R&D that is both environmentally astute and sustainable is examined. Pragmatic principles have guided the drafting of the model R&D tax incentive to ensure the incentive has universal application to suit design capacities of all stakeholders, including developing countries, by avoiding over-sophisticated legislation. Given the global environmental challenge agriculture faces, it is significant that the successful tax policy instrument be easily replicated, in order for the R&D tax incentive to be widely effective in generating additional investment.

ID: 063

## EU Energy Tax Directive, Promotion of Renewable Energy and State Aid Law

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According to the EU Energy Tax Directive (hereinafter ETD) member States have to tax all forms of energy regardless of their behavior in terms of $CO_2$ emissions. For this reason, it can be stated that ETD introduces general taxes on energy products, that is, taxes which tax all particular forms of energy regardless of its environmental performance. Nonetheless, the ETD provides the opportunity for States to correct the situation described. This means that the ETD has left to the discretion of the Member States the decision of set, or not, energy taxation as a tax with a real environmental purpose. In particular, Member States may either set up their energy taxes so as to take into account the environmental performance of each energy product taxed, or include ecological tax elements in their traditional energy taxes. Regarding the second question, some States chose to attempt "greening" their energy taxes through environmental tax elements in the form of tax exemptions or differentiated tax rate in favour of renewable energies. For example, some States have used the possibility provided by article 16 of the ETD to apply favourable tax treatment for biofuels and thus offset the costs of producing these products with regard to fossil fuels, with which they compete. However, the high degree of flexibility of the ETD brought with it not only a clear lack of efficacy from an environmental point of view, but also a further problem directly related to facultative nature of the tax measures adopted by member States to provide energy taxes with greater environmental coherence. Precisely, those States that have decided to implement these measures faced with the Commission's decision of initiate the procedure laid down in article 107 of the of the Consolidated Version of the Treaty of Functioning of the European Union (hereafter `TFEU´), as it considers the measures to be State aids, and thus possibly incompatible with the TFUE. So the mission of adapting energy taxes to the peculiarities of renewable fuels corresponds to Member States. This means that, in the EU context, we are facing a State intervention in the economy through measures capable of being classified as State aid under the EU law. Specifically, this paper analyses why and when tax exemption introduced in energy taxes to encourage renewables energies constitutes a State aid within the meaning of Article 107 of TFEU.

ID: 064

## Carbon Tax Burden: Different Perspectives of Distributional Impacts

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Background: The use of cap and trade mechanisms to reduce emissions in private transport sector could mimic the regressive effects of carbon taxes. The belief that carbon taxes have strong regressive effects has recently been challenged by Hassett et al. (2009). However, it is argued that carbon taxes can induce inflation that need to be considered in the tax incidence analysis (Morris and Minnings, 2013). While these factors can play an important role in measuring the tax burden, the way that it is measured may also be crucial in the conclusion of the degree of regressivity. Contribution: Significant amount of current research on the incidence of carbon tax in the private transportation sector estimate consumer deadweight loss (DWL) as in Harberger (1971). To obtain a measure of the distributional effects, they also divide the DWL by income (e.g. West, 2005; Bureau, 2011). However, Hausman (1981) has proposed a more accurate estimation of DWL that is rarely used in applied work. Additionally, Mayshar and Yitzhaki (1995) have moved a step forward by proposing measures of additional tax burden that do not require specifying a welfare function. They also consider the marginal cost of increasing funds and distributional impacts. For the first time, in this paper these three measures are compared paying special attention to the tax burden across low income and rural households. Methodology and data: In this paper life time income and inflation induced by energy taxes are included in the incidence analysis. Different policies of burden offsetting such as direct rebates, tax swaps at regional level will be analyzed. Lineal and non-lineal panel data estimation methods are used along with the German Mobility Panel (MOP).

ID: 066

## Reforming the VAT System to Support the Transition to a Low-Carbon and Resource Efficient Economy

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In the wake of the EU roadmap objective, "Getting the prices right and reorienting the burden of taxation", there is a renewed debate about the use of market-based instruments at national and EU level, thus reviving the ecological tax reform approach. However, while one can observe an increasing use of individual measures that pursue both economic and ecological goals (e.g. green elements within recovery programmes), the use of permanent economic incentives such as taxes can only be described as reluctant. The paper discusses the question of ecologically differentiated value-added taxes as a useful tool to overcome tax-related cognitive barriers by connecting to an existing tax system. This is elaborated along several aspects: (a) The role indirect of consumption taxes for the economy, (b) the legal issues of the VAT system at national and EU level, (c) the rationale for the EU harmonisation efforts in this context and, last but not least, (d) the distributional implications of value-added taxes which lead to the fact that VAT is a hotly contested terrain, both as a direct incentive as well as an indirect subsidy. Following this, the paper develops a proposal for a VAT reform. To this end, it looks at differentiations between sectors, products and services, and product and service groups and corresponding cases of application in Europe. It then turns to the consumption areas that are widely indisputed identified as particularly resource *and* carbon intensive and sets out how a harmonisation of the overall system and an ecological differentiation in single consumption areas could be brought together. It is argued to focus the harmonisation efforts on adjusting and correcting distorting reduced rates and broadening the tax base to environmental criteria by expanding the Annex III of the VAT Directive. The paper was originally prepared as a report within the scope of a research project for the German Federal Environment Agency (2008-2010) and has been continually followed up since then. Methodically, it bases on new institutional economics, co-evolutionary and transition management approaches. On the basis of a systematic screening process to identify suitable instruments to promote resource efficiency, an institutional analysis examined the options to alter the framework conditions and the impacts for relevant actors in their specific contexts.

ID: 067

## Taxation or Allocation: Legislative Lessons in Australia and EU ETS

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& Yiyuan (William) Su, Hokkaido University (JP)

According to Article 3.3 of the United Nation Framework Convention on Climate Change (UNFCCC), policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. Rather than provide unified criteria to determine which measures or policies are most cost-effective under UNFCCC, it provide members more discretion in choosing cost-effective measures and policies. Australia is Annex I Parties under the UNFCCC and ratified Kyoto Protocol in 2007. It takes a series of actions to reduce domestic greenhouse gas emissions, such as the cap-and-trade program called Carbon Pollution Reduction Scheme (CPRS) in 2008; and the Carbon Farming Initiative (CFI) allows farmers and land managers to earn carbon credits by storing carbon or reducing greenhouse gas emissions from the land. In 2011, Australia Government introduced the Carbon Pricing Mechanism (CPM) and entered into force in July 2012. It affects almost 500 biggest Australia's emission sources (called as liable entities in CPM) under this scheme. CPM is a hybrid schemes with taxation and emission trading to against climate change. They charge a fixed price as carbon tax starting from 2012 to 2015; the cap-and-trade with floating price follows after the year of 2015. The carbon taxation is also a preparation method for the liable entities to mitigate their reduction cost before enter into emission trading scheme after 2015. However, reviewing the pricing records in EU ETS, large amount of allowances were delivered through the Nation Allocation Plan (NAP) and dispatched to the local controlled emitters for free. The NAP exaggerated the required allowances and acquired "hot air" from the EU. It is one of the key reasons causing low price of EU allowances in ETS. The low price leads the controlled polluters losing their incentives to reduce greenhouse gas emissions. Moreover, without binding reduction commitment after 2015, the EU ETS will lose its efficiency and failed. Therefore, the comparative study on both fixed pricing and free allocation is an important lesson for foreign legislators. This article will review and compare the different allocation approaches between Australia CPM and the EU ETS from legal perspective. Since the energy sectors acquired most of the allowances during the allowances allocation in two Parties, this article will take energy sectors as example and find out which is the most cost-efficiency way to allocate allowance.

ID: 069

## Tax Treatment of the Interaction between Water and Energy

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Water and energy have been two disjointed systems, excepting hydropower. However, a joint treatment is essential to contribute to the objectives of the fight against climate change and sustainability, as far as joint management can generate economic savings, technical improvements and energy efficiency. Various studies show that it is a priority from the economic and environmental standpoint to advance in the joint management of the systems of production, storage and transport of energy and the abstraction, transportation, storage and water purification, insofar as they are complementary and interdependent systems. Both legal and tax treatment should also be aligned to ensure effective and consistent measures that lead to best environmental practices. Nevertheless, in the field of the analysis of the way in which taxation is influencing both systems management structure, there is a lack of studies that could serve as a starting point to promote a comprehensive treatment of the two areas in an efficient way that, in turn, serve as an incentive to the overall environmental objectives of the system as a whole. In EU context, on the field of water policy, the Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action, points out that further integration of protection and sustainable management of water into other Community policy areas such as energy, is necessary. In particular, Article 9 establishes that Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs and in accordance with the polluter pays principle. Regarding energy taxation, Directive 2003/96/EC of 27 October 2003, restructuring the Community framework for the taxation of energy products and electricity does not address properly the issue. The proposed paper aims to identify, analyse and evaluate current EU legislation and also its Spanish implementation, focusing on the most important aspects of the way in which taxation negatively affects the objective of obtaining the best environmental results in the joint management of water and energy. At the same time, we aim to propose some measures in order to articulate this necessary joint approach in taxation and tax incentives instruments on the energy and water sectors.

ID: 070

## Compliance of Carbon Pricing Mechanisms – A Comparison of the British Colombia Carbon Tax and the Québec Emissions Trading Market

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Carbon pricing is often recommended as a key policy option for reducing greenhouse (GHG) emissions, and carbon taxes and emissions trading systems (the two main pricing mechanisms) are increasingly being implemented in regions around the world. There is extensive scholarship examining various elements of the choice and design of carbon pricing instruments, and many discussions aimed at assessing the relative advantages and disadvantages of each measure. One of the design issues that has received somewhat less attention is that of compliance. Compliance is an essential part of instrument choice and design, since fraud and non-compliance can jeopardize a measure's objectives. In addition, how a measure is enforced has implications for the costs of its administration. This paper offers a comparative analysis of the compliance and enforcement systems established for British Columbia's carbon tax and Québec's emissions trading system. Our goal is to offer early observations about the surveillance burden to the B.C. and Québec governments with respect to these mechanisms, and to tease out the main differences between these two policies in terms of compliance and enforcement. We explain and evaluate the surveillance mechanisms used for each measure. Some of the questions we analyze include issues relating to the rationality of actors (e.g. alignment of incentives; dissuasion versus reparation), administrative costs, and environmental effectiveness. We will also explore implications of inter-jurisdictional linking (such as the harmonization of tax rates or a market link), which raise questions about harmonization of enforcement efforts and sanctions. In the case of the B.C. tax, which has been in place since 2008, we examine the experience to date with respect to enforcement and compliance. In the case of the Québec emissions trading system, which is new but with planned link to California via the Western Climate Initiative, we flag issues such as double compliance (involving two different sets of surveillance mechanisms): administrative and environmental compliance (with distinctions to be drawn between voluntary and compulsory participation) and also market rules compliance (primary, secondary and derivatives markets). We hope that the examination of the compliance systems for the two measures, implemented within a country with reasonably similar socio-economic and market conditions, will contribute to understanding about the relevance and importance of enforcement in the choice and design of carbon pricing policies.

ID: 071

## Long Term Climate Mitigation and Energy Use in Austria – The Impacts of Carbon and Energy Prices

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In accordance to the European 20-20-20 targets on greenhouse gases (GHG), renewable energy share and energy efficiency, Austria's national targets have been agreed to a reduction of 16% in GHG within the ETS-framework, an increase to renewable energy share of 34% and to stabilize the final energy demand on the 2005 level. To meet its goals, Austria has implemented a set of measures to increase energy efficiency and the renewable energy share. But the question remains if Austria is on the path to meet all its goals. The present paper develops energy use scenarios for the Austrian economy up to 2020 and further to 2030 to serve as a source of information whether the existing measures are feasible to meet the targets or not. If not, the question remains to which path do additional measures as fuel-tax raise, higher $CO_2$-prices, increase in building refurbishments or further energy efficiency investments could lead. For the scenario projection a model approach was used and a dynamic (macro-) econometric Input-Output (DEIO) model has been developed. The model includes exogenous data from international energy price forecasts and interlinked bottom-up models which estimate energy efficiency developments. The model is linked to physical energy demand of industries, price and trend-depending inter-fuel substitution functions as well as the demand for durable goods and energy demand of private households. This framework allows simulating the effects of price changes (as $CO_2$-certificate prices, mineral oil tax), efficiency developments (due to changes in the set of measures) on the Austrian final energy demand. We find that the existing measures do not lead to a stabilization of the final energy demand and further measures only lead to relative decoupling of energy use and economic growth.

ID: 072

## "A Template for the World": British Columbia's Carbon Tax

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1. Introduction: In the late 1990s, the Mountain Pine Bark Beetle launched an assault on British Columbia's forests, particularly on Lodgepole Pine, a common tree species in the Province's interior. The infestation spread quickly, thanks to the relative disappearance of winter temperatures colder than minus 35 °C that historically had prevailed for days to weeks in most years. The absence of severe cold snaps resulted in a proliferation of beetles that has now destroyed some 700 million cubic metres of mature pine trees over an area four times the size of Denmark. Drawing on high-level scientific advice in the mid-late 2000s, the Government of BC accepted that the beetle outbreak had been facilitated by warming associated with greenhouse gas emissions, and acted to reduce fossil fuel use by introducing the first broad-spectrum carbon tax in North America on July 1 2008. 2. Structure of the tax: The carbon tax was designed around three primary elements: broad coverage across the range of fossil fuels combusted in the province; revenue neutrality; and a low initial rate (CAN$10 per tonne of $CO_2$ equivalent emitted) that would increase $5/tonne annually over the initial five-year term of the tax, to $30/tonne as of July 1, 2012. The revenue neutrality provision required that every penny of the tax had to be used to reduce other taxes in British Columbia. 3. Impact on emissions: The tax appears to have had a significant influence. Analyses conducted by the think tank Sustainable Prosperity at the University of Ottawa, using Statistics Canada data, show that per capita fuel consumption in British Columbia between July 1, 2008 and June 30, 2012, fell by nearly 18% *relative to the rest of Canada*. While the carbon tax cannot be definitively fingered as the reason for all of this decline, the data suggest is at least a major cause (no other plausible explanations have emerged). Moreover, the per capita consumption of aviation fuel in BC - the only petroleum fuel not subject to the C tax because it is largely combusted outside the province - *stayed unchanged* during the same period relative to the rest of Canada. These data imply that well-designed carbon taxation schemes like that now in place in British Columbia yield positive results in mitigating greenhouse-gas emissions from a modern industrialized economy, an economy that in fact has kept pace with the Canadian average since the C tax was imposed.

ID: 073

## Energy Efficiency Policy vs Carbon Taxes – A Comparison of the Irish Case

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This paper examines the available data on energy efficiency improvements in the Irish private residential sector in an attempt to compare and assess the effectiveness of various combinations of economic instruments. A carbon tax has been in place in Ireland in several phases since 2010 at a rate of EUR 15 per tonne of $CO_2$ (with increases to EUR 20 on different fuels), covering most $CO_2$emissions from the non-traded sectors (mainly transport, heat in buildings and heat and process emissions by small enterprises). Prior to the introduction of the carbon tax in 2010 there were a number of schemes in place to tackle fuel and energy poverty of low-income householders – a Warmer Homes scheme (fuel poverty), delivered by community organisations, and a Home Energy Savings (retrofit grant) Scheme. The government announced increases in grants for energy efficiency in tandem with the introduction of the tax, overseen by a new National Energy Efficiency Retrofit Programme, and budgets for both schemes were also increased during this time (Department of Finance, 2010). EUR 115 million has been spent to date on retrofit grants (Sustainable Energy Ireland, 2013) which has a clear focus on supporting domestic energy efficiency. The uptake of these and earlier grants and their effectiveness are compared with the information available on the environmental and economic effectiveness of the carbon tax with reference to the fiscal crisis. Over recent years there have also been other instruments (mandatory energy rating of houses for sale or rent, information campaigns, voluntary targets) and the interplay between these instruments is discussed. According to the IEA (2013), 80% of the economic potential to improve energy efficiency remains untapped in the period up to 2035 in the buildings sector, and the market failures that impede EE investment are discussed in the context of the instruments employed in Ireland. Policy recommendations on the complementarity and effectiveness of the various instruments are made based on the conclusions of the case study.

ID: 075

## Motivating Progress on Environmental Tax Reform through Coalitions of Like-Minded Countries

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The momentum behind environmental tax reform (ETR) has continued to grow over the past two decades. What began as an exercise among a small vanguard of European countries has gradually expanded to encompass a number of countries and regions across the globe. Historically (with due exceptions), countries have progressed the ETR agenda on their own, in some cases inspired by efforts in other countries or sometimes held back by a lack of action in others. As we look to the future, different approaches to ETR can be considered to ensure further progress. One option that could help increase the effectiveness of ETRs, overcome obstacles such as competitiveness concerns and institutional barriers such as the fiscal unanimity rule in the EU, is to encourage multi-country cooperation and coordination through 'coalitions of like-minded countries'. Such coalitions would be voluntary initiatives, bringing together different groups of countries (and relevant actors) with similar interests in a particular thematic area. Within each theme, more specific focus areas could be identified around which a smaller group could collaborate to explore potential approaches to issues of common interest. Varying forms of cooperation are likely to be needed in relation to different resources, materials and pollutants. Cooperation is also likely to be more useful in certain circumstances and can be structured according to the issue at hand. Some issues are more amenable to collaboration between neighboring countries (e.g. to reduce the risk of fuel tourism across borders, the leakage of products or activities), some may be more suitable to a multi-country or regional approach (e.g. marine litter in the Baltic Sea, North Sea or the Mediterranean), while others could focus more on common challenges independent of geography (e.g. fiscal consolidation needs) or on general pan-European concerns (e.g. climate, energy security, biodiversity). This paper will present the results of a recent study by the Institute for European Environmental Policy (IEEP) for the Ministry of Infrastructure and the Environment of the Netherlands (IenM) which explores where further greening taxation in Europe could be appropriate and what could drive this agenda. It will discuss the study's proposals to establish coalitions of like-minded countries in a number of thematic areas, how to engage action and take this initiative forward in the years ahead.

ID: 076

## Comparative Study of Policy Making Process on ETR/Carbon Tax between Germany and Japan

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More or less after 20 years of discussion, Germany and Japan introduced an Ecological Tax Reform (ETR)/carbon tax. Although both countries share many common aspects in economic and political system, the year of introduction and contents of the two tax systems are quite different. The German government introduced the ETR in 1999, aimed at sending a price signal and designed tax revenue to be used for reducing social security cost, while the Japanese government introduced the carbon tax (officially called "Tax for Climate Change Mitigation") in 2012, aimed at generating financial source for climate change mitigation and so designed as a revenue increase type with relatively low tax rate. When one policy is considered, not only rationality of policy such as effectiveness, efficiency and influence to economy but also personal or organizational rationality such as economic benefits and securing or improving his/her/their position are pursued. It is possible to see that these rationalities are defined by political, social and economic circumstances, policy ideas as well as institutions which include both formal organizations and informal rules and procedures that structure conduct. Therefore, by investigating the policy making processes on the ETR/carbon tax in Germany and Japan, this paper aims at revealing the role of related actors including political parties, public administrations, experts, industries and NGOs and the characteristics of institutions in the two cases. And then, by comparing these two cases, we try to examine factors which promote, but also hinder or limit policy changes. Because both countries practically chose a basic framework for the tax system quite before their introduction and made a detail design of the ETR/carbon tax in a short period of time on the premise of the introduction, our analysis mainly focuses on these 2 stages, yet as far as of relevance to our analysis we also consider other later stages, too. With regard to policy ideas and policy changes, conception methodologies will be applied.

ID: 078

## The Policy and Politics of Implementing Environmental Fiscal Reform in Europe between 1990 and 2012

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This paper is a synthesis of the evidence relating to the economic, environmental and social effects of environmental fiscal reform (EFR) in theory and in practice, as implemented in Europe between 1990 and 2012. On the basis of this evidence the paper addresses objections that are commonly raised in respect of EFR including carbon leakage, distributional impacts on households, erosion of the tax base, and administrative and transaction costs and bureaucracy. It explores these and other barriers to EFR and how they have been addressed. On the basis of this evidence it then makes some suggestions as to why EFR has not been more widely implemented. One recent rationale for carbon-energy taxation has been its use, along with other EFR instruments including subsidy reform, as a means to reduce budget deficits and this paper evaluates the advantages and disadvantages of EFR in respect of this objective in relation to alternative approaches. Finally, the paper lists best practice examples of EFR instruments – not only environmental taxation but other EFR instruments as well – and highlights the lessons learned.

ID: 079

## Carbon Tax and Equity Issues in the European Union: Old Debate, New Insights

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More than two decades of practice and research on environmental taxes demonstrated that the regressive effects of carbon taxes can be offset by good policy design and ingenious compensation measures. However, in a number of European countries, carbon taxes are still being opposed because of alleged negative distributional effects. A gap remains between research and policy, which still needs to be addressed. A comparative analysis of EU Member States' strategies to compensate low-income households and vulnerable businesses can thus prove useful for policy makers of countries which did not green their fiscal system yet. *What can European countries learn from each other in terms of carbon tax compensation measures? What different types of recycling methods have been used by EU countries and what were their social and environmental impacts? Is there any relationship between the price of energy, the level of household energy poverty or the competitiveness of industries among EU member states?* This paper will address the following questions in a three step approach. 1) The study first reviews existing mechanisms to support vulnerable households and businesses in European countries, which established carbon taxes. It will develop a typology of the different types of compensation mechanisms put in place. Preliminary research shows that two types of compensation mechanisms can be distinguished: internal compensation (such as tax rebates) and external compensation (such as social security transfers (Chancel, 2013). The environmental, micro- and macro-economic impacts of each type of compensation mechanism will be assessed. 2) The study then focuses on the determinants of household and business vulnerability to energy among European member states. Using a combination of novel datasets, the research assesses the relative role of energy prices vs. other factors (e.g. inefficiency of housing stock) in driving energy vulnerability levels. Preliminary research suggests that there is a decorrelation between the level of energy prices and economic actors vulnerability towards energy. Countries with high energy prices can have much lower levels of energy poverty rates than average. Drawing from step (1), the research will show the role played by compensation measures to reduce energy vulnerability in the context of high energy prices and high energy taxes. 3) The study finally focuses on political debates over carbon taxes and their equity impacts in European countries. Drawing from step (1) and step (2), the research highlights arguments of pro and anti-carbon taxes among European countries and reveal how they mobilized equity argument and show what types of pro-carbon tax discourses won in the political debate.

ID: 080

## Understanding the impact of Environmental Tax on the Competitiveness of Enterprises: A Case Study from China

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The paper aims to study the impact of environmental tax on the competitiveness of enterprises under the scenarios of environmental taxes discussed in China, including a carbon tax. We capture the impact of environmental tax on the competitiveness of enterprises through two dimensions: cost and products differentiation. Environmental tax directly affects cost in two aspects: potential cost increase caused by environmental tax (C1) and the importance of cost in competitiveness of enterprises (C2); the differentiation impacts on enterprises by environmental tax can be summarized as: importance of differentiation on competitiveness (D1) and importance of environmental factors in differentiation (D2). Then we analyze the four industries in a case city in China (represented by S City) based on the environment – competitiveness matrix (ECM), using principal component analysis method to make quantitative analysis about corresponding indices of the two dimensions in cost, applying the result to cost impact and differentiation matrices, determining the type of enterprises in the two matrices and finally judging the positioning of enterprises in ECM. We find power industry and cement industry are more vulnerable to the threat of environmental tax, and the Iron & steel industry and pharmaceutical industry are less threatened by environmental tax.

ID: 081

## Constraints and Possibilities for Environmental Taxes in Spain

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In this paper we present a story of energy/environmental taxes in Spain and confront it with the existing empirical evidence on their effects, degree of energy dependence and main environmental problems. We enumerate some factors that may be behind a limited use of these fiscal instruments in Spain, also exploring the preferences of citizens on these instruments. Given the current favorable context for a more intense use of energy/environmental taxes in Spain, the paper concludes with some ex-ante simulations on a more intense use of environmental taxes and green tax reforms, taking into account the role of citizens' preferences and the institutional (quasi-federal) setting of Spanish public administrations.

ID: 082

## Payment for Ecosystem Services – Compensatory Mussel Production and the Provision of Ecosystem Services

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Voluntary market based policy instruments such as payment for ecosystem services (PES), carbon or biodiversity offsets, wetland banking or certification schemes have primarily focused on establishing incentives that would change land use behaviours, either in order to enhance habitat conservation or to improve the delivery of a bundle or specific types of ecosystem services from terrestrial habitats. Few examples, however, exist on the application of voluntary market based policy instruments in coastal and marine environments in general and for PES in particular. Long-line mussel farming is a novel measure that in principle works as a mitigation tool for removing excess nutrients in coastal waters: when harvesting mussels, nutrients are extracted from the water body. It has been shown in a full-scale test production cycle from Limfjorden, a fjord in Denmark that compensatory mussel production is a cost-efficient measure compared to the most expensive land-based measures. In this paper, we investigate the perspectives for introducing a Payment for Ecosystem Services (PES) scheme in the case of compensatory mussel farming. PES is a market-based voluntary incentive that works through conditional performance contracting between a provider of ecosystem services (in this case the mussel producer delivering nutrient mitigation services) and one or more buyers of ecosystem services. We look at two different types of PES: With off-set and without off-set applied to the case of ecosystem service provided by blue mussels filtering and sequestering excess nutrients. In the case of off-setting, buyers of the nutrient mitigation services are private agents (farmers) who are allowed to increase nutrient application on their land if they purchase equivalent amounts of off-sets from mussel farmers. In the case of no offsetting, the principal (state authorities) contract mussel farmers and fishermen to remove nitrogen from the water body through mussel farming/fishing. We investigate the feasibility of the different PES designs using a principal-agent framework and providing indicative insights as to the willingness to pay of farmers and the private costs of providing such an ecosystem service. Aspects of asymmetrical information, institutional, informational and technical complexity, information rents and additionality will be analysed.

ID: 083

## Potential for Environmental Fiscal Reform in 12 Member States – Key Issues

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The potential for environmental fiscal reform in 12 EU Member States has been surveyed with the aim to provide supporting evidence for new country specific recommendations in the 2014 European Semester process, regarding environmental tax reform. The study approach included the development of a set of 'good practice' environmental taxes, which, when applied to the Member State, were used to estimate future revenue potential. The combined results for the 12 EU Member States suggested that in 2016 the revenue potential was estimated to be around €35 billion, or 0.63% of the estimated GDP for the 12 countries combined, rising to €101 billion in 2025 (in real 2013 terms), or 1.57% of the combined GDP. During the course of the study a number of key issues relating to various environmental taxes were identified. This paper reviews these issues and outlines the key messages that arise for policy makers. The key issues related to, firstly, the revised Energy Tax Directive and the implications of harmonising the rates by energy content. Secondly, significant variation in the type of vehicle taxation across the Member States was identified. As there is a lack of clear guidance from the EU on whether circulation or registration taxes are preferred, identifying 'good practice' transport excluding energy taxes was problematic. Thirdly, one of the key environmental taxes that appeared to be low for most EU Member States, despite there being relatively sound evidence regarding the environmental externalities, relates to air pollution. Finally, the lack of clear definition of environmentally harmful subsidies created a barrier to fully mapping the subsidies, and valuing potential foregone revenue across the EU Member States. One specific source of uncertainty was the varying application of whether exemptions were classified as implicit subsidies, for example relating to energy tax exemptions and poverty.

ID: 084

## Complementarity Modeling of Overlapping Biofuel Policies in the United States: Interaction between Compliance Credit Markets

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Petroleum products such as gasoline and diesel fuel dominate the transportation fuel market in the United States. To counteract this, policy makers in the recent past have provided a number of support mechanisms in order to grow a domestic biofuel industry, which is now one of the world's largest. One of the most significant policies in the US is the volume mandate specified within the Renewable Fuel Standard (RFS). However, the RFS is not the only policy support; state-level programs, most importantly California's Low Carbon Fuel Standard (LCFS), are also driving the use of low carbon transportation fuels. Different categories of fuel are eligible for different levels of support under these policies; but the long-term goal of these programs is to drive the development of advanced biofuels (those with the lowest carbon content). To allow flexibility in the way the market complies, both of these programs contain compliance-credit trading mechanisms. The compliance credit for the RFS is known as a renewable identification number (RIN); the compliance credit for the LCFS is simply referred to as a LCFS credit. In situations where one or both of these fuels policies may be binding the price of these credits may be significant. As such, the revenue stream that an advanced biofuel producer would see from generating a RIN or an LCFS credit could make their fuel economically competitive with traditional petroleum based fuels. If supplied in California, many biofuels would be able generate both a RIN and an LCFS credit, further enhancing their production economics. Beyond the RFS and the LCFS there are a number of other overlapping factors that impact the use of biofuels for transportation, notably the 'blend wall' (the 10% blend limit of ethanol in gasoline) and a complicated system of tax credits. All of these overlapping policies will directly affect the price of both the RIN and the LCFS credit. To combine all of these market dynamics a novel model was formulated as a mixed complementarity problem (MCP) and can be thought of as a tool to understand the least-cost compliance strategies for rational market participants. Regulators track RIN and LCFS credit prices carefully because they are a measure of the cost of compliance, and this tool was designed to allow policy makers at both EPA and the California Air Resources Board to compare policy scenarios and study the effects of key market variables on RIN and LCFS credit price behavior.

ID: 085

## Assessment of the Impact of Motor-Fuel Taxation on Transport Behaviour in the Czech Republic using an Estimated Microsimulation Model

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This paper presents a microsimulation model, which is used for evaluation of regulation of environmental external costs of transport. The model integrates estimates of environmental external costs, estimates of behavior of households and public transport agencies and marginal costs of public funds. The model is used to gauge impacts of changes in motor fuel taxes on fuel consumption, GHG emissions and on public finance in the Czech Republic. The paper takes seriously the uncertainty in parameter values and employs global sensitivity analysis techniques to deal with it. The paper concludes with the identification of the importance of various parameters for the model outcome. These results can bring useful information to policymakers and other stakeholders concerning the relative merits of directing research.

ID: 086

## Fault Lines between Fees and Taxes – Learnings for US and EU Climate Change Policy

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This paper analyses a regulatory impediment for linking of emissions trading schemes that arises in the form of auction rules because of differences in environmental fees and environmental taxation rules at both sides of the Atlantic. Besides a functional comparative law approach comparing US and EU tax law, a law and economics approach is used to address the economic aspects of linking of emissions trading systems. In the US, Environmental Protection Agencies in various states have been charged with the task to establish a greenhouse gas emissions trading system. As a result two systems emerged: the Regional Greenhouse Gas Initiative (RGGI) in the north eastern states and the Western Climate Initiative (WCI) comprising California and several Canadian provinces. The Environmental Protection Agencies do not have the authority to establish taxes but are permitted to levy environmental fees. In both systems auction schemes with a 'reserve price system' were introduced. In a reserve price system the government does not sell allowances if the competitive bidding price is below a predetermined sales price. In both US emissions trading schemes court cases arose in which plaintiffs challenged the legality of introducing auctioning of greenhouse gas emission allowance auctions (California Chamber of Commerce v. Air Resources Board, Thrun et al. Index No.: 4358-11; RJI No.:01-11-104776). In its tentative decision the Californian Court ruled that auctioning constitutes a 'fee' rather than a 'tax' and that actions of the Environmental Protection Agencies were thus lawful. In the EU the European Commission avoided to even consider reserve price auctions when it analysed structural reform options of the Under the European Emissions Trading System (EU ETS). Possibly for fear that the introduction of a reserve price auction system would have transformed the EU ETS into a taxation measure. This is problematic for the Commission because tax measures must be decided upon by unanimity in the European Council, entailing that all Member States must agree upon such rules (Art. 311 TFEU). This renders the question of this paper if auctions are to be qualified as fees or taxes very relevant in the EU context. Moreover it will be analysed if the differences between the US and EU qualifications of environmental taxes and fees are indeed constituting a bar to linking emissions trading systems.

ID: 087

## From Decentralized to Integrated Carbon Taxes: Lessons from Tax Policy in the Canadian Federal System

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Greenhouse gas emissions contribute to climate change and global warming regardless of where emissions occur. The global nature of this externality represents a serious challenge to the development of effective climate change policies. Within many countries, climate change policies are implemented at the subnational, rather than national, level. This leads to a policy landscape that is often fragmented, ineffective at reducing emissions, and not cost-effective. This is certainly the case for Canada. Federal and provincial governments are proposing and implementing their own climate initiatives, more often than not without taking into account what other governments, and levels of government, are doing. To illustrate, British Columbia introduced a carbon tax in 2008, while Quebec introduced a cap and trade scheme in 2013. Canada is a highly decentralized federation; provincial governments have significant taxing powers, co-occupy most major tax fields and share responsibility for the environment with the federal government. Climate policy, including carbon taxes and permit trading schemes, can be implemented by either or both levels of government. So, while the climate policy outcome in the Canadian federation is not particularly surprising, from an economics perspective, it is arguably more costly, less efficient, and less effective at achieving emissions reductions than a national level, or highly coordinated, approach. The central question in this paper is "Is the current patchwork of ineffective and inefficient climate change policies the unavoidable price of Canada's particular brand of federalism?". To answer this question, the paper reviews federal and provincial sales, personal and corporate income tax systems. These tax systems have been characterized as uncoordinated, inefficient and costly to administer and each has undergone a transformation into a more integrated and efficient federal-provincial system. General sales taxes, for example, were uncoordinated (between federal and provincial governments and across provincial governments) and inefficient for many years *before* and *after* the introduction of the federal government's GST in 1991. However, by 2011, a more integrated, and efficient, federal-provincial sales tax system now exists. Using the lessons learned from the review of tax policy in the Canadian federation, the paper considers whether such a transformation is likely or feasible in the case of climate change policies.

ID: 088

## Econometric Analysis of the Impact of Fukushima Nuclear Disaster

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This paper aims to estimate the impact of Fukushima Daiichi nuclear power plant (1F) disaster on land prices of 532 sites in Fukushima and adjacent Miyagi Prefectures, using the time series data from the Land Market Value Publication and the Publication of market values of standard sites by prefectural government from 1992 to 2013. We employ the approach that combines the time series analysis and the Feasible Generalized Least Squares (FGLS) in order to address the spatial autocorrelation problem, which violates the assumption of random sampling. That is, using the time series data from 1992 to 2011, we estimate the prediction errors of all sites from 2011 to 2012 (the first term) and from 2012 to 2013 (the second term). Eventually we obtain the residuals, stemming from this time series analysis, with which we are able to estimate the covariance matrix of the disturbances and finally we estimate the impact of 1F disaster by FGLS. This approach is capable of overcoming the spatial autocorrelation problem without the arbitrariness of a researcher. Usually a researcher constitutes a spatial matrix to address the spatial autocorrelation but since she can considerably freely constitute it, there always exists some kind of arbitrariness. Employing this approach, we assess the spatial distance of the impact of 1F disaster from itself and the extent of its impact. In order to show the extent of its impact as a shock with sigma unit, we divide the impact of 1F disaster; we calculate using our regression equation, by the standard error of the corresponding prediction errors, which makes it easier to compare the fluctuations of land prices thought to be caused by 1F disaster with those before 2011. We define the set of sites where the land prices have decreased in more than 5 percent as the 1F-affected area, which in the first term reaches 46 km from 1F and in the second term extends to 68km, what the result of this paper shall show. Additionally, we also find that in both terms a large number of sites in Fukushima Prefecture suffer less than negative three sigma shocks, extremely severe ones, whereas there are few sites in Miyagi Prefecture suffering such severe ones.

ID: 089

## Environmental Tax Policy and System Dynamics Modelling for Water Management in the 21ST Century

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Water management in the 21st century requires new and innovative methods in order to address the needs and usage of this essential and finite resource if sustainable levels of potable water are to exist. This study offers a new way of designing policy within a systems framework, examining the effects of various policy instruments as they apply to the unconventional natural gas industry. As the world's population continues to rise at a rapid rate, so does the demand for energy and the world is currently witnessing a significant reliance on unconventional natural gas extraction to meet this demand. Society, the environment, and the energy industry – as just one branch of the economy, are all largely dependent on freshwater supplies; however, the available supply of potable water on the planet remains largely constant. Thus, there exists a challenge to balance the diverse needs within these highly interconnected socio-ecological systems. In order to understand and manage these relationships, new systemic models are required. Thus, this study applies system dynamics to the interactions between freshwater aquifers, the unconventional natural gas industry, and human patterns of consumption in order to develop a framework that can begin to address the complexities and uncertainties within these systems. Non-linear models based on complex systems are presented in this research project in order to identify a) archetypes – or common patterns – within the systems, and b) leverage points within the patterns where environmental tax policy might be introduced as a more effective regulatory instrument for water protection. Natural resources are typically regulated using command and control mechanisms, despite the controversy that such methods are not effective for a variety of reasons, one being the inability to promote innovation. In contrast, much of the literature supports the use of market instruments as better tools for environmental protection. The purpose of this study, therefore, is to expand the framework of policy development to include a systems approach in order to illustrate the role that market instruments can play in environmental protection. A move to such an approach is intended to provide policy makers with insight into the temporal and spatial scales of these socio-ecological systems, and thus facilitate the impetus to shift from short-term results to long-range planning.

ID: 090

## An Analysis on 2011 China' Coal Resource Tax Reform

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Coal is the blood of China's industrialization and modernization. China's Energy White Paper (2007) states that China's development depends upon coal for many years as China's energy resources are dominated by coal. Therefore, coal is a vital sector for China's energy security and growth stability. On the hand, one major source of PM2.5 pollutants is coal combustion and the extremely high levels of PM2.5 in key regions of China have triggered public concern and government action to restrict coal demand in China. As a traditional and feasible policy instrument, taxation is regarded for dealing with energy issues, and coal resource tax as an instrument for adjusting the cost gap and dealing with the externalities and market failure, leading to optimal coal consumption. This paper focuses on the new coal resource tax system enacted on 1 November 2011 which substantially raised the tax rate on coal from 0.3-5 yuan per ton to 0.3-20 yuan per ton, examines the impact of the reduction of coal production, and of increasing the Chinese government tax revenue. Firstly, the paper shows that although changing the resource tax on coal provided extraction companies with an incentive to reduce extraction subject to the new tax system, the effect is less significant. Secondly, by raising the tax rate, the reform increased coal resources tax revenue, raised local fiscal revenue, but the proportion of coal resources tax to total tax revenue is reduced. Because the new tax system also changed the resource tax on crude oil and natural gas from an amount-on-volume tax to an ad valorem tax, crude oil and natural gas resource tax revenue increased significantly. Finally, we discussed the reason that government cannot advance a change without conflicts to set 3%-5% tax rate based on coal price replaces current amount-on-volume tax to regulate the coal extraction.

ID: 091

## Technology Adoption Incentives under Endogenous Uncertainty: The Role of Carbon and Energy Policies

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We compare a carbon tax and a cap-and-trade mechanism in terms of their propensity to induce carbon-reducing technological adoption, when investments are undertaken under uncertainty on the demand and/or on the input cost sides. Risk neutral firms affect the variance and the correlation of the shocks they are exposed to through their technological choice, thereby making uncertainty endogenous. We find that uncertainty associated to a given technology always affects expected profits under a carbon tax, while under cap-and-trade this is the case only as long as shocks are not perfectly correlated. As a result, while under a carbon tax symmetric firms use the same technology in equilibrium, a cap-and-trade system might induce asymmetric adoption. This is in line with other main contributions in the field. We then proceed to apply our results to investigate the impact of a feed-in tariff that provides investors in low-emission energy technologies with a buffer against price fluctuations, and show that the feed-in tariff not only eliminates the revenue shocks of the firms subject to it, but it may also alter the correlation of the revenue shocks across firms. We find that, while a feed-in tariff unambiguously decreases technological adoption under a carbon tax system, its effects under a cap-and-trade regime are subtler. If the two technologies exhibit a sufficiently heterogeneous productivity per emission (i.e., if they are sufficiently different in terms of emission intensity), then the feed-in tariff reduces the incentives for asymmetric adoption, and provides incentives in the direction of a symmetric technological behaviour by the two firms. This can alternatively increase adoption (if the symmetric outcome prevailing under the feed-in tariff prescribes adoption), or reduce it (if the symmetric outcome prevailing under the feed-in tariff prescribes non-adoption). If, on the other hand, the technologies have a sufficiently similar emission intensity, then the feed-in tariff increases incentives for asymmetric adoption. This may alternatively entail an increase in adoption (under parameter values for which the equilibrium outcome without the feed-in tariff entails no adoption), or its reduction (under a no-feed-in tariff equilibrium entailing full adoption). These conclusions are, in our view, policy relevant, as they show that under uncertainty the adoption impact of overlapping climate and renewable energy policy tools crucially depends on the chosen carbon policy as well as on the technologies under scrutiny.

ID: 092

## Emissions Trading Enhances the Social Desirability of Environmental Improvement

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This paper investigates the role of emissions trading in terms of the impact on the social desirability of environmental improvement in an economy with transboundary pollution. We assume a world economy with N countries, which are Pigouvian, without trade. We first show that emissions trading always make environmental improvement in countries to import emission permits more socially desirable no matter how emission permits are allocated among countries at the initial time. Moreover, we assume that utility from consumption is expressed as a logarithmic function and the initial allocation of emission permits satisfies Pigouvian optimality for each country. Then emissions trading makes environmental improvement in every country socially desirable if and only if the rate of income growth of country is strictly greater than that of price rise of emission permit for the country. Finally, in this simple model, we point out that emissions trading equilibrium in general cannot be a Nash equilibrium whatever the initial allocation of emission permits is. This implies that emissions trading equilibrium is generally subject to an international social pressure to move to other states, so it is difficult to maintain emissions trading equilibrium however desirable it is.

ID: 093

## Tax Expenditures to Promote Environmentally Responsible Investment

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1. Towards an increased use of multi-targeted tax incentives: Recently, at the OECD, thirty-six countries have agreed to step up efforts to achieve the economic transformation necessary to deliver sustainable growth, including through incentivising private investment in low-carbon infrastructure and climate-resilient infrastructure. The alignment of different policies (e.g. fiscal, climate, investment and development co-operation) may support an effective partnership among governments and the private sector. Within the European Union, similar objectives could be accelerated through responsible corporate strategies. The "environmentally responsible investment" requirement must be included in the different types of tax incentives. 2. The current blurred limits affect the acceptable environmental tax expenditures: Current initiatives in the international arena (like Base Erosion and Profit Shifting), lead to distinguish a desired incentive from a gap or mismatch; and their exploitation with or without artificiality. Some taxes may be not collected willingly -where the Constitution allows it, for environmental purposes. But the benchmark for assessing if tax expenditures are consistent or not with the promotion of environmental responsibility could be global, or at least regional. 3. How to improve the control of the tax expenditures in order to promote environmentally responsible investment? It is necessary an improved control of tax incentives (both in the home and host countries, and within regional groupings). Do the tax incentives legally established to internationalize the economic activity care about possible environmental impacts abroad? Is this a matter of Corporate Social Responsibility? Taking into account comparative Law, to promote accountability, with the unilateral measures that each State can implement domestically, two paths may be explored: a better design of the environmental tax incentives, and their application under cooperative compliance schemes. 4. The complex situation in developing economies: Considering the debate on tax or aid, tax should replace aid in the long run. Nowadays, the developing countries get directly official development aid; and indirectly some environmental benefits from investments -as good governance conditions are usually imposed on aid. However, the foreign investors usually get more economic benefits in return than the aid received. If aid disappears, there is a risk to maintain the environmental protection, financing it through the investors. A step could be no tax for aid, through environmental tax expenditures suitable for sustainable development. Due to the environmental responsibility toward, within, and from the EU, some revenue losses in the home State might result in benefits for stakeholders in the host State.

ID: 094

## Can a "Price-Distorting" Tax Help Meeting Climate Change Targets by Speeding Up Substitution in Natural Resources Use?

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Efficiency in the allocation of a country's resources is one of the most important targets of decision makers. The difficulty in reaching the target depends on the fact that the market driven resource allocation is seldom optimal and that existing tax systems add further tax-induced distortions. We study how the introduction of 'price-distorting' taxes may change the intertemporal allocation of natural resources, apart from the problem of evaluating its impact in terms of social welfare optimization. We address the theoretical problem of designing a tax actually capable of speeding up the process of substituting secondary material for the virgin one in the case of a renewable natural resource, and of substituting a cleaner (and renewable) source in the case of an exhaustible natural resource. This is to say that when it comes to choosing the type of instruments to use, quantitative restrictions versus relative price changes, we rely on the latter. The proposed environmental tax should tailor the induced substitution effect to correspond to how much natural resource should be left un-extracted (such as oil) or un-used (such as forests) in order to meet the climate change target.

ID: 095

## The Paradox of the Markets' Power

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Climate change is a result of the greatest market failure the world has ever seen. Most environmentalists will agree with this statement by Sir Stern, published 2006. But two qualifications seem justified. One, if all ecological damages done to this planet where depicted as an iceberg, climate change would only be its visible tip. Climate gases concern only our atmosphere (and are not the only damage done to it, just think of other harmful gas emissions, dust, noise or excessive light pollution). We are also hurting all other eco-spheres, from water in all its forms to animals and plants over the earth's surface layers to the mining, spilling and fracking taking place below the surface. So in environmental policy debates, the first step should be to acknowledge the sheer dimension of the problem, leading to important implications for scope and power of instruments we need. Speaking of policy instruments, we are already at the second qualification. After a certain time, every market failure becomes a government failure, for lack of reaction. We should move from deliberating the problem's causes to focusing debates on appropriate solutions and the establishment of responsible governance. After extensive debate, we should recognize the paradox of markets, to be part of the problem, but also of the solution. Excluding population, growth is the major driver of environmental destruction, evidenced by the high correlation between global energy consumption and GDP growth since 1800. It would be naïve to believe that weaker instruments, like limited regulation or moral suasion, or voluntary technical innovation, could compensate the negative environmental impact of largely unregulated market dynamics. The only instruments that can neutralize and turn around the markets' destructive power are powerful market-based instruments like eco-taxes, emission trading, green subsidy reform or other green budget instruments (i.e. tolls, green purchasing etc.). Within a shift to green growth, total decoupling should be the objective. Given the dimensions of the environmental challenge, even staunch protagonists of market based instruments (MBI) cannot deny that we must combine all instruments, whether technology, life style, and direct regulation through "command and control" or indirect regulation through MBI. Markets and states need to cooperate. The paper ends by pleading for integrated policy packages called "eco-social sector strategies", a better combination of equity and sustainability issues, and a proactive EU role with the ambition to turn Europe into the greenest continent on the planet.

ID: 096

## Will the EU ETS Affect the Competitiveness between EU and Non-EU Airlines

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The European Union (EU) has pioneered greenhouse gas (GHG) emissions reduction with the establishment of an emissions trading scheme (ETS). Going even further, beginning in 2012, each airline was to hold a number of permits proportionate to the following an initial, partially free distribution among the carriers (2008/101/EC, known as the EU Aviation Directive). For fairness in competition, all flights departing from, and arriving at EU airports would be included in the trading scheme, including international (non-EU) airlines. This approach raised a series of huge reactions because a number of countries, for instance, the US, China and many other developing countries, do not have mandatory emission abatement obligations under the Kyoto Protocol. Pressure from these countries resulted in the suspension of the inclusion of aviation in the EU ETS from October 2012 for one year to allow for the possibility of the development of a Market Based Mechanism (MBM) as an alternative route for reducing aviation emissions. To accommodate the special circumstances of developing countries, European Commission revised the Aviation Directive to indicate that flights to and from third countries that are not developed countries and which emit less than 1% of global aviation emissions would benefit from a full exemption (MEMO/13/906, 2013). Due to the revision of the EU Aviation Directive, the competitiveness between EU and non-EU airlines may get in favour of outsiders. Since almost the whole network of EU airlines is covered by the EU ETS, carriers based on the EEA area would bear more costs than non-EU airlines. In this case, this paper models airlines responding behaviours in the competitive air transport market under the EU ETS to see how the emission trading will affect the aviation industry. By analysing current market participants and their market shares, we build a MYOPIC model to see what strategies competitors will choose to remain their competition advantages with the increases costs from purchasing emissions allowances and also how their business behaviours will affect the improvement of the EU ETS in the future. By modelling the effects of the EU ETS on airlines responses, we can gain insights into whether the emission trading would cause competition disadvantages and how the trading scheme can be improved for achieving both environmental and economic goals.

ID: 097

## "A Green Tax Reform in Times of Financial Economic Crisis. The Italian Attempts 2012 and 2014"

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paper presents the attempts of a green tax reform in Italy in 2012 and 2014 in the frame of a general tax reform and in times of financial-economic crisis. The Government has issued a proposal of general tax reform (Apr.2012) including for the first time ever a significant element of green tax reform, after international and national preparation work, aligned on OECD, EU and EEA analysis and policy debate. The proposal includes explicitly a carbon-based revision of the fuel-energy excise tax; the reduction, removal or reform of environmentally harmful tax expenditures (mainly fuel excise taxes); and potentially any other new measure ("incentives and green taxes") for maintaining environmental sustainability. It plans to earmark the revenue from the carbon tax to the financing of renewables and low-carbon technology diffusion. The Government proposal has been through ups and downs in the parliamentary process, finally being suspended after the Government fall and call for elections (Dec.2012); it has then be relaunched by Parliamentary initiatives and approved in Feb.2014. The Government has been granted by the Parliament the implementation powers for 12 months ("Delega Fiscale"). In the meanwhile, the Parliament has approved and the Government implemented a number of environmentally related measures, in the frame of the 2011-12 anti-crisis packages (Save-Italy, Grow Italy, Simplify-Italy): fuel excise tax increase, with a reduction of the petrol/diesel tax gap; ¼ reduction of company cars tax deductions; super-circulation tax on large vehicles (over 185 kW power); waste tariff refiscalisation; attribution of water tariffs regulation to the independent Authority for Electricity & Gas (endowed with recognized experience and know-how in energy pricing, charging and regulation); restructuring of incentives in favour of thermal renewables and energy efficiency; strengthening of the White Certificates mechanism for energy efficiency in firms; introduction of public incentives for youth employment for green growth; a small financial transactions (Tobin) tax. In the technical debate, green tax reforms seem to have advanced significantly, as is shown by the Recommendations from the OECD Environmental Performance Review Italy 2013, the States General of Green Economy (participatory process involving industry and research), environmental NGOs (e.g. WWF, Legambiente), the "European Semester" recommendations. The paper analyses the decision-making process strengths and weaknesses and the potential for new developments.

ID: 099

## Outward Foreign Direct Investments Patterns of Italian Firms in the EU-ETS

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The research question we investigate is relative to the still limited literature measuring the effects of more stringent environmental regulation on the possible increase or decrease of production abroad generated by Multinational Enterprises (MNEs). In particular, we take into consideration the role played by the EU Emission Trading System (EU-ETS henceforth). It is the central policy instrument introduced by the European Commission in order to mitigate the emergence of climate change. However, due to its nature of unilateral policy instrument, the EU-ETS raised many concerns in terms of carbon leakage, i.e. the delocalization of production of involved industries towards environmental policy-free geographical areas. The issue of carbon leakage has been recognized by the Commission which exempted from the auctioning of emissions allowances those sectors more exposed to the risk of leakage. On the other hand, however, firms who are willing to become leader in the market for CO2 allowances could expand their presence in countries covered by the EU-ETS (or other non-EU emission trading schemes) in order to employ their emission-abating (or energy efficient) technologies in a greater number of production plants. In this paper we aim at assessing whether EU-ETS has any effect on the intensive and extensive margins of outward Foreign Direct Investment (FDI) patterns of Italian firms. Using a novel panel dataset covering the first two phases of the EU-ETS and the pre-ETS period, we are able to observe the patterns of FDI by destination country of firms, distinguishing between those with plants covered by the EU-ETS and other firms. Preliminary results show that firms in the EU-ETS tend to increase their presence in countries not covered by the EU-ETS as well as in countries within the EU-ETS. Moreover, no substantial difference in FDI patterns is found for firms in sectors exempted by the auctioning in the current third phase of the EU-ETS.

ID: 100

## The EU Emission Trading Scheme: First Evidence on Phase 3

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The EU Emission Trading Scheme (EU ETS) covers about 50% of the EU's total greenhouse gas emissions. Since its start in 2005, it is the core instrument of European climate policy. Phase 1 (2005 – 2007) was, however, characterized by pronounced over-allocation. For Phase 2 (2008 – 2012), the European Commission took a more active role in approving the Member States' National Allocation Plans. As a consequence verified emissions exceeded allocation for the EU total in 2008. Due to the external shock of the financial crisis and the associated decline in economic activity and emissions the cap was only stringent in 2008, whereas the next years (and Phase 2 in general) showed again a pronounced surplus of allowances. The evaluation of the pilot phase led to essential changes in the design of the EU ETS for Phase 3 (2013 – 2020) in the context of the EU Energy and Climate Package and the new emissions trading directive respectively. For the ETS sectors an emissions reduction of 21% until 2020 was adopted. A major change compared to the first two trading periods was the proposed EU-wide cap instead of national allocation caps. In the allocation of allowances sectoral differences were, however, taken into account: The power sector generally faces auctioning from 2013 on; sectors potentially 'exposed' to carbon leakage receive 100% free allocation based on benchmarks; and other sectors receive 80% free allocation in 2013 based on benchmarks (the share of free allocation is reduced to 30% in 2020). Due to these changes, allocation was 118% below verified emissions in 2013. Despite this stringent cap, carbon prices still have not recovered and range around € 5 as of May 2014. In this paper, changes in sectoral allocation between Phase 2 and Phase 3 are analysed using allocation and emissions data from the EU Transaction Log. Furthermore, the implications of backloading (i.e. the postponement of auctions of 900 million of allowances from the beginning to the end of Phase 3 in order to stabilise the carbon market) and surplus allowances banked from Phase 2 to Phase 3 on the development of the carbon price are assessed.

ID: 101

## Decoupling of GHG Emissions from Growth – How Important are the Carbon Dioxide Taxes? A Case Study of Sweden

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Sweden introduced a tax on carbon dioxide emissions as early as in 1991 which improved the steering effect of the energy tax into low-carbon energy sources. The energy- and carbon tax is widely acclaimed as one of the main contributors to the decoupling of GHG emissions from GDP growth. There is also strong theoretical support for general carbon dioxide taxes as a cost effective climate policy that minimises the welfare losses to society. A recent overview of the literature that has been actual basis for evaluation – and decision making – gives however poor support to this notion when it comes to the Swedish case. While the GHG emissions from production continues to decrease parallel to positive economic growth, analyses of descriptive statistics of time series data of prices, disposable income and taxes indicate that the steering effect of the taxes at times have been high but is decreasing for a number of years. We recognise that there are difficulties inherent in the problem of evaluating economic instruments of such magnitude as carbon dioxide taxes and we find that ex ante evaluations of Swedish climate policy during the last two decades on macroeconomic level generally have overstated the welfare costs of GHG reductions. There are only a few ex post evaluations of the actual effects on GHG emissions from energy- and carbon dioxide taxes. The only certain ex post result that we find support for is that carbon dioxide taxes have positive fiscal effects. The results raise important questions on basis for decision making in future climate policy. While our result does not discard theoretical support for carbon dioxide tax as a cost effective policy instrument for GHG-reductions, we claim that the Swedish case indicates that there are probably a number of other factors that need to be in place to make a climate policy, which relies heavily on taxation of carbon dioxide, successful in terms of decoupling GHG emissions from economic growth.

ID: 102

## Taxation Treatment of Emissions Trading Permits

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Emissions trading schemes (ETS), also referred to as cap-and-trade schemes, have become a first choice policy response to greenhouse gas emissions and climate change in much of the world. In many cases, a major impediment to implementation is the level of acceptance from domestic business. Such concerns are based on the observation that such emissions pricing represents an additional cost to business, which is exacerbated if significant sectors of domestic industry compete with international counterparts who do not face such imposts. The treatment ETS permits within an existing tax system can significantly influence the overall cost of an ETS to business. Inappropriate treatment, including non-treatment, may lead to economic distortions that have unintended consequences. As a result, it is important that this easily overlooked aspect of ETSs is thoroughly considered and appropriate treatments integrated. This paper considers the policy issues arising under an income tax, drawing on examples implemented in practice as well as theoretical approaches that have been put forward.

ID: 103

## Subsidies to Fossil Energy Consumption in Italy: A Quantitative Assessment

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1) Foreword: the Polluter Pays Principle in the EU and Italian law: In this section the authors will recap where the PPP stands in the supranational/EU/Italian law (EU treaty, Kyoto Protocol, Italian laws and decrees, Italian Energy Strategy). 2) The energy/environmental sensitive taxes in Italy: the general rule and the exemptions: Here the authors will review in terms of structure and amounts the Italian taxes which possibly impact the environment with some comparison with other European countries. Special focus will be on exemptions from excises on energy products (mostly fuels) which benefit mainly the transport sector. A quantitative evaluation will be performed on this, based on raw data from the Treasury's accounting office (Ragioneria Generale dello Stato). 3) The non-market portion of Italian energy bills: Here the authors will carry out an introductive analysis on how the Italian gas and power bills are composed. Focus will be on distinguishing the market based portion of bills (due to the wholesale energy commodity production/import price) and the administrative (rules driven) portion. The latter bears non-proportional charges to cover system costs which are partly not linked to the energy sector and whose share is growing in time with respect to the total bill. A non-proportional charge implies a cross-subsidy among clusters of customers. The authors will perform a quantitative evaluation of the most relevant amongst these cross subsidies, based on raw data from the Italian independent energy regulator. (In)consistency of these subsidies with energy efficiency and decarbonization policies will also be investigated in this section. Furthermore a rough analysis of anticompetitive effects will be carried out. 4) Interaction between carbon subsidies in axes and energy bills and support policies to renewable energy sources and energy efficiency: This section will investigate some qualitative effects of the co-existence in Italy of tax/bills subsidies to fossil energy and subsidies to renewable energy sources and energy efficiency. A simple microeconomic approach will be carried out to see how a mutual reduction of both subsidies to fossils and renewables can be neutral in terms of competitiveness for a biomass-fed electricity producer in an auction-based electricity market. 5) Conclusions: Energy taxes and bills in Italy are counterproductive in terms of decarbonization and efficiency policies and distort competition. An estimate of direct and indirect subsidies to fossil energies and some policy recommendations are carried out in this section.

ID: 104

## Congestion Tax in Sweden – Economic and Environmental Effects

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A congestion tax is currently in place in two cities in Sweden: Stockholm (since 2007) and Gothenburg (since 2013). The purpose of the tax is primarily to reduce traffic congestion but also to improve the environment through reduced emissions and lower noise levels and contribute to financing the regional infrastructure. The congestion tax is charged for vehicles registered in Sweden that are driven in and out of the city centre on weekdays during daytime. No tax is charged on weekends, public holidays, on a day preceding a public holiday or during the month of July. Each passage, in or out of central Stockholm, costs SEK 10, 15 or 20 (in Gothenburg SEK 8, 13 or 18), depending on the time of day. The maximum amount per day and vehicle is SEK 60. The Swedish Parliament has decided on some changes to the system in Stockholm from January 2016. The maximum tax amount will be increased to SEK 35 per trip and to SEK 105 per day and the area covered by the tax will also be extended to a major highway passing through Stockholm. Vehicles are automatically registered at control points' during the periods when the tax is charged. I will shortly explain the system of congestion tax in Sweden, focusing on administrative aspects, as well as elaborate on our experiences thus far in terms of economic and environmental effects. A tax decision, by the Swedish Transport Agency, includes all of the passages subject to the tax that a vehicle has made during one calendar month. The tax decision is made in the middle of the next month and a payment slip is issued to the owner of the vehicle. A surcharge of SEK 500 is applied if the tax is not paid on time. It is not possible to make a congestion tax payment directly at a control point. The introduction of the congestion tax has until 2013 in Stockholm led to a 20 percent drop in traffic in and out of the city centre, resulting in a reduction of the $CO_2$ emissions related to vehicle use of between two and three percent in the Stockholm county. The congestion tax has only been in force in Gothenburg since 2013, but the statistics still show a clear drop in the traffic in and out of the city centre.

ID: 105

## The Effects of Carbon Taxes on Investments in Smart-Grids and Consumer Engagement

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Overview: Present global challenges, like the need to reduce GHG emissions to face climate change, are questioning the architecture of current power systems. Smart-Grids - i.e., the idea of introducing I&CT features into the power network, so that it will be able to manage electricity and information, with the aim of exploiting local electricity-production possibilities in line with “glocalization” trends and of changing consumer energy-demand patterns – have the chance to induce qualitative changes in the system architecture and open to new organizational spaces/times of action. The aim of the paper is to analyse the potentials embedded in grid innovation and consumer engagement in the light of climate change mitigation tax policies. Methods: The analysis is performed with an integrated-assessment-model, the WITCH Model – a long-term inter-temporal optimization model integrating economic and climate issues - extended to include the option of investing in Smart-Grids. We test 4 stabilization policies and a business-as-usual scenario. We consider a set of taxes on GHG emissions aimed at reaching two climate stabilization targets whereby GHG concentration cannot exceed 450 or 550 ppm $CO_2$-eq in 2100, and two timings with policies starting now or in 2030. Smart-Grids are modelled through: (a) the increase of share of renewable power manageable by the network; (b) the reduction in the costs of customer relationships via Smart-Meters; (c) electricity generation with residential photovoltaic, (d) “virtual” electricity generation through demand-side-management policies. Under the 5 climate-policy scenarios we evaluate: (i) the economic attractiveness of the innovation of the power network via Smart-Grids, (ii) the optimal time and sizing of investments in the options newly available, (iii) the implications on the optimal electricity-mix, (iv) the tax revenues, (v) the additional extra-dividends that can be generated by the taxes when favouring investments in Smart-Grids and consumer engagement, looking, qualitatively, at the additional effects on the environment, technology, economics, organizational structures, society and geopolitics. Results**:** We find that it becomes optimal to invest in grid innovation, in order to start gaining the management benefits and to take advantage of consumer generating opportunities (of electricity and of “nega-watts”), starting from now. The additional benefit of being able to increase the penetration of renewable energy sources is exploited starting from 2035. Renewable sources reach, under all scenarios, very high shares in the electricity mix. Moreover, our qualitative evaluation highlights that the innovation of the electric power grid via Smart-Grids, by means of consumer engagement and empowerment, can induce very interesting extra-dividends that should be considered by policy makers.

ID: 106

## Taxing Emissions from Maritime Fuels Unilaterally

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Global tax exemptions for maritime fuels cause large and growing fiscal losses, distorted trade patterns, significant greenhouse gas problems as well as local emissions. Yet, sea trade is so mobile as a tax base, and both the price elasticity of demand as the competitiveness concerns of sea-trading nations so great, that it is widely considered impossible to introduce maritime fuel taxes unilaterally. Even major advocates for the removal of tax exemptions for maritime fuels, such as the World Bank and IMF, caution that such action would only be possible with global coordination. But reaching such an agreement within G20 and IMO has proven impossible and so the tax exemptions persist with all their severe consequences. This article describes a mechanism for taxing maritime fuel emissions without the need for global coordination. Through economic and legal analysis, we show a way to realise maritime fuel taxes without cross-border tax avoidance problems. This mechanism is robust even when the initial coalition of countries adopting it is small. The rest of the world has an incentive to join the scheme instead of undercutting fuel prices of those sea ports within the coalition. The mechanism neither distorts trade shares, nor shipping routes. It complies with EU, US and WTO law. The tax administration systems would use existing structures and procedures at customs agencies and international sea transport surveillance systems, thereby limiting administration costs and compliance costs to a minimum. The potential government revenue gains are large. In the case of Europe, it is also likely that this extra revenue would not fall prey to earmarking, as the EU has an existing legal framework for similar revenues that would naturally apply a fiscal rule that fits well here. Structure: The article describes and models the mechanism, and analyses its properties using existing evidence on price elasticities for maritime fuels and cargo discharging services. It analyses the incentives of ships to stop refuelling in the implementing coalition of countries, and of countries outside the coalition of implementers to undercut the fuel prices of those insiders, and from which coalition size onwards outsider countries have an incentive to themselves join the coalition. The article then turns to a legal analysis of the possibility for implementation in US and EU, respectively, followed by an analysis of the compliance costs and administration costs of implementing the scheme within the existing legal framework for sea trade in these regions. Lastly, we analyse the efficiency properties and the legal feasibility of different arrangements for the use of revenues from the scheme.

ID: 107

## The Transition to the Low-Carbon Society: What Role for Taxation?

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This paper explores the potential of linking two theoretical bodies to each other, on the one hand the theory of the internalization of externalities by the use of regulatory taxation, and on the other hand (sustainability) transitions thinking and transitions theory. For almost a century, scholars have been emphasizing that taxation is one of the most effective instruments to internalize environmental externalities created by our economic and societal systems (such as climate change; Pigou, 1920 and 1960). Moreover, since the introduction of the concept 'Environmental Tax Reform' (ETR), the debate on the use and the effectiveness of environmental taxation has been broadened from environmental impact as the sole criterion to evaluate this instrument, to including other evaluation criteria, such as employment impact (socio-economic), distributional impact (social), competitiveness impact (economic) and fiscal neutrality (public finance). On the other hand, contemporary sustainability challenges, such as climate change, are increasingly analyzed from the perspective of systems and transitions thinking (e.g. Grin et al., 2010), emphasizing the need for socio-technical system change and long-term goals for analyzing sustainability issues. Although both theoretical concepts each have a vast body of literature behind them, barely any article can be found combining the two. In this paper we will carry out an exploratory analysis of the potential of taxation as an instrument to support sustainability transitions. Our analysis starts from both theoretical bodies, identifying the points where the characteristics of both concepts combine and where they are contradictory. Questions addressed include the long term impact of regulatory taxes and there potential in a shift from one 'dominant regime' to the replacement by a 'niche'. Such a niche could take the shape of a technology, a practice, a culture or a structure (De Haan & Rotmans, 2011). Subsequently, our theoretical findings will be applied for one case of a sustainability transition process, namely the transition to a low-carbon society and a sustainable energy system. In the end, we list the strengths, weaknesses, uncertainties and future challenges with regard to the use of taxation in the field of sustainability transitions.

ID: 109

## Taxes and Other Determinants to Emissions from Road Freight Transport in Sweden

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Freight transport accounts for up to 16% of Sweden's total $CO_2$ emissions and is increasing. Road freight transport represents 35% of this number and apart from air transport, is the only transport mode that is increasing in absolute terms. This is to contrast with Sweden´s target of zero emissions from the transport sector by year 2030. The corresponding policy challenge in Sweden and abroad is further augmented by a lacking understanding about the determinants to emissions from the road freight transport sector, in particular for the last decade. Existing Swedish studies tend to be qualitative and focusing on individual explanatory factors alone, providing insufficient information for cost-effective policy design. Among the possible explanatory factors to emissions from the sector count changes in demand and in input prices such as alteration of the comparatively high Swedish taxes on energy and on $CO_2$ emissions. However, also recent changes in foreign competition due to EU enlargement may affect, through increased competition or less fuel efficient vehicles. Changed preferences for just-in-time deliveries to industry may occur as a consequence of among other fluctuations in demand. To this end, in order to enhance the decision basis for designing taxes and other policy instruments, interviews with representatives of the Swedish transport sector and a literature overview was conducted, followed by econometric analysis of the determinants to emissions in the sector, at the national level with quarterly data for the years 1994 to 2013. A co-integration time series approach was deployed, identifying the magnitude of impacts across different variables. Moreover, in contrast to the bulk of earlier ex-post studies, this analytical approach enables to differentiate between static and dynamic effects. The results highlight among other that higher GDP has a large but only short term effect on emissions, which does not change the equilibrium level of emission intensity. The separation of short term and longer terms effects of the variables provides a much enhanced decision basis for designing policy instruments, by taking into account the role that factor substitution and technological development may have to rebound the short term effects of policy changes. Taken together the results should be important in instrument design and in modelling of future scenarios aimed at supporting decision making towards a lower carbon emissions economy, in Sweden and beyond.

ID: 110

## Taxation and Innovation in Eco-Industry

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Recent stand in environmental literature considers a specialized industry that sells abatement services to polluting firms. It is shown that taxation is an important element in triggering competition in eco industry and that wrongly targeted instruments can actually worsen the environment as they may increase the market power of upstream suppliers. Little has been said about innovation incentives in vertically related markets. We consider a setting where upstream suppliers of abatement services provide not only quantity of abatement equipment but also its quality. We show that taxation is an important instrument incentivizing the eco-industry and that only when it is set at sufficiently high levels that eco-industry starts to respond by providing more efficient abatement equipment. Innovation incentives in integrated relationship are also considered. We show how taxation changes private incentives to innovation in both integrated and un-integrated case. The differences in incentives get smaller with taxation.

ID: 112

## Putting a Price on International Aviation's Greenhouse Gas Emissions. Regime Interaction between the Climate Regime and ICAO

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This article explores the regulation of international aviation's climate change impacts through the establishment of market-based instruments. Specifically, it focusses on the overlap between the two legal regimes at play, i.e. the climate change and the International Civil Aviation Organization (ICAO) regimes, with regards to carbon taxes and emissions trading. Although the need to reduce the aviation sector's contribution to GHG emissions has been acknowledged at the political and academic level, international aviation GHG emissions have remained largely unregulated. However, some attempts to put a price on emissions have taken place, most notably through the inclusion of the sector in the European Union Emissions Trading Scheme. In the international arena, negotiations over aviation sector emissions regulation are ongoing in both the climate regime and ICAO since the 1990's. In 2013, the ICAO's 38th Assembly agreed on the adoption of a market-based mechanism for international aviation by 2016, where an emissions trading system seems to be the preferred option. Nevertheless, and despite opposition to fuel taxes and charges embodied in the air transport legal system, some argue in favour of a corrective tax to address climate change induced by aviation. These developments are intensifying the debate around the nature, choice and design of economic instruments and have revealed the challenge of accommodating concepts, norms and principles from both regimes. Given the global nature of climate change, related international law-making often takes place outside of the core climate regime, conforming to the trend towards increasing fragmentation of international law and leading to situations of overlap and influence between different legal regimes. This article explores the particular aspect of interaction with regards to the use of market-based measures for international aviation, while aiming to contributing to the legal literature on environmental economic instruments. The article first summarises the legal framework for setting a carbon price on international aviation, including an overview of the different options considered to date. It then analyses the interaction between the climate and ICAO regimes, focusing on the prohibitions and exemptions around taxing aviation contained in the Chicago Convention, and the norms and principles under the UNFCCC umbrella. It is argued that the presence of market-based instruments to deal with environmental problems in ICAO has been reinforced by an interaction with the climate regime. Finally, the article argues that while *prima facie* there are some legal tensions between the regimes, there is also considerable scope for synergy.

ID: 113

## Environmentally Related Taxes and Subsidies Linked to Climate Policy

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To make informed climate policies, there is a need for data on taxes and subsidies related to greenhouse gases and the use of fossil and renewable fuels. Such data is generally not available today. To assess the impact of the economic instruments on environmental issues, it is preferable to also have data on the environmental pressure to be able to make the connection between the instrument and its effect. In the FP7 project CREEA, Compiling and Refining Environmental and Economic Accounts, we have investigated how taxes and subsidies can be linked to energy or emissions data. The aim of the work was to identify the climate related parts of the environmental taxes, environmentally motivated subsidies, potentially environmentally damaging subsidies and the environmental goods and service sector. The climate related parts of the environmental monetary accounts were used to investigate the possibility of forming a link with the emission accounts. The emission accounts include data on emissions and emission intensities, both on industry level. Regarding the environmental taxes, the most apparent link was found between the $CO_2$ tax and $CO_2$ emissions, showing how the tax is distributed across sectors and industries compared to how $CO_2$ emissions are distributed. For example households in Sweden pay 40 percent of the total amount of $CO_2$ tax but stand for around 18 percent of $CO_2$ emissions. Many different instruments are used, and the rules make them affect economic actors differently. If data on the emission permit trading was available with NACE industry categorization this would increase the possibilities for analyses on how $CO_2$ emissions are prized. Today the trade emissions data is collected on a company level, but for analysts it is only available for broader sectors rather than by economic actors. The environmental accounts data on emissions to air and environmental taxes are now obligatory for reporting to Eurostat, opening up new possibilities for comparative analyses between countries. However, there is also a need for data on general economic instruments that are not designed with an environmental purpose but that affect the environment in a potentially damaging way. The way international transports are exempted from taxes is such an example. Examples of methods to capture those instruments in statistics will be given.

ID: 114

## Developments and Opportunities for an Ecological Tax Reform in Spain

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& Eike Meyer, Green Budget Europe (BE)

1) Situation and latest developments of energy and environmental taxation in Spain: Spain is facing severe economic and fiscal challenges. In 2012, the public debt reached a level of 86% of GDP. The unemployment rate stood at 25.8% in December 2013. In this context, there is a strong need to develop fiscal strategies with the least detrimental effect on growth and jobs. At the same time, the share of revenues from environmental taxes in overall tax revenue in Spain is the second lowest among EU member states. The Country Specific Recommendations for Spain (2012) explicitly suggested increasing environmental taxes. In late 2012 the Government introduced some new energy taxes (mainly related to the electricity sector) and amended some others. In 2013 a new tax on fluorinated gases was created. 2) Opportunities and proposals for an Ecological Tax Reform in Spain: With a more general scope, in 2013, the Government also created an expert commission and asked it to develop a proposal for a reform package for the Spanish fiscal system. The final report of this commission was published in March 2014. Elements of carbon and energy pricing are considered in detail in the commissions' report. The proposals are concrete and include the adjustment of the current energy taxes and the suggestion to base tax rates on the energy and carbon content of energy products, etc. In the following months the Government will presumably decide which proposals send to the Parliament and a parliamentary discussion will then begin. In parallel, the CEPRiE ("Carbon and Energy Pricing Reform in Europe") project has Spain as one of its two main focus countries and is being developing a detailed analysis of the situation of energy taxation in the country. Besides, the project is stimulating the debate, gathering support for an ecological tax reform in Spain, and dispelling concerns about regressiveness and job losses. Within the project concrete proposals are being elaborated aimed at expanding carbon and energy taxation, and phasing out several tax deductions favouring energy consumption. The paper will present the main the situation of energy taxation in Spain and the proposals coming from the different actors, especially focussing on those arguing in favour of an ecological tax reform.

ID: 115

## Determinants to Decreasing $CO_2$ Emissions in the Swedish Residential Sector

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Cost effective policy making hinges on taking stock of the experience from previously implemented instruments. However it is particularly challenging to disentangle the separate effects of policy instruments when they are deployed in a package, an instrument mix. One such example is the Swedish residential sector, a major energy user and hence an important aspect to consider in climate change mitigation strategies. Emissions from heating in the Swedish residential sector have decreased strongly since the 1990's, mainly due to households replacing their oil-fired boilers for alternative heating systems. This experience could prove important lessons for future attempts to induce structural technology shifts. To this end, this paper presents empirical evidence on the replacement decision of the households. Possible explanatory factors to the rapid conversion rate include increasing price of heating oil and specific policies targeted at fossil based heating such as carbon dioxide tax, a long-term information campaign and a conversion subsidy. Interviews were conducted with government staff at several agencies involved in the policy, and a data set was constructed of the number of oil-fired boilers in Swedish detached houses at district level. The data was assessed with fixed effects panel regressions, on annual data for the 1998 to 2012 period. The results indicate that a higher oil price including the $CO_2$ tax, both alone and in interaction with the price of the technology substitute, had significant negative effects on the number of boilers in use. The information policy instrument shows a highly significant negative impact, suggesting that the consulting service among other lowered the search cost for the households. Surprisingly enough, the subsidy did not have a significant impact. These results should be of use for policy makers when designing policies aimed at inducing shifts in technology, both in the residential and other sectors in Sweden and beyond.

ID: 116

## Brazilian Taxation of 'Carbon Credits'

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The paper has the aim to analyze the transactions of "carbon credits" according to the perspective of countries that are sellers of these "carbon credits" as established at Kyoto Protocol mechanisms known as *emissions trading* – "the carbon market" and *clean development mechanism* (CDM). This analysis will be basically according to Brazilian tax system. The article plans to examine whether the Brazilian fiscal framework and state bureaucracy, including the fiscal federalism model, cope with Kyoto Protocol. Recognizing that developed countries are principally responsible for the current high levels of greenhouse gas GHG emissions in the atmosphere as a result of decades of industrial activities, the Protocol placed a heavier burden on developed nations under the principle of "common but differentiated responsibilities", however, in developing countries there are doubts how to deal with these transactions, how to classify them according to national legal system, how to value and tax them properly. Brazilian authorities seem to be worried if there are any distortions in the "carbon credit" transactions and give tight controls to these situations. On the other hand, with adverse consequences to the competitiveness to the development to Brazilian green, clean and sustainable economy, entrepreneurs are complaining that in Brazil it takes an average of 314 days to registered a *clean development mechanism* project in the Brazilian Ministry of Science, Technology and Innovation-MCTI while in China it takes 18 days and in India it takes 76 days.

ID: 117

## Environmental Taxation and Energy Policies: An Overview of the Brazilian Situation and its Sustainability's Perspectives

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& Saulo Carvalho, Federal University of Ceará (BR)

The article aims to analyze how the paradigm changes on the Brazilian energy policies can develop a new system of environmental taxation in regard to social-environmental demands in the country and the world. Based on a general overview of the tax policies in the Brazilian energy sector, this study searches for solutions to an increased sustainability of the sector, mainly through the development of a new taxation model on oil and its derivatives. With the recent discovery of a considerate amount of fossil fuels in rocks located in deep sea (so called pre-salt layer) and the development of extraction technologies, Brazil has been placed in the international scenario as a strategic country for the energy resources geopolitics. Besides, Brazil has one of the major hydroelectric plants in productivity in the world (Itaipu) and a great exploration potential of alternative energies, what leaves the country on a privileged position in the world, with the perspective of turning self-sufficient as energy exporter in a few decades. Although with an evolved constitution in areas such as environmental sustainability, there is no tax policy in the Brazilian energy sector regarding these aspects. Even with highly complex tax legislation in the energy sector, none of the taxes has an environmental character and only one has a non-fiscal character. Among these non-fiscal taxes is the "intervention in the economic field" that taxes import and commercialization of ethanol, oil, natural gas and its derivatives. After presenting an overview of the Brazilian tax system regarding the energy sector, special attention given to the intervention in the economic field on fuels, this article proposes to outline a new paradigm for the Brazilian environmental taxation that raises the concerns with social-environmental sustainability in the country and its economic development.

ID: 118

## The Use of Economic Instruments in Nordic Environmental Policy 2010-2013

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The Working Group on Environment and Economy of the Nordic Council of Ministers regularly publishes a comparative overview of the use of economic instruments in the environmental policies of the five Nordic countries. The most recent report was published in 2009 and covers the period 2006-2009, along with a topical report on mixes of policy instruments. This report is part of that series. The report contains two parts. Part 1 presents an overview of the use of economic instruments in the Nordic countries, and changes over the period 2010-2013. Part 2 contains a framework for investigating which elements, or instruments, in fiscal budgets might be considered environmentally harmful (or classified as an environmentally harmful subsidy). It also contains three case studies of such potentially harmful subsidies. Environmental tax reform, the adoption of renewable energy action plans and the introduction of the emissions trading system EU ETS in Iceland and are some of the major changes to economic instruments used in environmental policy in the Nordic countries. Since Iceland's inclusion, the EU ETS is the primary economic instrument to curb GHG emissions in all Nordic countries. Instruments used to reach other environmental targets, such as waste reduction and marine preservation, have remained relatively unchanged since 2009, or have seen small changes. Three environmentally harmful subsidies are assessed based on the fiscal and environmental impact of reform: 1) lower energy tax on diesel used in transport compared to petrol, 2) EU direct payments to farmers, and 3) over-allocation of allowances in the EU Emissions Trading Scheme.

ID: 119

## Do You Get What You Pay For With U.S. Climate Change Tax Provisions?

Hans Sprohge, Wright State University (US)
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In 2008, the United States Congress directed the Department of the Treasury to work with the National Academy of Sciences (NAS) to undertake "a comprehensive review of the U.S. Internal Revenue Code to identify the types of and specific tax provisions that have the largest effects on carbon and other greenhouse gas emissions and to estimate the magnitude of those effects." On June 20, 2013, the NAS released a report of its findings entitled Effects of U.S. Tax Policy on Greenhouse Gas Emissions. The report states that the combined effect on greenhouse gas emissions of current U.S. tax provisions is minimal. Their combined impact is less than one percent of total U.S. emissions and could be either positive or negative. The Department of the Treasury estimates that the cost, for virtually no environmental benefits, to the U.S. taxpayers of the combined energy sector tax subsidies in 2011 and 2012 totaled $48 billion. This paper will review the NAS report, discuss the findings, and recommend changes to U.S. energy tax policies which may eliminate wasteful spending and have more of a positive impact on the environment.

ID: 120

## Responding to Climate Change Impacts: Can Tax and Other Fiscal Measures Advance Adaptation Efforts

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Will humans go the way of the dinosaur? Extinct? Or will we (can we!) adapt? Those subject to the adverse effects of climate change will only survive by *adapting* to changes in their environment. Slow and ineffective government efforts have failed to forestall climate change's acute environmental disruptions (now and in the future). While mitigation efforts and technology research must continue at full speed, the adverse effects of climate change are upon us. It's inevitable – we must adapt to this new, more hostile world or go the way of the dinosaurs. Adaptation includes changing processes, practices, and structures to curb possible damages - or - to take advantage of opportunities accompanying climate change. The implementation of adaptation actions needs to be regularly monitored, evaluated and revised, both in terms of the validity of the underlying scientific assumptions and the appropriateness of projects, policies and programs, including their effectiveness, efficiency and overall utility. As advocated by the U.N., successful adaptation strategies not only depend on governments but also on the active and sustained engagement of stakeholders including governmental organizations in all sectors, the public and private sectors, civil society and other relevant stakeholders. This paper analyzes the efficacy of the United States using tax incentives or other fiscal measures to increase research, planning and implementation of adaptation measures. The paper begins with an explanation of climate change adaption, including changing infrastructures, moving populations, and dealing with the repercussions of adaptation. Next, the paper considers existing adaptation plans developed by several different sources and at different stages of implementation. The paper then looks to fiscal instruments and whether or not tax incentives, for example, will make a difference in the efforts to adapt to the changing world. This section considers measures implemented by other countries and their success. The paper then discusses any efforts in the United States to deal with adaption. Finally, the paper analyzes the existing plans and structures to provide guidance and parameters in developing tax incentives in advancing adaptation efforts.

ID: 121

## Designing a VAT-Inspired Destination-Based Carbon Tax

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Among measures to limit the growth in the concentration of atmospheric greenhouse gases, a price on carbon emissions is generally regarded as one of the most effective. Despite this recognition, global progress on pricing carbon emissions has been limited, as several jurisdictions have failed to introduce effective carbon pricing, and those which have done so have typically included exceptions for trade-exposed industries. In marked contrast to this experience, most countries around the world have introduced value-added taxes (VATs), and have done so largely without the need for any international coordination. A key feature to the success of these taxes is that they are levied on a destination basis – imposed on imported goods and services and removed from exported goods and services – so that domestic producers are not competitively disadvantaged vis-à-vis producers in other jurisdictions. For these reasons, a destination-based VAT may provide a useful model for a feasible carbon tax. If a VAT-inspired carbon tax is to be a feasible approach to carbon pricing, however, it must address two significant and inter-related challenges. First, since a VAT-inspired carbon tax would be based not on the value of goods and services subject to market transactions, but on the carbon emissions that are embedded in these goods and services, it will be necessary to devise an administratively feasible method to measure these embedded carbon emissions. Second, to the extent that a VAT-inspired carbon tax is imposed on a destination basis, the tax may confront challenges under international trade law. This paper attempts to address these administrative and legal challenges, in order to advance the case for a VAT-inspired destination-based carbon tax.

ID: 122

## Taxes and Fees as Climate Policy Instruments

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The Danish climate policy think tank CONCITO will present the final results of a long-term project on the use of taxes and fees in Danish climate policy - a project supported by the VILLUM FOUNDATION. The project recognizes that to reach the two degree target, per capita emissions of greenhouse gasses must not exceed two tonnes $CO_2$ per capita in 2050. Emissions today are about 11 tonnes per Dane per year. The project assesses how close we can get to the two tonnes emissions per capita through taxes and fees. The project calculates a number of scenarios where the starting point is a uniform price on greenhouse gas emissions across sectors at 880 DKK/tonne of $CO_2$. The calculations show that a uniform $CO_2$ tax in the long run is a cost-effective mechanism for reducing emissions globally, or in a larger region such as the EU, if there is an ambitious agreement on reduction targets and the use of a price instrument as a means. This is primarily because a relatively high and uniform price for $CO_2$ leads to technological innovations within the transport and energy sectors that contribute significantly to the reduction of $CO_2$ emissions, without noticeable reductions in welfare. The project also concludes that a unilateral Danish implementation of a high, uniform $CO_2$ tax would be less cost-effective than an international $CO_2$ tax, primarily because Denmark is such a small market that it cannot drive technology development within e.g. transportation. In addition, a uniform Danish $CO_2$ price threatens large parts of Danish agriculture, which is heavily export-oriented. Finally, it is stated that passenger transport in Denmark is considerably heavier $CO_2$-taxed than other sectors and that a uniform Danish $CO_2$ price therefore would result in both cars and fuel to be considerably cheaper, which would lead to more cars and more transport than today. In a climate policy context this seems rather counterproductive and a shutdown of Danish agriculture is hardly a political acceptable consequence of tax harmonization. Henceforth, Part II of the report describes possible scenarios for climate friendly Danish taxation here and now in the three major sectors for greenhouse gas emissions: energy, transport and agriculture. These scenarios show that there is great potential for making better use of taxes and fees as a climate policy instrument in the energy and transport sectors, while the instrument has its limitations in the agricultural sector.

ID: 123

## Facing the Dilemma: Who Cares about Environmental Taxes?

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Environmental taxes have been applied in one form or another in many developed and developing countries. The increased frequency of extreme weather and a wider perception of ongoing deterioration of the environment and nature have prompted most persons to believe that the earth is becoming more fragile and human beings are facing much severer environmental problems than ever before. Environmental problems are caused by human beings and if we continue to apply business-as-usual behavior and ignore daunting challenges, we will lose opportunities to reverse the trend and improve the only home for our generation, as well as to save it for future generations. Despite widespread support for action in the abstract, when it comes to the particular question of how to better use market mechanisms – typically environmental taxes – to effectively change environmentally-damaging behavior, it is difficult to find support for the proposition that everyone should pay for the social costs inflicted by pollution and other environmental problems. Politicians shy away from proposing new environmental taxes and researchers and commentators are divided in opinions as to whether environmental taxes should be imposed, and if they are needed, how we can avoid or lessen any adverse impact on the economy. Companies, especially large companies, are reluctant to accept environmental taxes as these would increase their business costs. Ordinary people do not like paying more taxes, and if taxes are inevitable, they hope to see them shifted to others. The dilemma we thus face is who really cares about environmental taxes. The article considers the question and examines ways to deal with conundrum people generally agree there is a need to protect the environment but are unwilling to support action in practice for the environment in the form of increased taxation.

ID: 124

## Competitiveness and Innovation Towards Green Growth in Developing Countries: A Case Study of Brazil

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The challenges of sustainable development are immense and it can be asserted that they are even greater in developing countries, which are playing an increasingly prominent role in the global climate change scenario. According to a prominent Latin-American economist (Raul Prebisch) with regards to sustainable development "we are not in the face of new problems, but of old problems that have become more severe". This paper contributes to advancing the understanding of the relation between long term economic development and environmental protection in developing countries. The paper aims to assess the role of green innovation as a potential lever for long term competitiveness in Brazil as a case study, by econometrically assessing the influence of green innovation on labour productivity, a critical element of competitiveness. The Verdoorn Law as interpreted in the Kaldorian tradition is tested, according to which industrial productivity depends on output growth due to increasing returns to scale arising from both static and dynamic scale economies. This paper is original in that it tests this hypothesis in the context of green innovation and also of a developing country. Building on a growing literature on innovation and green growth, this work tests innovation as a systemic process. The influence of taxes on green innovation is also addressed. Even though Brazil does not present specific environmental taxation, it is assessed whether the existing taxes contribute or discourage green innovation. Three datasets were treated and combined in the model: Innovation Survey (PINTEC), National Accounting System (Sistema de Contas Nacionais) and Input Output Matrix. The analysis is carried out at the sectoral level (24 sectors) for the year 2008. Preliminary results provide evidence of a statistically positive, significant relation between green innovation and labour productivity. This result corroborates with the hypothesis that green innovation can be a driver of long term economic development. Preliminary results also show a positive influence of external demand (exports) on productivity, which can be interpreted as a demand-led driver of productivity gains. Preliminary results also suggest that existing taxes in Brazil do not seem to be responsive to green innovation efforts, which may be interpreted as a potential room for the country`s tax system to help greening its economy.

ID: 125

## An Overview of the Environmental Taxation in France

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According to the roadmap after 2012 environmental conference, the Government wanted to establish a permanent mechanism for consultation and evaluation of environmental taxation. This device took the form of a committee for Green Taxation that was installed December 18, 2012, under the presidency of Christian de Perthuis. This committee is responsible for formulating an opinion on environmental fiscal measures proposed by the Government and to make proposals on the subject. It gathers experts, politics and the different stakeholders (trade unions, NGOs, consumer associations, employer's federation…) to negotiate consensual proposal on green taxation for the government. Since its implementation, the Green Tax Committee voted and formulated several proposals especially on carbon taxation (adopted in December 2013), the tax differential between diesel and gasoline, tax on refrigerants fluid and tax against the artificial soil. This paper aims to present the work of this Committee during the past two year and the perspective upcoming. Section one gives an overview of the environmental taxation in France and compares it with other European countries. Section two present the recently adopted carbon tax through its rate, its evolution over time, its base and the use of the revenue generated and ask about the difficulties to implement that kind of instrument. Section three dealt with the other major fiscal measures that have been discussed by the committee and the upcoming challenges for green taxation in France.

ID: 126

## Enhancing the Implementation of Environmental Fiscal Reform at EU and National Level through the European Semester

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The current European Union context is unique, given both the high degree of cross-border interdependencies shaped by the EU policy framework, i.e. in terms of economic and climate policies and the depth of the economic and fiscal crisis. While recent economic analysis suggests that the economic situation in most EU Member States is improving, the consequences of the crisis will remain a huge challenge and budgetary consolidation one of the main concerns for national governments. Environmental Fiscal Reform (EFR) could play a major role in raising governmental revenues and to set clear signals for investments into a low-carbon economy. The paper will discuss how the European Semester as one of the central policy tools of the European Union could guide the block of currently 28 Member States towards more efficient and sustainable financial policies by implementing more EFR elements. After the elections in May 2014, the political dividing lines may further change from a left/right debate to a debate between pro and anti-Europeans. Given the fact that tax policy falls under the unanimity rule, the possibilities for implementing Environmental Fiscal Reform at EU level seem to be limited at first sight. However, the European Semester has essentially changed the way in which fiscal and economic policy is formulated in the EU. EU competences are expanding into new areas, pushing the nexus of budgetary consolidation and climate/energy policy-making further upstream, which gives EFR a strong potential role. Thus, the European Semester could be a crucial tool to guide long-term structural changes as long as it properly addresses the sustainability dimension of Europe 2020 by mainstreaming all its climate objectives in these economic processes. Entry points for the promotion of Environmental Fiscal Reform therefore derive from the challenges related to tackling the crisis since 2007/8 on the one hand and from the EU climate and energy policy agenda on the other. By promoting the ambitious implementation of Environmental Fiscal Reform the next European Commission and the renewed European Parliament could make a significant contribution during the next legislative period. The first part of the paper will present the European Semester in order to analyse challenges and opportunities for ERF implementation in the second part. Finally, we will look at possible routes to enhance the implementation of EFR, both at national and EU level.

ID: 127

## Environmental Fiscal Reform in Germany – Making Progress in Times of Complacency

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As in most European countries, progress on Environmental Fiscal Reform (EFR) in Germany has stagnated during the last decade. A tax reform implemented in 1999 by a center-left government resulted in the contribution of environmental taxes to overall tax revenue increasing from 5.1% (1998) to 6,5% (2003). Since then, there has been no progress with the exception of minor reforms implemented in 2010 as part of the austerity package. As a result of this stagnation and rising revenue from other taxes, the relevance of environmental taxes has declined. In 2013 their contribution to overall revenue was 5.1% again. As is common with EFR, most initiatives for expanding environmental taxes in the past years were successfully blocked by vested interests with a reference to effects on industry competitiveness and on low-income households. In addition to this, the political environment for EFR in Germany is different from many other EU countries as the level of tax revenue has been increasing and pressures for austerity are low. This paper sets out to improve the understanding of the politics behind this stagnation and to identify potential ways forward. A first section will present an overview of the status quo of environmental taxation in Germany both qualitatively and quantitatively. It will also summarize the most important reforms of the past 15 and reform initiatives of the past five years. A second section will look at the political economy of a number of concrete reform initiatives of the past year (i.a. the increase of tax rates on diesel, the reduction of energy tax reductions for industry, tax exemptions in the aviation sector and the introduction of a nuclear fuels tax). This section will summarize the political process of each of these initiatives and analyze the political economy, most importantly in terms of their (potential) effects on companies and/or low-income households. A third section will describe the current situation in Germany regarding a number of political and economic framework conditions generally known to be related to the success of EFR (i.a. the state of the environment and the public perception of it, energy prices and the public perception on them, the state of public budgets and revenues, employment and the cost of labour, external trade balances, etc.) and discuss their impact on the prospects for EFR. A fourth section will briefly look into the programme, actors and actions of the current government in relation to EFR so far. A final section will summarize and draw conclusions with an aim on identifying potentials ways forward and strategies to promote EFR in Germany in the current political and economic situation.

ID: 128

## The EU Emissions Trading 'Revolution' in 2008: A Failed Policy Innovation?

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In 2013 it became very clear that EU climate policy was at a crossroads, particularly its "cornerstone" emissions trading system (ETS). The system had experienced several years with a surplus of allowances and low carbon price. So when the European Parliament rejected even a temporary tightening of the ETS in April 2013 the alarm bells rang loudly. Established in 2003, the ETS started up in 2005 but was not functioning very well, so significantly altered, 'revolutionary' rules for the 2013–2020 phase were adopted in 2008, introducing a much more centralized and market-streamlined system. The system is now the largest carbon trading market in the world, with a turnover of some 90 billion euros in 2010. The current problems with the ETS have arguably their roots very much back in policy design decisions taken back in 2007 and 2008, with the revision of the ETS for the 2013-20 phase and the very set-up of the climate and energy package. Linking up to the discussion about the different faces and roots of 'policy innovation', this paper addresses three main clusters of questions: first and foremost, with regard to the *invention* dimension of policy innovation, what were the more specific design components of the ETS cap-setting approach adopted in 2008? To what extent and how did they constitute a marked break with the past? What were the main determinants - was it a model shaped primarily by EU-internal factors? Or did EU-external factors such as learning from others play a central role? Second, as regards policy innovation *diffusion*, have the model's problems changed the ETS' image in the international society from a frontrunning, positive position into a sort of 'bogey man', with little or no diffusion to others? Third, with regard to *evaluation*, which conclusions have EU policy-makers themselves drawn about the merit of the 2008 approach? And which conclusions should we as researchers draw about the model – is it a 'failed innovation', or is the model in itself not to blame at all, only unfortunate circumstances? This is a question also with considerable policy implications, as emissions trading is spreading around the globe and getting the designs right is of high importance for this instrument's contribution to a low-carbon development.

ID: 129

## Environmental Taxes – The European Way

Chas Roy-Chowdhury,
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The global downturn has been devastating especially in the developed world. The European Union is an economic superpower. Yet even though it is such a power block it is the one major location which is taking its responsibilities seriously and actually taking positive action to reduce its carbon emissions. In my presentation I would like to talk about the progress so far in a time of deep economic down turn, the plans for the future and the EU emissions trading scheme. I would also like to mention the Australian emissions trading scheme, although I recognise this will be disbanded, and draw upon some of the difficulties being faced by the EU in relation to its scheme, for instance carbon pricing, impact upon airlines due to the extra-territorial nature of the scheme. Is environmental taxation in the EU likely to be up against finite constraints due to global competitive pressures where other jurisdictions do not tax emissions? Is the EU also in danger of creating a perfect storm of carbon leakage hence not help itself and not help the global economy to reduce emissions? Is tax really the way forward to reduce emissions?

ID: 130

## China's Carbon Tax Legislation

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Today, some developed countries have established the carbon tax system through legislation, in order to effectively reduce carbon dioxide emissions, and thus contain the crisis of human society survival and climate change. In this context, China as a developing country, the carbon tax legislation is a key issue affecting all walks of life. Due to climate change being a global problem, no single country can deal or solve it on its own. China as a responsible big power, should make a larger contribution to climate change mitigation, therefore, carbon tax legislation is imperative. In Finland, the Netherlands, Denmark, Sweden, and Norway the experience of these developed countries were the following. First, the introduction of a carbon tax, with carbon content as the tax basis. Second, follow the principle of tax neutrality and objectivity. Third, perfect the tax policy as it relates to climate change. China currently has not introduced a carbon tax. On December 2, 2013 it was reported to the State Council of the Environment, that a carbon tax was intended to be incorporated into the environment tax. Carbon reduction technology is not mature at the present time. China government has not determined the carbon dioxide standards to reduce the emissions of pollutants and implement total premise, thus they delay. Therefore, developed countries that have a program can provide some technical support to the recent new government head of China, to promote a carbon tax system as soon as possible.

ID: 131

## Use of the Delphi Method in Developing Climate Change Law and Policy

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This paper examines the Delphi method as a tool for legal research that can be used to facilitate transparent and informative law-making in the various fields of policy. It points to strengths and limitations of the technique based on the findings of the Delphi study conducted to assist climate change policies assessment in Australia. Whether the Delphi method is utilised in empirical or theoretical legal research or in legal and policy decision-making, this article demonstrates the strength of the technique in providing transparent and justified results, which in turn reinforces the utility of the method as a legal research and/or decision-making tool. Various methods have been applied to climate change policy analysis, with disparate and often contradictory results. Attempts to compare costs of abatement against the expected environmental benefits are frequently undermined by fundamental uncertainties or questionable assumptions. Expected environmental benefits are unquantifiable because of inadequate understanding of both the climate system and likely societal responses to climate change. The central challenge is to reflect these factors, and climate impacts. An evaluation method which is able to incorporate environmental, economic and equity factors is required to assess climate change policy. This paper considers the principles or criteria utilized in the development of Australia's climate change policy and compares them to the criteria identified and prioritised in a Delphi study used in comparing a carbon tax regime to an emissions trading scheme. We then consider what this comparison reveals about policy and law-making and the impact a technique like the Delphi method can make on the process.

ID: 132

## Carbon Energy Tax in Mexico: A Perspective From the South

Juan Manuel Ortega Maldonado & Humberto Serrano Guevara,
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A major tax and constitutional reform took place in Mexico in 2014; these include, amongst other things, the approval of the first tax on the sale or import of fossil fuels. Beyond the amount - which is really insignificant comparing with the total revenues of the federal government - or its tax structure - that is similar to those in other countries - it worth to remark the context in which this reform has development and we want to note: 1) Mexico has a monopoly of the oil industry through public body called PEMEX , which aims to change from a constitutional reform also this year ; 2) In addition, it is a tax that is set in a country that is the second Latin American economy, no other Latin American country has established a similar tax , 3) the introduction of a carbon tax in Mexico reaffirms commitment to achieve their goals emission reduction by 2020 and 4) confirm the commitment of Mexico in the Cancun Agreements 2010 and General Climate Change Act passed by the Mexican congress. This new tax is inserted into the few experiences tax fossil fuels in developing countries (Brazil, Colombia and China are considering the establishment of a similar tax but yet to materialize). Mexico is estimated that each person emits 3.8 tons of $CO^2$ per year. This tax would help reduce consumption and at the same time be a major gain for public finances. Moreover, it seems that climate change is leaving the lists of concerns of developed countries like the United States, and is becoming a hot topic in developing countries such as Mexico. So, México needs to say something about it.

ID: 133

## Subsidies for Electricity from Renewables: How They May Need to Change Not to Make Renewables Die of Their Success

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In the last years, Europe has experienced an increasing gap between the cost of electricity and its price to final consumer. At the same time, the amount of electricity produced with renewable sources of energy has been growing in Europe, also indeed thanks to the support from subsidies and the consequent effect in terms of economy of scale on the market. The aim of this paper is, by looking at these two trends, to see if subsidies for renewable as they are, are still useful or if they risk to work against, as at a first look at the electricity bill the main reason for the price and cost gap seems to be the subsidies. The rise of renewable is indeed great news, but if the electricity system in Europe stays like it is, it will not be able to absorb further electricity from renewables without the risk of instability in electricity supply. As of today, electricity from renewable has priority in the grid system – because of its volatility (sun and wind come and go) and because there is no usable technology to store electricity produced from renewable (apart from some hydroelectric trick). Electricity from traditional providers – coal, nuclear – must then be available as a back up to keep the electricity supply stable and continuous. The rise of amount of electricity from renewable is in some countries causing the shutting down of traditional providers, especially those for which economically and technology-wise speaking it is not possible to accommodate the amount of production. Brand-new providers have not opened in Germany recently, in Italy protestations are rising, and Poland is using this as an excuse to exploit its coal intensively. Traditional providers- and we go back to the opening of this abstract – accuse the recent policy of great subsiding renewable for this situation. They are claiming for subsidies as well, for their role of back-ups of renewable, saying that renewables cannot alone satisfy the market request. It could be a short term option, while investing in – and subsiding? – the development of convenient ways to store electricity, the update of the grid market and better country connections to valorise own resources. And thus release some subsidies from renewable technologies that may already be mature enough to stay on the market alone.

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